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Cruz Jentoft AJ, Sayer AA. Sarcopenia. Lancet 2019;393 (10191): 2636-46. (PMID: 31171417)

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Piers R, Albers G, Gilissen J, et al. Advance care planning in dementia: recommendations for healthcare professionals. BMC Palliative Care 2018;17(88):1-17.(DOI:10.1186/s12904-018-0332-2).

3-Articles in Turkish:

Ozturk S. Clinical and Nuropathological Classification of Dementia. Turkish Journal of Geriatrics 2010; 13 (Supl 3):15-19. (in Turkish)

Give PMID or DOI numbers if possible.

4-More than 6 authors will be mentioned with the three authors' names:

Groessl EJ, Kaplan RM, Rejeski WJ et al. Physical Activity and Performance Impact Long-term Quality of Life in Older Adults at Risk for Major Mobility Disability. Am J Prev Med 2019; 56 (1): 141-146. (PMID: 30573142).

5-Books:

BG Katzung. Special Aspects of Geriatric Pharmacology, In:Bertram G. Katzung,Susan B. Masters, Anthony J. Trevor (Eds). Basic and Clinical Pharmacology. 10th edition, Lange, Mc Graw Hill, USA 2007, pp 983-90.

6-Articles or documents from electronic publications:

World Health Organization. Global Health and Aging [e-book] NIH Publication; 2011. [Internet]. Available from: http://www.who.int/ageing/publications/global_health.pdf. Accessed: 09.09.2019.

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FROM THE EDITOR IN CHIEF

The burden of COVID-19 on societies and economies and the measures are being implemented across almost all parts of the world. The pandemic spreads among persons of all ages and conditions. Although the majority of those who are infected with COVID-19 have a self-limiting infection and do recover, older adults are at a significantly increased risk of severe disease following this infection.

COVID-19 is typically signaled by three basic symptoms: a fever, an insistent cough and shortness of breath. But the seniors may not have these characteristics. Some symptoms described are; sleeping more than usual, stopp eating or speaking, seeming confused, losing orientation, becoming dizzy or falling. Also immune response may be blunted and their ability to regulate temperature may be altered. It is well documented that, mortalities are occurring in individuals with underlying chronic conditions, especially those with cardiovascular diseases, hypertension and diabetes. Underlying chronic illnesses can mask or interfere with signs of infection in the elder people. They may get weak and dehydrated. If early signs of COVID-19 are missed, seniors may deteriorate before getting needed care.

This situation needs an action in solidarity to prevent the further community spread of the virus, protecting older people living alone in the community, as well as supporting all health and social care workers.

In these difficult times, the elder people should not neglect or underestimate their own health problems and cling to life. They should keep in mind that; they are very valuable to their loved ones. The motivation of the elderly in the home environment is important.

On the other hand, there were extraordinary seniors feeling the urge to give a helping hand and contribute towards the fight against Covid-19, such as sewing face-masks for front liners on a voluntary basis or helping to distribute them. There are many stories from different parts of the world, as examples of that this is a time to take action, contribute and be part of the game.

It seems crucial for the societies to ensure people from all ages stay connected.

For further reading:

1- Statement – Older people are at highest risk from COVID-19, but all must act to prevent community spread. [Internet] Available from: <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-older-people-are-at->

highest-risk-from-covid-19,-but-all-must-act-to-prevent-community-spread. Accessed: 1.5.2020.

2- Issue Brief: Older Persons and Covid-19. A Defining Moment for Informed, Inclusive and Targeted Response. [Internet] Available from: <https://www.un.org/development/desa/ageing/wp-content/uploads/sites/24/2020/04/POLICY-BRIEF-ON-COVID19-AND-OLDER-PERSONS.pdf> . Accessed: 1.5.2020.

3- Turkish Geriatrics Society. There is a letter for the older persons. [Internet] Available from: http://www.turkgeriatri.org/haber_detay?id=104. Accessed: 1.5.2020.

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5- Graham J. Seniors With COVID-19 Show Unusual Symptoms, Doctors Say. [Internet] Available from: https://www.medscape.com/viewarticle/929407?nlid=135285_5403&src=wnl_dne_200428_mscpedit&uac=156903HX&impID=2362421&faf=1#vp_2. Accessed: 1.5.2020.

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EDITORIAL

BRIEF NOTES ON TOBACCO USE IN AGED POPULATION

Tobacco use is a lethal addiction which is very prevalent in almost all ages. However, prevalence rates decrease in aged population. People usually start tobacco in younger ages and due to a couple of reasons, prevalence decreases in aged population. One major reason may be the fact that tobacco users die before they reach to older ages. Another fact may be the higher quit rates due to any disease/health problem when one ages. Non-communicable diseases are prevalent in older age and tobacco consumption is closely connected with majority of these prevalent conditions. Lung cancer, COPD (chronic obstructive pulmonary disease), heart disease, stroke, diabetes, vision loss due to cataracts and age-related macular degeneration, and almost over ten types of cancer, including colon, cervix, liver, stomach and pancreatic cancer, are examples. Deepa et al. stated that, in older adults, both current and past cigarette smoking increased the risk of heart failure (1). And in current smokers, this risk was high irrespective of pack-years of exposure, whereas in past smokers there was a dose-effect association (2).

Healthy aging is a goal for almost all societies since 2000s defined very clearly in the Madrid International Plan in 2002. In this regard, mental and social wellbeing should be focuses as well as the physical component of health as defined by the World Health Organization. Mental and social wellbeing needs a healthy cognitive system in older ages and risky behaviors including smoking which is among preventable threats. Moreover, cognitive system is progressively affected contributing to a decline in cognitive function as early as middle-age. The impact increases with age and amount smoked, although quitting can reduce the risk and harm caused. Hazards are in a wide range. For example, musculoskeletal system is also progressively effected and the damage has been observed to start as early as the late teens and increases with age but both the risk and harm can be partially reversed by quitting. Smoking has a negative impact on bone mineral density, associated with more bone fractures and slower healing, also smokers and ex-smokers experience more pain in the back, neck and legs causing disability in performing activities of daily living and maintain quality of life (3,4).

Heavy smoking was also found to be associated with higher prevalence and severity of periodontitis (5). Alveolar bone loss and implant failure, increased joint disease, poor functional outcomes, and poor therapeutic response was detected by the researches and the writers also found evidence of adverse effects on muscles, tendons, cartilage, and ligaments regarding the locomotor system (6).

Frailty is an emerging gerontological concept describing a multidimensional syndrome characterized by loss of physiologic reserves, which leads to increased vulnerability to age-related diseases and functional impairment. It has been shown that; frail people are at higher risk of age-related diseases and higher late-life mortality. A systematically research was planned to investigate the association of tobacco smoking with frailty in a population-based cohort of older adults and the authors stated they observed that current smoking, cumulative smoking exposure (pack-years), and time after smoking cessation (years) were significantly associated with the frailty index, which is accumulation of deficits as a proxy measure of aging. This study suggested that epigenetic alterations could play a role in smoking-associated development of frailty (7).

Passive smoking also causes mortality and morbidity starting from the very young ages. In some cases, burden may affect elders worse. For example, disaster situations may have the potential to start tobacco in other age groups (8). Or widowhood may be another risk factor as highlighted by Perkins et al in 2018 (9).

There is only one and exact solution to prevent all these risks and unwanted outcomes which is very simple in theory: "tobacco free life". Unfortunately, addiction is not easily avoided and comprehensive tobacco control policies structured for all ages is crucial. Tobacco control refers "not to start to smoke", "prevention from the risks of passive smoking" and "quitting". Aged population generally need quitting services rather than the

other two components. Nevertheless, there are factors which may complicate the course mentally and practically although it is a fortunate to know that quitting at any age can provide health and well-being for older people. When a 60 years of age person quits, about three years of life expectancy will be gained. If a patient with a life-threatening disease decides to quit, complications are expected to decrease. For instance, having another heart attack risk is expected to decrease by 50% among people who quit smoking after a heart attack (10). Also, continuing smoking after cancer diagnosis has been shown to reduce treatment efficacy and thus survival with deterioration in quality of life. Therefore it is crucial to recommend quitting to a cancer patient if s(he) smokes (11).

To achieve success in quitting at older ages, we should change a number of myths on the issue at older ages as such myths have the potential to make aged people refrain from quitting tobacco (12). Incorrect information and opinions are needed to be changed systematically by spreading the evidence based content written below (13):

- a. Tobacco has no benefit
- b. Tobacco smoke does not improve mood
- c. Cessation produces significant benefits
- d. Reducing the number of cigarettes does not work

When smoking is prevented, both increase in life expectancy at birth and improvement of quality of life are expected. Lei MK et al. conducted regression analyses of methylation data from 22 subjects, as they entered and exited inpatient substance use treatment, to determine change in biological age, as indicated by the deviation of their methylomic age from chronological age across two time points (14). And the results showed that; successful smoking cessation makes patients appear biologically younger than they were at baseline, and to do so quite rapidly. In today's youth driven society, the



researchers observations may serve as a powerful impetus for some to quit smoking and clinicians counseling patients should consider whether the addition of this information may be useful in persuading patients to quit smoking.

It is clear that, precautions at the earliest ages will provide maximum benefit. In this regard, lifelong smoke-free approach may be a good way to choose at the highest level. There is another important aspect of tobacco-free life in older ages. Most of the aged people are grandparents, they have probably grandchildren which gives them another responsibility to be good role models for their younger generations. Role model identity of older

ages are defined in the literature. Non-smoker role models are chosen by the younger generations (15).

One more fact should be highlighted before concluding. Smoking itself facilitates aging. Shorter telomeres among smokers are found when compared to the non-smokers. This finding highlights the link tobacco smoke exposure and ageing-related disease (16).

Global struggle with tobacco usage frequently focuses on younger ages which can be understandable to basically beat back the tobacco companies' manipulations. However, aged people should not be forgotten in this struggle as we have many promising data on tobacco-free lives.

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RESEARCH

VALIDATION OF THE TURKISH VERSION OF THE WHOQOL-AGE AND A PROPOSED ALTERNATIVE SCALE STRUCTURE

ABSTRACT

Purpose: The WHOQOL-AGE is a combination of the EUROHIS-QOL.8 and the short version of the WHOQOL-OLD. The aim of the present study is to explore the psychometric properties of the Turkish version of the WHOQOL-AGE in terms of its validity and reliability.

Methods: Internal consistency, item-total correlations, and item success were analyzed taking the original structure into account. The validity tests consisted of construct validity and criterion validity analyses. The original scale structure was compared with a proposed new scale structure, comprised of two domains and based on the exploratory and confirmatory factor analysis, in terms of goodness-of-fit measures.

Results: The mean age of the sample population (n = 550) was 73.09 ± 6.77 , and 58.9% were female. Skewness and kurtosis were both within accepted limits (<1.0) and the floor and ceiling percentages also showed good measuring capacity ($<10\%$). The Cronbach alpha value was 0.90 for domain 1 and 0.86 for domain 2. The goodness-of-fit analysis results for the original scale structure and the new scale structure, respectively, were comparative fit index = 0.89 and 0.83, Tucker Levis index = 0.87 and 0.81, and root mean square error of approximation (RMSEA) = 0.12 and 0.073.

Conclusion: The WHOQOL-AGE.TR is moderately compatible with the original scale structure. The EFA revealed a new scale structure: the domain 1 ('satisfaction with physical and mental health and well-being' domain) includes items 1–5, 9 and 10, and the domain 2 ('satisfaction with economic and social well-being' domain) includes items 6–8 and 11–13.

Keywords: Quality of life; Aged; Psychometrics.

INTRODUCTION

Quality of life (QoL) for the elderly is of increasing importance as the frequency of chronic conditions grows worldwide, so health professionals need to implement QoL into their clinic practice for older adults. Therefore, there is a need for age-specific generic QoL scales evaluating quality of life for the older adults (≥ 65 years of age). The World Health Organization Quality of Life Assessment (WHOQOL) is a tool for the evaluation of QoL in adults, and it has been developed into long (the WHOQOL-100), intermediate (the 26-item WHOQOL-BREF) (1), and short (the 8-item EUROHIS-QOL 8) (2) versions. The WHOQOL group, including the Turkish field center, also developed a supplementary module of the WHOQOL for older adults called WHOQOL-OLD (3), which has widely been used for geriatric and public health research. All of these instruments have been adapted for the Turkish population (4,5). QoL experts recommend using the generic and population/condition-specific QoL instruments to assess QoL in all population groups. The only validated generic QoL instrument for the elderly in Turkey is the 24-item WHOQOL-OLD. As a result, when using a combination of these QoL tools for elderly patients, a long battery of items has to be applied, which is time-consuming for the professionals and difficult for the older patients to concentrate on. Fang et al. (6) developed three short versions of the WHOQOL-OLD, each consisting of six different WHOQOL-OLD items. The psychometric properties of the Turkish versions of these three short WHOQOL-OLD tools has been presented elsewhere with questionable psychometric results that might be attributed to the item on death and dying (7). Consistent with the Turkish psychometric results, in order to have a brief QoL tool for aging populations, the developers of WHOQOL-AGE dropped the death and dying item and combined the first short version of the WHOQOL-OLD with the EUROHIS-QOL 8 to create a new 13-item QoL instrument for the elderly, WHOQOL-AGE, in a

project titled Collaborative Research on Ageing in Europe (COURAGE in Europe) (8). Despite recommendations that both a generic and an age-specific instrument be used for outcomes research, the 24-item WHOQOL-OLD has been frequently used in Turkish studies without combining it with any generic version (WHOQOL-100 or WHOQOL-BREF), mainly to avoid using long instruments in geriatric research. The aim of the present study is to explore the psychometric properties of the Turkish version of the WHOQOL-AGE in terms of its validity and reliability.

MATERIALS AND METHODS

1. Study sample

The study sample consisted of 550 older adults recruited from two districts of Manisa Province to include both an urban and a rural population. The sample size was calculated with 95% confidence, 50% unknown event percentage, and 5% precision. The urban and rural samples were randomly selected from among the urban districts ($n=1867$) and rural districts ($n=1463$) of the province by using a multistage sampling method using the records of the district family health centers.

2. Measures

The suggested items of the WHOQOL-AGE were taken from the already translated and validated Turkish versions of the EUROHIS-QOL 8 and the short version of the WHOQOL-OLD. The WHOQOL-OLD short (4) was combined with the EUROHIS-QOL 8 (7). With the item related to death and dying in the short WHOQOL-OLD excluded and a 13-item WHOQOL-AGE-TR was created, as suggested during the development of the original WHOQOL-AGE. So the WHOQOL-AGE 13 item scale structure is composed of EUROHIS-QOL (the first 8 items) and WHOQOL-OLD short items.

All participants completed the Katz Index of Independence in Activities of Daily Living (Katz ADL index) to assess their level of physical independence. The Katz ADL index measures



independence in the six activities of bathing, dressing, toileting, transferring, continence, and feeding. For all six activities together, the possible score range for the Katz ADL index is 0–6 (9). Additionally, all participants answered questions about the presence of any chronic conditions or disabilities and their socio-demographics.

3. Psychometric analyses

The reliability and validity analyses were completed following the descriptive and item distribution analyses.

Both exploratory and confirmatory approaches were employed during the reliability analyses and factor analyses. The exploratory approach was used to probe the possible change in structure of the WHOQOL-AGE, and the confirmatory approach was used to test the predefined and suggested item/domain structure of the original instrument.

3.1 Distributional properties

The distribution properties of each item and predefined domain of the WHOQOL-AGE were determined through skewness and kurtosis analyses, and the measurement capacity of each domain was evaluated through floor and ceiling effects. The limit values were accepted as 1.0 for skewness, 2.0 for kurtosis, and 15% for the floor and ceiling effects (10).

3.2 Reliability analyses

Internal consistency, item–total correlations, and item success (based on the item–domain correlation results) were analyzed with a confirmatory approach by considering the original structure of the WHOQOL-AGE.

Cronbach's alpha coefficients were calculated to assess the internal consistency of the overall scale and domains of the instrument. The expected minimum satisfactory value for alpha was around 0.7. Alpha values for the case of 'if item deleted' were also calculated in order to show the contribution of each item to the scale variances.

For any item that makes a positive contribution to its own domain, the alpha value is expected to be lower than the global alpha value when the – problematic- item is removed from the analysis.

Item–total correlations assume that an item should have a correlation coefficient at least 0.3 with the domain it belongs to. The term 'item success' refers to the percentage of items that have higher correlations with their domain. In other words, all items are expected to have significantly higher correlation coefficients with the domain they belonged to than with the other domain.

3.3 Validity analyses

The validity analyses consisted of construct validity and criterion validity analyses. Factor, known groups, and convergent validity analyses were employed to examine the construct validity of the scale.

3.3.1 Factor analyses

Both exploratory (EFA) and confirmatory factor analyses (CFA) were done to test the construct validity of the Turkish WHOQOL-AGE-TR. The EFA was run using principal components analyses with oblique (direct oblimin) rotation. Satisfactory fit of the Turkish version to the original WHOQOL-AGE scale structure was tested using several goodness-of-fit indices generated by CFA, such as the comparative fit index (CFI), root mean square error of approximation (RMSEA), and chi-square. The cut-off values of good fit for these indices are >0.90 for CFI, <0.08 for RMSEA, and <2.0 for the ratio of chi-square to degrees of freedom (χ^2/df) (11). The χ^2/df ratio was preferred since chi-square statistics are sensitive to sample size.

3.3.2 Known groups validity

The known groups validity of the WHOQOL-AGE-TR was tested using the hypotheses that advanced age, poor education, low social class, chronic illness, poor living conditions, inadequate social support, and verbal and/or physical abuse of the elderly can decrease WHOQOL-AGE scores.

3.3.3 Convergent/discriminant validity

The Katz ADL index scores were divided into three categories as 'totally dependent', 'partially dependent', and 'independent', and the mean domain scores of these categories were compared.

3.3.4 Criterion validity

Additionally, a criterion validity analysis was carried out by running a multiple linear regression using the general QoL item of the WHOQOL-AGE (item 1) as a reference dependent variable and the domains as independent variables.

A Students' t-test was run for the comparison of two independent continuous variables, and a one-way analysis of variance (ANOVA) was used for three or more independent continuous variables, where the parametric test requirements were satisfied and Cohen's effect size (ES) was used to distinguish the effects of different variables on the WHOQOL-AGE scores (12).

Parametric and non-parametric statistics were used to compare the means where appropriate. Post hoc comparisons were done using the Tukey's B. Spearman's correlation was used for the comparison of the two discrete numeric variables. The statistical packages used were SPSS version 23.0 and Lisrel 8.05. The acceptable type 1 error was considered as less than 0.05 in the analyses.

4. Ethical issues

The study was approved by the Ethics committee of Manisa Celal Bayar University (July 10, 2019/Ref 20.478.486).

RESULTS

The mean age of the sample population was 73.09 ± 6.77 ; 58.9% were female; 31.3% has no education; 22.4% had inadequate income, 29.1% were physically dependent to some extent, 34.0% was living alone; and 77.9% suffered from at least one chronic illness; 21.2% has ever been faced a kind of abuse; 17.2% reported poor relationships with friends or family members.

1. Item and reliability analyses

The item score distributions assessed by skewness and kurtosis were all in accepted limits and floor and ceiling percentages also indicated a good measuring capacity not exceeding 10%. Item-domain correlations were all above 0.30 and each of the items had a higher correlation coefficient with the domain it belonged to compared to its correlation with the other domain. One exception is the item 9, which showed high correlations with both domains of the WHOQOL-AGE. In the urban sample, items 9 and 10 correlated higher with domain 1 than domain 2, which they belong to according to the original scale structure. The mean inter-item correlation for the WHOQOL-AGE-TR items was 0.54 for item 9 and 0.40 for item 13, with pairwise correlations ranging from 0.30 to 0.73. The internal consistencies of both domains are satisfactory, with alpha values for domain 1 and domain 2 at 0.90 and 0.86, respectively (Table 1). None of the 13 items indicate any problem in the 'if item deleted/removed' analyses for either the urban or rural samples. This confirms that all of the items contribute to the variances of the domains they belong to.

The domain and overall scale scores were similar ($P>0.05$) between the urban and rural study samples. The scores for domain 1 were 66.07 ± 14.35 and 64.63 ± 13.13 for the urban and rural samples, respectively. The scores for domain 2 were 63.34 ± 13.40 and 61.51 ± 13.39 for the urban and rural samples, respectively. The overall scale scores were 64.70 ± 13.22 and 63.07 ± 12.72 for the urban and rural samples, respectively.

2. Construct validity analyses

The construct validity of the Turkish version of the WHOQOL-AGE was tested using known groups validity, convergent/divergent validity, and factor analyses. Both exploratory and confirmatory approaches were employed for convergent/divergent validity and factor analyses.

The known groups validity results for the



Table 1. Item distributions, item success, measurement capacity and the internal consistency of the original scale structure of the Turkish WHOQOL-AGE.

Item	Mean (SD)	Skewness	Kurtosis	Floor (%)	Ceiling (%)	Correlation with Dom.1**	Correlation with Dom.2**	If item deleted Cronbach's Alpha***
2	3.22(0.97)	-0.20	-0.42	4.0	8.0	0.74	0.57	0.89
3	3.03(0.92)	-0.20	-0.19	5.6	3.8	0.75	0.61	0.88
4	3.26(0.93)	-0.43	-0.12	4.2	5.6	0.81	0.63	0.88
5	3.19(0.99)	-0.35	-0.42	5.5	6.6	0.79	0.65	0.88
6	3.46(0.83)	-0.43	-0.01	1.3	7.1	0.70	0.59	0.89
7	3.47(0.89)	-0.38	-0.15	1.6	9.5	0.66	0.57	0.90
8	3.15(0.94)	-0.10	-0.40	3.5	6.4	0.73	0.60	0.89
(1)*	3.16(0.86)	-0.32	0.21	4.0	4.0	0.76	0.73	0.88
9	3.10(0.96)	-0.18	-0.26	5.6	5.8	0.71	0.70	0.82
10	3.00(0.90)	-0.05	-0.40	3.8	3.5	0.66	0.74	0.82
11	2.99(0.91)	-0.06	-0.38	4.5	3.6	0.67	0.77	0.82
12	3.10(0.90)	-0.07	-0.10	3.6	6.7	0.53	0.74	0.86
13	3.23(0.88)	-0.14	-0.33	2.0	5.6	0.53	0.73	0.86

* Item 1 loads on both of the 1st and the 2nd domains of the original scale structure;

** Spearman's Rho;

*** Cronbach's Alpha values for the Domain 1= 0.90 and Domain 2=0.86

WHOQOL-AGE-TR are presented in table 2 according to the original scale structure. The WHOQOL-AGE-TR domain scores and overall scores could be distinguished by all of the subgroups of the known groups variables.

The EFA, run independently using varimax and direct oblimin rotations, revealed a somewhat different domain structure compared to that of the original scale structure proposed by Brown et al. (13) (Table 3). The Kaiser–Meyer–Olkin value was 0.94 (>0.5) and Bartlett's test of sphericity was significant ($p<0.001$) for all of the factor analyses. The adjusted coefficient of determination (R^2) was 62.5.

In the varimax rotation, even if the unstable items 6,8,10, and 11 were left aside, items 7 and

9 were in unexpected domains in regard to the original structure. In contrast, the direct oblimin rotation stabilized the item loadings of the item 6 and item 8 which were unstable items in the varimax rotation, forming domain 1 consisting of items 1–5,9, and 10 and domain 2 consisting of items 6–8,12, and 13. Only item 11 was found to be unstable in the oblimin rotation. The items 7 and 9 were loaded in unexpected domains, consistently in both Varimax and Oblimin rotation solutions. Eventually, the EFA revealed a two-domain structure in the Turkish version with different item compositions than the original scale structure; domain 1 includes items 1–5,9, and 10, which relate to 'satisfaction with physical and mental health and well-being', and domain 2 includes items 6–8 and 11–13, which relate to 'satisfaction with economic

Table 2. Known groups validity analyses for the Turkish version of the WHOQOL-AGE***.

		Domain 1	Domain 2	Overall Score
Gender	Male	66.7±14.2	64.5±13.0	65.6±12.9
	Female	64.5±13.5	61.1±13.5	62.8±13.0
	p (ES*)	0.068 (0.16)	0.004 (0.24)	0.014 (0.22)
Marital st.	Married	68.1±12.5	64.9±12.1	66.5±11.7
	Single	61.7±14.7	59.2±14.3	60.4±13.9
	p (ES*)	<0.001(0.48)	<0.001(0.43)	<0.001(0.47)
Education	Illiterate(a)	60.9±14.2	58.1±13.5	59.5±13.2
	Primary(b)	64.4±13.7	60.9±12.8	62.6±12.6
	Secondary and over(c)	69.3±12.5	66.6±12.5	67.9±11.9
	p, Post hoc**, (ES*)	<0.001, a<b<c, (0.51)	<0.001, a<(b=c), (0.50)	<0.001, a<b<c, (0.52)
Chronic Illness	Present	63.5±13.8	61.0±12.9	62.3±12.8
	Absent	72.4±13.4	68.6±13.5	70.5±11.9
	p (ES*)	<0.001(0.64)	<0.001(0.56)	<0.001(0.63)
Physical dependency‡	Totally dependent	43.3±11.7	44.4±11.9	43.8±11.3
	Partially dependent	56.3±11.6	54.1±11.1	55.2±11.6
	Independent	69.8±11.9	66.4±11.1	68.1±11.3
	Post hoc**, (ES*)	<0.001, a<b<c, (1.94)	<0.001, a<b<c, (1.59)	<0.001, a<b<c, (1.87)
Abuse (physical-psychological)	Never	56.4±1.8	52.6±12.3	54.5±11.5
	At least once	66.8±12.6	63.9±12.6	65.4±12.1
	p (ES*)	<0.001(0.86)	<0.001(0.92)	<0.001(0.93)

*Cohen's Effect size (18); **Tukey B; ***Original Scale structure; ‡Assessed by Katz index

and social well-being'. Item 1, the overall QoL item of the WHOQOL-AGE-TR, which is almost equally loaded (unstable) in both domains in the varimax rotation, was decisively included (highly loaded) in domain 1 during the oblimin rotation (Table 3).

The comparison of the EFA results for the rural, urban, and overall data sets by direct oblimin rotation revealed that the rural and urban data sets showed invariance in items 6 and 11 (not shown

here due to restricted number tables). Similar invariances for items 12 and 13 were reported from three different country sets in the COURAGE study (14), and these invariances were mainly attributed to socioeconomic variables. In addition to the socioeconomic differences between the rural and urban samples, sociocultural diversity may also contribute to these inconsistencies. For example, item 6, which is related to satisfaction with



Table 3. Exploratory Factor Analysis results of the Turkish version of the WHOQOL-AGE by using two different rotation methods with Kaiser Normalization.

Items	Varimax rotation		Direct Oblimin rotation	
	Dom.1	Dom.2	Dom.1	Dom.2
Q1...overall quality of life	,645	,458	,605	,260
Q2...satisfied with... senses overall?	,736	,203	,811	-,083
Q3...satisfied with your health?	,837	,212	,929	-,115
Q4...satisfied with oneself?	,738	,356	,755	,098
Q5...satisfied to perform daily living activities?	,814	,305	,866	,005
Q6...satisfied with personal relationships ?	,424	,587	,290	,510
Q7...satisfied with ..living place (home)?	,170	,807	-,100	,882
Q8...satisfied with the way you use time	,437	,596	,302	,515
Q9...enough energy for everyday life?	,789	,307	,836	,018
Q10. control over the things he/she likes to do?	,649	,437	,617	,234
Q11. satisfied with opportunities to continue achieving in life	,523	,596	,406	,477
Q12. enough money to meet needs?	,167	,750	-,082	,816
Q13. satisfied with intimate relationships?	,332	,579	,182	,540
Adjusted R2	62.5%			

personal relationships and was originally included in domain 1 of the WHOQOL-AGE, was loaded in domain 2 ('satisfaction with economic and social well-being') for the rural sample and domain 1 ('satisfaction with physical and mental health and well-being') for the urban sample. Obviously, this item was comprehended in different ways by rural and urban older adults, but it loaded consistently in domain 2 in the overall dataset. Similarly, item 11, which relates to satisfaction with opportunities to continue achieving in life, was loaded in domain 1 for the rural sample, in domain 2 for the urban dataset, and shared with both domains in the overall dataset. Nevertheless, since its loading is

higher for domain 2 and it is conceptually closer to 'satisfaction with economic and social well-being', item 11 was assigned to domain 2 of the Turkish version.

According to the original scale structure, items 2–8 formed domain 1, items 9–13 formed domain 2, and item 1 was shared by both domains. Based on this original structure, the goodness-of-fit statistics of the WHOQOL-AGE-TR generated by CFA were CFI=0.89, Tucker Levis index (TLI) = 0.87, RMSEA=0.12, and χ^2/df =8.26. In comparison, the goodness-of-fit statistics of the newly proposed WHOQOL-AGE scale structure based on the EFA

were CFI=0.83, TLI=0.81, RMSEA=0.073, and $\chi^2/df=8.26$.

Convergent validity results are presented in Table 4. The Katz ADL index physical dependency categories were sensitive to the domain scores of both the original scale structure and the proposed alternative scale structure ($P<0.001$). On the other hand, the difference between the correlation coefficients of the Katz ADL index score and the two domain scores of the proposed alternative structure (0.58 vs. 0.41) was greater than with the original scale structure (0.51 vs 0.47), indicating there is better convergence between the domains of the alternative scale structure proposed in this paper.

The criterion validity of the WHOQOL-AGE-TR was tested by regressions of the general QoL item (item 1) against the individual items of WHOQOL-AGE (table 5). The R2 values for both domains are acceptable. Except items 6 and 10, all the other items have a meaningful relationship with reference item 1. All of the Variance Inflating Factor (VIF) values are in acceptable limits rejecting any co-linear relationships between items.

DISCUSSION

WHOQOL-AGE has just recently developed as a hybrid instrument of two QoL scales: EUROHIS-QOL 8 (15) and one of the three short versions of the WHOQOL-OLD (16,17). Both of the mother tools (i.e. WHOQOL-BREF and WHOQOL-OLD) consist of four and six domains, respectively. Although the invariance of the WHOQOL-AGE among three different populations was presented (18), there is a need to examine the scale structure of the WHOQOL-AGE for different cultures and populations. Thus, this research tested the goodness of fit of the Turkish WHOQOL-AGE-TR against the original structure using exploratory and confirmatory approaches. The main reason for using the exploratory approach is the different scale structures of the EUROHIS-QOL 8 between the Turkish validation study (4) and some other country-specific data (Romania, Slovakia, and Israel) in a global EUROHIS study (15). In the Turkish validation study and especially in the Romanian sample of the global EUROHIS study, the EUROHIS-QOL 8 revealed a two-domain structure. Additionally, the developers of the WHOQOL-AGE proposed two different item compositions for the scale. Caballero et al. (8) suggested that item 1 be a shared item between the two domains

Table 4. Convergent validity of both the original scale structure and alternative scale structure by using daily living activities assessed by KATZ index.

		Independent (n=390) (a)	Partially dependent (n=141) (b)	Totally dependent (n=19) (c)	P** (post hoc***)	KATZ index score (Spearman's Rho)
Developer's (Original) scale structure	Domain 1	69.77±	56.32±	43.32±	<0.001 a>b>c	0.51
	Domain 2	66.742±	54.13±	44.36±	<0.001 a>b>c	0.47
Our alternative scale structure*	Domain 1	68.03±	51.04±	36.28±	<0.001 a>b>c	0.58
	Domain 2	68.41±	58.16±	48.90±	<0.001 a>b>c	0.41

* Domain 1: Satisfaction with physical and mental health and well-being; Domain 2: Satisfaction with economical and social well-being ; **Kruskall Wallis ANOVA ***Mann Whitney U (pairwise comparisons, type 1 error was considered as <0.015)



Table 5. The regressions of the general Quality of Life item (q1)* against the remaining items, for each of the domains of the WHOQOL-AGE (Multiple linear regression analyses for the original scale structure).

Item / Domain	Standardized Beta	p**	VIF**
Items of the Domain 1 (model 1)			
Q2...satisfied with... senses overall?	,209	,000	1,777
Q3. ..satisfied with your health?	,130	,006	2,694
Q4. ..satisfied with oneself?	,176	,000	2,707
Q5. ..satisfied to perform daily living activities?	,131	,005	2,673
Q6. ..satisfied with personal relationships ?	,070	,064	1,710
Q7. ..satisfied with ..living place (home)?	,117	,001	1,550
Q8. ..satisfied with the way you use time	,132	,001	1,736
R2 =0.55; Constant	-	,025	-
Items of the Domain 2 (model 2)			
Q9. ..enough energy for everyday life?	,224	,000	2,042
Q10. control over the thing he/she likes to do?	,069	,176	2,593
Q11. satisfied with opportunities to continue achieving in life	,306	,000	2,439
Q12. enough money to meet needs?	,138	,000	1,476
Q13. satisfied with intimate relationships?	,101	,008	1,393
R2 =0.45; Constant	-	,000	-

*q1 (general quality of life item) as dependent variable; **VIF: Variance Inflating factor as an indicator of colinearity.

whereas Santos et al. (18) classified item 1 only in domain 1 of the WHOQL-AGE.

The distribution parameters did not indicate any problems for any of the items. Skewness and kurtosis are in acceptable limits for all items of the WHOQOL-AGE. The mean WHOQOL-AGE score of this study sample was around 64 whereas the results of a COURAGE study presented by Raggi et al. (19) gave overall higher mean WHOQOL-AGE scores (Finnish 78, Polish 70, and Spanish 74). These score differences can easily be attributable to the mean age of the study samples. The mean age of this study sample was 73 while that of the COURAGE study had a much younger mean age range of 45–57.

Reliability analyses of the original scale structure

were also found to be within acceptable limits and consistent with the original development papers (8,18). The Cronbach's alpha values for both domains were above 0.70, and the 'if item deleted' alpha values indicated that all items positively contributed to their domains. In terms of item success, all items except item 9 had significantly higher correlation coefficients with the domain they belonged to than with the other domains. Item success was about 92% (12/13), confirming the adequacy of the internal consistency.

The known groups validity analyses revealed satisfactory results for the original scale structure. As expected, the existence of any chronic illness, physical dependency, or physical/psychological abuse revealed quite high ES values. The

discriminating effects of level of education, health, physical/psychological well-being, social support, abuse, and dependency were all confirmed by the previous QoL literature on the elderly (14,20,21, 22).

The EFA was run by principal components analyses using an oblique (direct oblimin) rotation since the correlation coefficient between the two suggested domains of the WHOQOL-AGE was 0.82, which a number of statisticians have suggested is a high correlation. Due to the same rationale (i.e. correlated domains), the WHOQOL-AGE developers also used a geomin rotation, which is designed as an oblique rotation (23,24). Hence, direct oblimin rotation stabilized the item loadings of the varimax rotation, allowing for the proposal of an alternative scale structure. The two-domain solution of the WHOQOL-AGE-TR explained 62.5% of the variance, which is very close to the 65.0% of the development study (8).

Based on the EFA of the Turkish data, the CFA results are somewhat contradictory between the original scale structure and the proposed alternative scale structure, so the goodness-of-fit statistics that were generated for both the original and the proposed scale structures need to be reviewed. As conventionally suggested, three goodness-of-fit indices (CFI, TLI, RMSEA) and a badness-of-fit measure (chi-square) were used in this study. Beginning with chi-square, as the original research did (8), this study also could not reach an acceptable χ^2/df figure (<2.0) since this measure is sensitive to sample size. We found similar CFI and TLI figures, both less than 0.90, for the original scale structure (8,18,19,25) and the proposed alternative scale structure. However, the RMSEA values are quite different between these two scale structures. The RMSEA value was 0.12 for the original scale structure whereas it was 0.073 for the alternative scale structure. The CFI statistic assumes that all latent variables are uncorrelated, but the latent variables are correlated in this study. Therefore, the RMSEA is more reliable than the

CFI for this study, which means that the alternative scale structure may be better than the original scale structure from the COURAGE study.

The Katz ADL index was used to test the convergent validity of the WHOQOL-AGE based on the hypothesis that high physical dependency (as assessed by the KATZ ADL index) is expected to correlate with physical wellness items or domains. The results showed that the difference between the correlation coefficients of Katz ADL index and the domain 1 and domain 2 scores are greater for the alternative scale structure ($0.58 - 0.41 = 0.17$) than the original structure ($0.51 - 0.47 = 0.04$) (Table 6). The fact that domain 1 of the alternative structure is composed of more concrete health and well-being items may explain the higher correlation coefficient between the Katz ADL index score and domain 1 ('satisfaction with physical and mental health and well-being') score and the lower correlation coefficient between the Katz ADL index score and domain 2 ('satisfaction with economic and social well-being') score of the alternative scale structure. This indicates a good convergence and divergence of the alternative structure of the WHOQOL-AGE-TR.

CONCLUSION

The new alternative scale structure proposed in this paper is moderately compatible with the original scale structure of the WHOQOL-AGE proposed by the developers of the instrument. An alternative two-domain scale structure is suggested in this paper with a better RMSEA value than the original structure. The two domains of WHOQOL-AGE generated in this study are called 'satisfaction with physical and mental health and well-being' and 'satisfaction with economic and social well-being'. Further studies are needed to test the original and alternative scale structures of the WHOQOL-AGE in different populations and cultures.



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RESEARCH

POLYPHARMACY PREVALENCE AMONG GERIATRIC PATIENTS IN PRIMARY HEALTHCARE SETTINGS ACROSS TURKEY: A CROSS-SECTIONAL ANALYSIS THROUGH THE NATIONWIDE PRESCRIPTION INFORMATION SYSTEM

ABSTRACT

Introduction: Polypharmacy has become a common health problem as populations age. We aimed to determine the prevalence of chronic and cumulative polypharmacy in the geriatric population using primary healthcare services in Turkey.

Materials and Methods: The electronic prescriptions ordered by family physicians across Turkey for geriatric patients (≥ 65 years) in the Prescription Information System during 2018 were studied. Chronic polypharmacy criteria were proportion of patients who were given prescriptions containing ≥ 5 drugs four or more times during a year. Cumulative polypharmacy was defined as proportion of patients who were prescribed ≥ 5 drugs with different ATC4 codes in a month or in each quarter of the year.

Results: Turkey's total population is 82 million; 7,186,204 are aged 65 and over, constituting 8.8% of the total. Of this geriatric population, 6,104,798 (85.0%) had at least one prescription in 2018. Each geriatric patient had 6.4 prescriptions, with each prescription containing an average of 2.9 drugs with different fourth-level Anatomical Therapeutic Chemical codes. Each drug was prescribed in 2.7 boxes on average. Of these prescribed patients, 14.3% received prescriptions containing ≥ 5 drugs four or more times during 2018. The percentage of patients who received at least one prescription per month containing ≥ 5 drugs ranged between 16.4% and 20.7%. The most commonly prescribed drugs were acetylsalicylic acid, diclofenac, paracetamol, and pantoprazole.

Conclusion: Polypharmacy is a critical health problem among geriatric population in Turkey as in other industrialized countries. Educating physicians as well as the public is essential to overcome polypharmacy.

Keywords: Geriatrics; Polypharmacy; Epidemiology; Prescriptions.

INTRODUCTION

As multimorbidity is becoming a major issue with increasing ageing populations, multidrug use (i.e., polypharmacy) is a common health problem in the geriatric population, leading to increased drug side effects, drug–drug interactions, decreased patient adherence to treatment, and increased morbidity (1,2). Although there is no consensus on the definition of polypharmacy, it is commonly referred to as the concurrent use of multiple, unnecessary, or ineffective drugs by a patient (3). Various indicators of polypharmacy have been used in the literature (4). The number of concomitant medications taken in a day, the average number of medications prescribed in a year, and the 20-day average of the number of medications prescribed at two-week intervals have been suggested as indicators of simultaneous multidrug use (5). The proportion of patients prescribed with five or more drugs in each quarter of the year has been considered a marker of cumulative multidrug use, and the proportion of patients taking five or more drugs that are prescribed at least three or four times a year has been defined as chronic multidrug use (6,7). The simultaneous use of five or more drugs has been reported to increase side effects and drug–drug interactions and thus is considered the most common indicator of polypharmacy (8). Based on these definitions, the prevalence of polypharmacy ranges between 45% and 82% in the geriatric populations (9,10).

Similar to other developing countries, the proportion of elderly people is increasing in the Turkish population. Individuals over 65 years constitute 8.8% of the population of 82 million of Turkey in 2018 (11). However, the prevalence of polypharmacy in the elderly has not been comprehensively studied at the population level.

The primary aim of this study was to determine the prevalence of chronic and cumulative polypharmacy in patients aged 65 and over who use primary healthcare services across Turkey.

MATERIALS AND METHODS

Study design and population

This was a retrospective study in which electronic prescription data were analyzed. Prescriptions from family physicians across Turkey for patients aged 65 and over and entered into the Prescription Information System (PIS) during 2018 were studied. The PIS is a nationwide database where family physicians enter their prescription data. The PIS was developed and is still operated by the Turkish Medicines and Medical Devices Agency (TMMDA) to monitor and encourage rational drug prescription across the country (12).

The study sample was composed of all electronic prescription data entered in the PIS between January 1, 2018 and December 31, 2018 by family physicians for patients aged 65 and over. The Anatomical Therapeutic Chemical (ATC) classification system of the World Health Organization Collaborating Center for Drug Statistics Methodology was used for the drug nomenclature (13).

The electronic prescription data from the PIS were obtained as the number of patients and prescriptions and did not include individual data of any patient or physician. The study was approved by the Baskent University Medical and Health Sciences Ethics Committee (Project no: KA19/241; Date: 09.07.2019) and supported by Baskent University Research Fund. The PIS data was used with the permission and contribution of the TMMDA's Department of Rational Drug Use (E.116688, 11.07.2019).

Outcome variables: polypharmacy indicators

The average number of prescriptions per patient, the average number of drug items, and the average number of boxes per prescription were calculated. Due to their limited systemic effects, topical dermatological agents were excluded from the analysis.

Chronic polypharmacy was defined as the



proportion of patients prescribed four or more prescriptions over one year, each of which contained 3, 4, or ≥ 5 drugs per prescription with different ATC 4 codes. Since this criterion aimed to determine chronic systemic multidrug use, topical dermatological agents (ATC code D) with limited systemic effects and systemic antibiotics (ATC codes J01) generally used in the treatment of acute infections were excluded.

Cumulative polypharmacy was defined as the proportion of patients who were prescribed ≥ 5 drugs with different ATC 4 codes in a month or in each quarter of the year. This criterion aimed to evaluate the multiple use of systemic drugs within a certain period. Therefore, while topical dermatological agents (ATC code D) were excluded from the analysis, systemic antibiotics (ATC codes J01) with the potential to interact with the concomitant drugs were included.

The 10 most commonly prescribed drugs (excluding topical dermatological agents [ATC code D] and systemic antibiotics [ATC codes J01]) were listed according to their ATC 4 and ATC 5 codes. The 10 most common diagnoses entered into the PIS database and the distribution of patients and prescriptions for these diagnoses were also evaluated. The International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) was used for the definition and coding of diagnoses.

Statistical analysis

The average number of prescriptions per patient was calculated by dividing the total number of prescriptions issued to number of geriatric patients in primary healthcare settings across Turkey in 2018. In other words, dividing the total number of prescriptions (denoted as y) by the number of patients (denoted as x) yields the average number of prescriptions per patient (p). This is expressed mathematically as $p=y/x$. The average number of drug items and the number of boxes were calculated as per prescription in

a similar way. Other data were summarized as descriptive statistics (mean, standard deviation, frequency, and percentage) and were presented in tables and figures. Since the data were obtained not as individual patient data, but as an aggregate data of the number of patients, prescriptions, drug items, and boxes, etc.; significance tests could not be performed.

RESULTS

Turkey's population aged 65 and over in 2018 was 7,186,204. Of this population, 6,104,798 (85.0%) had at least one prescription in primary healthcare settings in 2018. The percentage of prescribed patients rose with increasing age, reaching 91.4% for patients aged 85 and over (Figure 1). While the prescription rate was higher in female patients than in male patients aged 65–69 years (84.0% vs. 77.9%), this difference disappeared in older age groups (Figure 1).

Over 39 million prescriptions were issued to population over 65 in 2018, which corresponds to an average of 6.4 prescriptions per patient. Each prescription contained an average of 2.9 individual drug items, and each drug was prescribed in an average 2.7 boxes (Table 1). There was a systemic antibiotic in 7.7% of all prescriptions.

Chronic polypharmacy

The percentage of patients prescribed with four or more prescriptions over one year, each containing 3, 4, or ≥ 5 drugs per prescription were 15.9%, 9.9%, and 14.3%, respectively, with no gender difference (Table 2). The percentage of patients chronically prescribed multiple drugs rose with increasing patient age (Figure 2).

Cumulative polypharmacy

The percentage of patients who received at least one prescription containing ≥ 5 drugs in a month ranged between 16.4% and 20.7%, being slightly higher during the winter months (Table 3, Figure 3A). The percentage of patients who

Figure 1. Percentage of Turkey's population aged 65 and over having at least one prescription in primary healthcare settings in 2018.

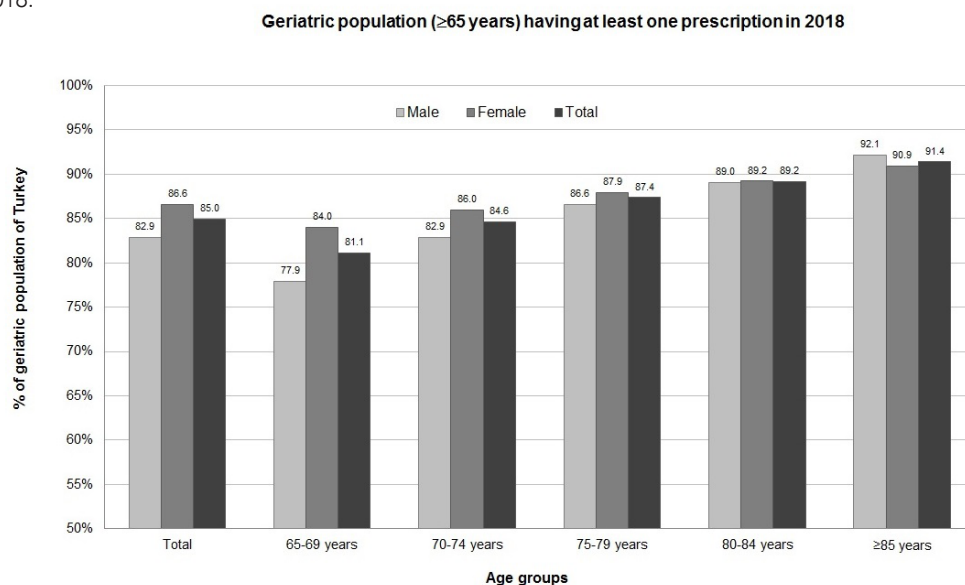


Table 1. Basic characteristics of prescriptions for geriatric patients in primary healthcare settings across Turkey in 2018.

	Male	Female	Total ^a
Total population of Turkey aged 65 years and over in 2018	3,170,132	4,016,072	7,186,204
Prescribed patients	2,626,705	3,476,943	6,104,798
Prescriptions	16,676,117	22,438,776	39,117,912
Prescriptions containing antibiotics	1,324,083	1,694,810	3,019,303
Individual drug items in all prescriptions	46,672,701	66,673,332	113,353,487
Drug boxes in all prescriptions	124,830,141	175,775,687	300,622,579
Prescription per patient	6.3	6.5	6.4
Individual drug items per prescription	2.8	3.0	2.9
Drug boxes per prescription	7.5	7.8	7.7
Drug boxes per item	2.7	2.6	2.7

^aTotal number of patients includes individuals whose gender information has not been entered.



Figure 2. . Percentage of geriatric patients in primary healthcare settings who were given 4 or more prescriptions containing ≥ 5 drugs in 2018.

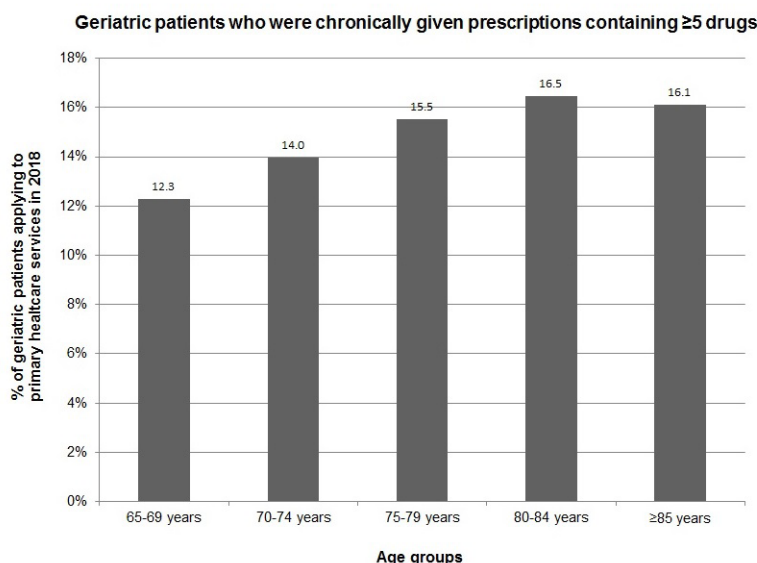


Table 2. The patients who were chronically prescribed multiple drugs (4 or more prescriptions over one year, each containing 3, 4, or ≥ 5 drugs per prescription).

Chronic polypharmacy (≥ 4 prescriptions per year)	Male	Female	Total
3-drug prescriptions	185,791 (15.8%)	195,652 (15.9%)	448,956 (15.9%)
4-drug prescriptions	116,187 (9.9%)	122,149 (10.0%)	280,028 (9.9%)
≥ 5 -drug prescriptions	167,710 (14.2%)	176,738 (14.4%)	402,969 (14.3%)
Total	1,178,818	1,227,142	2,827,643 ^a

^aTotal number of patients includes individuals whose gender information has not been entered

received at least one prescription containing ≥ 5 different drugs in a quarter was 28.3%, 26.4%, 24.8%, and 25.7% in the first, second, third, and fourth quarters of 2018, respectively (Table 3, Figure 3B).

Common drugs and diagnoses

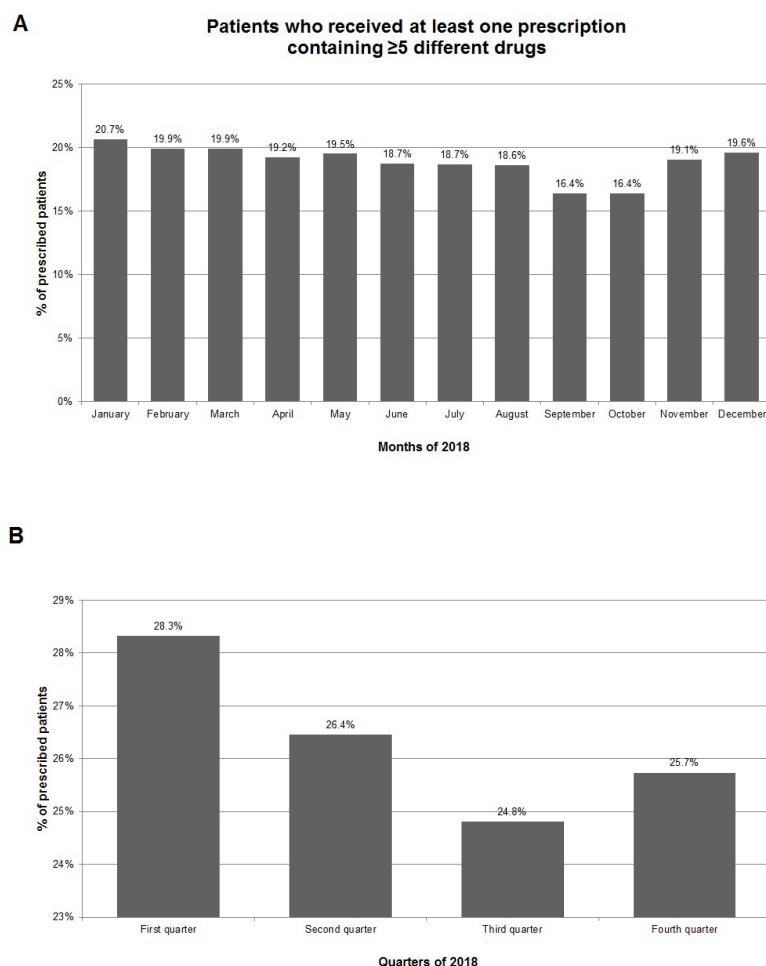
Proton pump inhibitors and acetic acid derivatives constituted the most commonly prescribed group of drugs, followed by platelet aggregation inhibitors and anti-inflammatory drugs, such as anilides and propionic acid

derivatives at the ATC 4 level (Table 4). At the ATC 5 level, acetylsalicylic acid, diclofenac, paracetamol, and pantoprazole were the most commonly prescribed drugs (Table 4). The most common diagnoses in the analyzed prescriptions were essential hypertension, myalgia, gastroesophageal reflux, and benign prostate hyperplasia.

DISCUSSION

Polypharmacy is a growing medical concern among the elderly population, causing critical

Figure 3. Percentage of prescribed patients who received at least one prescription containing ≥ 5 drugs in a month (A) or in each quarter (B) of the year.



problems such as increased healthcare costs, a high risk of adverse drug reactions, drug-drug interactions, medication non-adherence, reduced functional capacity, and cognitive impairment (1,2). In this prescription-based nationwide study, we determined the prevalence of chronic and cumulative polypharmacy in the geriatric population of 6,104,798 individuals using primary healthcare services in Turkey.

Similar to previous studies, the present study showed that 85% of Turkey's population aged 65 years and over received at least one prescription drug during 2018. A survey conducted by in-home interviews in the United States of 2,206 community-dwelling adults aged 62 years and over reported that 87% were using at least one prescription medication (14). Prescriptions containing systemic antibiotics constituted 7.7% of all prescriptions



Table 3. The patients who were cumulatively prescribed ≥ 5 drugs.

Timeframe	Number of prescribed patients	Patients who received at least one prescription containing ≥ 5 different drugs	
		n	%
First quarter (January-March)	4,760,283	1,348,384	28.3%
January	2,761,601	570,826	20.7%
February	2,562,455	510,417	19.9%
March	2,733,532	544,401	19.9%
Second quarter (April-June)	4,806,627	1,271,332	26.4%
April	2,632,597	506,631	19.2%
May	2,785,906	543,469	19.5%
June	2,522,276	472,896	18.7%
Third quarter (July-September)	4,448,414	1,103,600	24.8%
July	2,637,344	492,563	18.7%
August	2,448,043	456,207	18.6%
September	2,022,176	331,619	16.4%
Fourth quarter (October-December)	4,533,457	1,166,790	25.7%
October	2,210,510	362,790	16.4%
November	2,640,460	503,152	19.1%
December	2,583,139	506,687	19.6%

in our study. Depending on the study setup and population, antibiotic prescription rates in primary care have shown large variability of between 20% and 41% in the literature (15,16). The lower antibiotic prescription rate in our study is thought to be the result of regulatory restrictions imposed on antibiotic prescription in primary care in Turkey in recent years. Additionally, elderly patients are usually treated by systemic antibiotics in secondary

and tertiary hospitals rather than in primary care.

Chronic polypharmacy is an indicator of healthcare quality in the Organisation for Economic Co-operation and Development (OECD) resources (17). The OECD indicator for chronic polypharmacy among the elderly is the proportion of people 75 years and over who are taking ≥ 5 drugs chronically, which is defined as medication prescribed for more than 90 days or

Table 4. Considering the number of patients, 10 most commonly prescribed drugs at ATC4 and ATC5 level.

ATC4 Code	Name	Male		Female		Total ^a	
		n	%	n	%	n	%
A02BC	Proton pump inhibitors	1,082,459	41.2%	1,702,555	49.0%	2,785,272	45.6%
M01AB	Acetic acid derivatives and related substances	886,245	33.7%	1,411,783	40.6%	2,298,298	37.6%
B01AC	Platelet aggregation inhibitors excluding heparin	983,573	37.4%	1,094,577	31.5%	2,078,277	34.0%
N02BE	Anilides	716,621	27.3%	1,147,141	33.0%	1,863,947	30.5%
M01AE	Propionic acid derivatives	727,977	27.7%	1,093,753	31.5%	1,821,973	29.8%
M02AA	Anti-inflammatory preparations, non-steroids for topical use	623,395	23.7%	1,032,524	29.7%	1,656,108	27.1%
R05X	Other cold preparations	725,510	27.6%	879,684	25.3%	1,605,406	26.3%
C07AB	Beta blocking agents, selective	610,965	23.3%	793,974	22.8%	1,405,014	23.0%
C09DA	Angiotensin II antagonists and diuretics	410,754	15.6%	974,356	28.0%	1,385,158	22.7%
C08CA	Dihydropyridine derivatives	370,858	14.1%	632,566	18.2%	1,003,496	16.4%
ATC5 Code	Name						
B01AC06	Acetylsalicylic acid	828,083	31.5%	964,593	27.7%	1,792,788	29.4%
M01AB05	Diclofenac	682,593	26.0%	1,081,009	31.1%	1,763,794	28.9%
R05X	Other cold preparations	725,510	27.6%	879,684	25.3%	1,605,406	26.3%
N02BE01	Paracetamol	494,815	18.8%	812,304	23.4%	1,307,235	21.4%
A02BC02	Pantoprazole	456,711	17.4%	708,201	20.4%	1,165,008	19.1%
C07AB02	Metoprolol	446,289	17.0%	513,983	14.8%	960,332	15.7%
A10BA02	Metformin	371,780	14.2%	589,156	16.9%	960,987	15.7%
A11DB	Vitamin B1 in combination with vitamin B6 and/or vitamin B12	362,409	13.8%	574,483	16.5%	937,007	15.3%
A02BC03	Lansoprazole	363,242	13.8%	567,072	16.3%	930,402	15.2%
M01AE17	Dexketoprofen	361,156	13.7%	561,044	16.1%	922,306	15.1%
	Total number of patients	2,626,705		3,476,943		6,104,798	

^aTotal number of patients includes individuals whose gender information has not been entered.



four or more prescriptions in a year. According to 2016 data, this proportion varies between 44% and 87% among European countries (17). Although previous local and small-size studies for Turkey reported that higher rate of chronic polypharmacy (18), in the present study, only 14.3% of patients aged ≥ 65 years received prescriptions containing ≥ 5 drugs four or more times during one year. Thus, it is noteworthy that the chronic polypharmacy rate in Turkey is remarkably lower than European countries. This low rate is thought to be due to the difference between our study and the OECD indicator in terms of patient age and the definition of chronic polypharmacy. While our study population consisted only of elderly patients who used primary healthcare services, chronic polypharmacy data in other European countries include all people in prescribing databases that cover patients with chronic diseases who apply to the second- and third-level healthcare services and potentially use many medications chronically.

In our study, the prevalence of cumulative polypharmacy (the percentage of patients who received five or more drugs in a prescription in a month) ranged between 16.4% and 20.7% during 2018. In the literature, the prevalence of polypharmacy between 27% and 67%, depending on the design and population of the studies. In a National Health Survey from Spain, the prevalence of polypharmacy (≥ 5 medications) and hyperpolypharmacy (≥ 10) in 7,023 participants aged 65 and over was 27.3% and 0.9%, respectively (19). In primary care setting studies from Turkey, the prevalence of polypharmacy ranged between 33% and 42%, and the number of medicines used per day was 4.3-4.7 in adults aged ≥ 65 years (20,21). The accessibility to health services, female gender, depression, and chronic diseases were reported to be significant risk factors for polypharmacy (20). In a registry-based cross-sectional study from Sweden, in a cohort of 15,945 patients aged 75 years and over, the proportion of patients who used five or more medications at the same time was reported to be 33.4% (22). In an Italian registry-based

study (the REPOSI register), the prevalence of polypharmacy (five or more different medications in a prescription) was 51.9% at hospital admission and 67.0% at discharge among 1,332 inpatients aged ≥ 65 years across 38 internal medicine wards in Italy (23). The comparability of polypharmacy rates between studies is limited because of the differences between the populations and the parameters of polypharmacy in studies.

Proton pump inhibitors, anti-inflammatory drugs, and antiplatelets were the most often prescribed medications. The most commonly prescribed specific molecules were acetylsalicylic acid, diclofenac, paracetamol, and pantoprazole. In a survey of adults aged 62 years and over from the United States, lipid-lowering medications were reported to be the most commonly prescribed agents followed by antiplatelets, anti-inflammatory drugs, and proton pump inhibitors (14). In another survey of 164,513 multimorbid patients aged over 65 years from Spain, proton pump inhibitors, lipid-lowering medications, and antiplatelets were the most commonly prescribed drugs in primary care settings (24). Although the most prescribed drugs in our study were similar to other countries, considering the most common diagnosis, hypertension, it is remarkable that lipid-lowering and antihypertensive drugs were not prescribed frequently, due to the fact that these drugs are usually prescribed in secondary and tertiary care services rather than primary care in Turkey.

The main limitation of the present study was that it analyzed the drug use of the elderly population through prescriptions. Although the major way to access drugs in Turkey is through prescriptions, people may freely obtain over-the-counter medications or dietary supplements. This study did not evaluate patients' access to these substances or medication adherence. Considering the increasing use of over-the-counter medications and herbal or dietary supplements among older adults and critical drug-herb and drug-supplement interactions

(14,25), non-prescription medication should also be taken into account in future polypharmacy studies. Furthermore, this study focused primarily on the number of medications in prescriptions, but not on unnecessary or inappropriate drug prescription, which is a critical component of potentially inappropriate medication use along with polypharmacy.

In conclusion, 85.0% of Turkey's geriatric population had at least one prescription in 2018. Each patient had an average of 6.4 prescriptions, and each prescription contained

2.9 medications on average. The percentage of patients who were chronically prescribed with five or more medications was 14.3%, and those who were cumulatively on polypharmacy ranged between 16.4% and 20.7% during the year. The most commonly prescribed drugs were proton pump inhibitors, anti-inflammatory drugs, and antiplatelets. Polypharmacy is a critical health problem among the geriatric population in Turkey as in industrialized countries. Educating physicians as well as the public is essential to overcome polypharmacy.

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RESEARCH

INVESTIGATION OF THE EFFECT OF PREOPERATIVE DEMOGRAPHIC CHARACTERISTICS ON RESPIRATORY AND CARDIOVASCULAR COMPLICATIONS AFTER A THYROIDECTOMY IN GERIATRIC PATIENTS; A RETROSPECTIVE STUDY

ABSTRACT

Introduction: Recently, patients are discharged home between 6 to 24 hours after thyroidectomy. The safety of this method in geriatric patients is not clear. Our aim is to investigate the effect of preoperative demographic characteristics on respiratory and cardiovascular complications after total thyroidectomy in geriatric patients who are over 65 years.

Materials and Method: After obtaining local ethical committee approval, the perioperative data of geriatric patients who had total thyroidectomy between January 2016 and December 2018 were evaluated. Patients' age, sex, body mass index, American Society of Anesthesiologists score, preoperative systemic disease or medical comorbidities such as thyroid hormone dysfunction and electrolyte imbalance, difficult airway, operation time, preoperative vocal cord paralysis and thyroid malignancy were evaluated. Patients with respiratory or cardiovascular complications 30 days after surgery were evaluated about the effect of demographic data by using one -way ANOVA test.

Results: Of the 191 patients in this retrospective analysis, 10 of the patients suffered from respiratory complications and 13 suffered cardiovascular complications. Patients who were observed respiratory complications had a higher body mass index compared to others ($p=0.043$). Patients with cardiovascular complications had an older age and higher systolic and diastolic blood pressure prior to surgery ($p=0.013$, $p<0.01$, $p=0.032$, respectively). Systemic diseases and medical comorbidities were not associated with postoperative complications.

Conclusions: Systemic diseases and medical comorbidities may not increase postoperative complication risk in geriatric patients undergoing outpatient total thyroidectomy. Postoperative complications in these patients may be related to respiratory or cardiovascular risk factors prior to surgery.

Key words: Aged; Surgery; Comorbidity; Thyroidectomy.



INTRODUCTION

The aging population has increased in parallel with technological developments and advances in medical care. The total thyroidectomy rate due to thyroid diseases has increased in the geriatric population. In recent years, patients, even geriatric patients are discharged within 6-24 hours postoperatively following a total thyroidectomy to ensure that medical interventions are performed in the most cost-effective manner (1).

The World Health Organization defines a chronological age of 65 years as elderly (2).

Postoperative morbidity and mortality rates are high in geriatric patients due to cardiovascular diseases, drugs used due to treat concomitant diseases, and physiological problems caused by advanced age (3). To address this issue, factors linked to postoperative complications in the geriatric population should be investigated to identify which patients are at risk of complications after early discharge.

The main complications of thyroid surgery are laryngeal nerve injury, hypocalcemia and bleeding (4). Given the comorbidities that often accompany advanced age, surgical procedures may be risky in this population (5). Thus the treatment of thyroid diseases in the elderly requires special attention due to the increased risk of complications.

Previous studies on the effect of age on post-thyroidectomy complications failed to show a clear safety risk of surgery among geriatric patients (1,2,6). However, there is a lack of evidence about how ageing effects when there is a medical comorbidity such as hypertension or electrolyte imbalance.

The aim of this study was to determine the risk factors related to postoperative respiratory or cardiovascular complications in patients older than 65 years of age with a diffuse goiter or malignancy who underwent a total thyroidectomy in the general surgery operating room of Istanbul University- Cerrahpasa, Cerrahpasa School of

Medicine.

MATERIALS AND METHODS

After obtaining the approval of the local ethics committee, we examined the preoperative anesthesia evaluation forms, perioperative anesthesia-recovery room follow-up slips and surgical records of all patients aged older than 65 y who underwent a total thyroidectomy performed between January 2016 and December 2018 in Istanbul University- Cerrahpasa, Cerrahpasa School of Medicine General Surgery Operating Room.

Each patient's age, sex, height, weight, body mass index (BMI), American Society of Anesthesiologists (ASA) score, preoperative comorbidities (hypertension, heart disease, asthma, chronic obstructive pulmonary disease, thyroid hormone dysfunction, and electrolyte imbalance) were recorded, in addition to airway related factors (i.e., a difficult airway), operation time, preoperative vocal cord paralysis and reason for the surgery (i.e., presence or absence of malignancy).

Thyroid hormone dysfunction (THD) was considered as any deviation from the reference values (thyroid stimulating hormone [TSH]: 0.46 – 4.68 mU/L, T4: 0.7-2.0 ng/dL). THD patients in whom oral medications failed to normalize TSH and T4 values underwent surgery. Huge deviations from normal ranges were treated with plasmapheresis.

Any respiratory or cardiovascular complications 30 d after surgery were recorded.

Respiratory complications included the following: PO₂ desaturation of <90% under 4 L/min O₂ via a face mask in the recovery room, dyspnea, respiratory insufficiency, pneumonia, pulmonary embolism, and ventilator requirement for >48 h. Cardiovascular complications included: new-onset arrhythmias, myocardial infarctions, and cerebrovascular events. The same surgeon (S.T.) performed all the thyroidectomies. An

endotracheal monitoring system (Medtronic NIM, Jacksonville, FL) was used to monitor neural stimulation with 1.5 mA.

In this study, which was conducted to investigate the relationship between demographic data and respiratory and cardiovascular complications after a total thyroidectomy in the geriatric patient population, the power (test power) of each variable was determined to be at least 0.80 and Type 1 Error 0.05. The number of sampling was determined to be 190 by the single-stage random probability sampling method based on the main population ratios. Descriptive statistics were applied to continuous variables with the data presented as the mean, standard deviation, minimum and maximum. Categorical variables were expressed as numbers and percentages. Kolmogorov-Smirnov ($n > 50$) and Skewness-Kurtosis tests were conducted to determine whether the data were normally distributed. Parametric tests were performed due to a normal distribution. An independent T-test or a one-way analysis of variance was used to compare the mean values of postoperative complication groups. A chi-square test was used to determine the relationship between postoperative complications and other categorical variables. The statistical significance level (α) was taken as 5% in the calculations. The SPSS (IBM SPSS for Windows, ver.24; IBM) statistical package program was used for all calculations.

RESULTS

In total, 191 patients (females, $n=118$; males, $n=73$) older than 65 y were included in this retrospective study between January 2016 and December 2018. The mean age of the patients was 69.27 y, the mean height was 162.16 cm, and the mean weight was 76.26 kg. The mean BMI was 27 kg/m², and the mean ASA score was 2.05. The demographic data are given in Table 1. Respiratory complications were observed in 10 patients (5.2%), cardiovascular complications were observed in 13 patients (6.8%).

The mean BMI of the patients with respiratory complications was higher than that of the other

patients ($p=0.043$) (Table 1). The mean age of patients with cardiovascular complications was also higher than that of the other patients ($p=0.013$) (Table 1). The mean systolic and diastolic arterial pressure values of patients with cardiovascular complications were higher than those of patients without complications ($p<0.01$ and $p=0.032$, respectively) (Table 2).

The duration of the operation, postoperative NRS scores, and pre-postoperative vocal cord paralysis were similar among the patients (Table 2).

Three of 10 (30%) patients who experienced cardiovascular complications and 37 of 168 (22%) patients without any complications had THD before the operation. Two of 10 (20%) patients who experienced respiratory complications and 16 of 168 (9.5%) patients who did not experience any complications had an electrolyte imbalance prior to surgery. Neither THD nor an electrolyte imbalance had an effect on postoperative complications ($p=0.24$ and $p=0.26$, respectively) (Table 2).

Six of 10 patients (60%) who experienced cardiovascular complications were hypertensive, and one patient had ischemic heart disease. Stridor was observed in 8 of 10 (80%) patients who developed respiratory complications. Stridor was not observed in any of the patients who developed cardiovascular complications and only in 1 (0.1%) patient who was not observed any complication ($p<0.01$).

One patient had a difficult airway and had a narrow airway passage in the glottic area according to the ear nose throat surgeon consultation. This patient had a Mallampati score of 4 and was intubated using a video laryngoscope (C-MAC® S video laryngoscopes, Storz, Germany) with an obturator used in the second attempt. The patient had no adverse respiratory events after extubation.

None of the patients were referred to the post anesthesia care unit after surgery.

All the patients were discharged within 23 h after surgery.



Table 1. Demographic data.

	RC	CVC	None	p
Number of patients	10	13	168	
Mean age (years)	67	72*	69	<0.01
Female sex [n(%)]	6 (60)	11 (84.6)	101 (60.1)	0.21
BMI (kg/m ²)	33*	29	29	0.04
ASA classification	2.4	2.07	2.03	0.08

*statistically significant compared to the other groups. RC: Respiratory complication group. CVC: Cardiovascular complication group
BMI: Body mass index. ASA: American Society of Anesthesiologists. None: Patients without any complications

Table 2. Perioperative data and medical conditions of all patients.

	RC	CVC	None	p
OD(min)	56	50	54	0.61
SAP(mm Hg)	135	166*	143	<0.01
DAP(mm Hg)	77	89*	82	0.03
NRS	2.60	2.23	2.39	0.69
Malignancy[n(%)]	1(10)	2(15)	24(14.2)	0.38
NVS>1[n(%)]	2(20) *	1(7.7) *	3(1.8)	0.04
THD[n(%)]	0(0)	3(23.1)	37(22)	0.24
EI[n(%)]	2(20)	0(0)	16(9.5)	0.26
Pre VCP[n(%)]	2(20)	0(0)	3(1.8)	0.08
Post VCV[n(%)]	2(20)	0(0)	11(6.6)	0.2

*: Statistically significant. OD: Operation duration. SAP: Systolic arterial pressure. DAP: Diastolic arterial pressure. NRS: Numeric rating scale score. NVS: Nausea and vomiting scale score. THD: Thyroid hormone dysfunction. EI: Electrolyte imbalance. Pre VCP: Preoperative vocal cord paralysis (Right or left) Post VCV: Postoperative vocal cord paralysis (Right or left). None: Patients without any complications.

DISCUSSION

Thyroid diseases are common among elderly patients (2). Although there are concerns about the negative effects of aging on mortality and morbidity after thyroid surgery, this issue has not been clarified previously. In recent years, the majority of patients who have undergone thyroid surgery are discharged within 24 h. (1,6). However, comorbidities in geriatric patients may give rise to complications after thyroid surgery. In the current study, older age and hypertension were risk factors for postoperative cardiovascular complications, and a higher BMI was a risk factor for the development of postoperative respiratory complications.

In previous studies (3,7, 8) older age (i.e., >70 y) was a risk factor for postoperative complications after outpatient thyroidectomy. The results of these studies are in accordance with those of the present study. In contrast, one previous study found that a thyroidectomy could be safely performed in elderly and very elderly patients (1). However, this study focused on different postoperative surgical complications, particularly the development of hypocalcemia, postoperative hematomas, and recurrent laryngeal nerve injury. A number of studies suggested that comorbidities in the elderly population seemed to be responsible for postoperative complications (9, 10). In the present study, 7 of 10 patients who had cardiovascular complications postoperatively experienced cardiovascular diseases (hypertension and ischemic heart disease).

As reported previously, the incidence of heart diseases increases with ageing (11, 12). The mean systolic and diastolic arterial pressure values in patients with cardiovascular complications were higher than those in patients without complications. We are not surprised about the cardiovascular effects of patients with heart diseases in our study. Based on the results, we conclude that patients with cardiovascular diseases preoperatively had cardiovascular complications postoperatively. However additional medical comorbidities such

as THD, or EI were not related to cardiovascular complications.

In the previous study, patients with respiratory complications had a higher BMI than that of the other patients. Previous studies demonstrated an association between morbid obesity and postoperative respiratory complications in various types of surgery (13, 14, 15). Research also reported that obesity was an important risk factor for the development of asthma, obstructive sleep apnea, obesity hypoventilation syndrome, and pulmonary hypertension (16). In the same study, chest wall and respiratory system compliance were decreased in morbidly obese patients, and morbidly obese patients were prone to atelectasis and respiratory insufficiency (16). Furthermore, obese geriatric patients were shown to have severe skeletal muscle dysfunction, which reduced their quality of life and survival (17). In the present study, the mean BMI of the patients with respiratory complications was 33 kg/m². This result is in accordance with that of previous studies (16, 17, 18, 19). In contrast, preoperative unilateral vocal cord paralysis had no effect on postoperative respiratory complications in the present study. As surgeons in our hospital use a neural monitoring system to ensure nerve integrity, the contralateral recurrent nerve was not damaged in any of the patients. No respiratory complications were observed in patients who had unilateral vocal cord paralysis before surgery.

Stridor is an abnormal, high-pitched sound produced by turbulent airflow through a partially obstructed airway at the level of the supraglottis. In the present study, stridor was observed in 8 of 10 patients who developed respiratory complications in our study. Stridor after a thyroidectomy may indicate a laryngeal edema, laryngeal nerve palsy or laryngeal dysfunction secondary to hypocalcemia. Seven of the study patients with stridor had a BMI greater than 30 kg/m². As since stridor was transient and treated in the recovery room, we believe stridor observed in our patients was related to laryngeal edema. In cases of stridor observed in the recovery room after a



thyroidectomy, anesthesiologists must be alert to the possibility of laryngeal edema, laryngeal nerve palsy or acute hypocalcemia.

The results of the previous study revealed no association between medical comorbidities and postoperative complications. According to our results, neither preoperative thyroid hormone dysfunction nor an electrolyte imbalance affected postoperative complications.

Hyperthyroidism has profound effects on the heart. These effects include tachycardia, arrhythmias, increased systolic pressure, increased systolic function, left ventricular hypertrophy, and diastolic dysfunction. However an adaptation mechanism may restore patients' health status and hyperthyroidic patients may not be adversely affected in cases of a thyroid hormone imbalance (18, 20). In common with the findings of the present study, Pitzalis et al (21) found no correlation between hyperthyroidism and increased cardiac anomalies. We think this issue needs to be further evaluated. During anesthesia and surgery, hypothyroid patients have an elevated risk of complications including heart conduction anomalies, hemostasis problems and decreased pulmonary ventilation. We expected that a combination of older ages and hypothyroidism would have adverse effects on cardiovascular and respiratory functions. However in accordance with the findings of a previous study (19), hypothyroidism was not associated with postoperative cardiovascular and respiratory complications. In the previous study, anemia and hypertension were more prevalent in hypothyroid patients, but this was not related to adverse events.

Although serum TSH levels increase slightly with age, cardiovascular adverse events related to hypothyroidism are uncommon in the elderly (22). Furthermore, hypothyroidism and aging have similar effects on the basal metabolic rate, thereby raising the question whether hypothyroidism is a protective adaptive mechanism for the aging body. Previous studies demonstrated that hypothyroidism was shown to deteriorate the

existing cardiac disease in the elderly. However, in the present study, unattended hypothyroidism was not related to adverse cardiovascular events, similar to that found in previous studies (22,23)

In addition to THD, profound hypo- and hypercalcemia were not seen in any of our patients perioperatively. A mild electrolyte imbalance was not associated with adverse events in our study, similar to that found in previous research (3).

Some authors found a relation between malignancy and postoperative complications rates after a thyroidectomy (3, 24). However, these complications involved surgery- related complications such as a subcutaneous hematoma, hypocalcemia, or recurrent nerve palsy. The extent of surgery, invasion of the surrounding tissues, and preoperative recurrent nerve palsy related to thyroid malignancy may result in increased surgical complications. Other studies reported contrary results, like our study (1, 25). To date, it has not been shown to be related to respiratory and cardiovascular complications. This finding is in accordance with our results.

In conclusion, there are conflicting results on the safety of elderly outpatient thyroid surgery. The results of our study may confirm that patients with respiratory or cardiovascular risk factors prior to surgery are at risk of postoperative complications, whereas medical comorbidities such as THD, electrolyte imbalances, neoplasms and older age are not additional risks causing postoperative complications. We believe geriatric patients may safely undergo thyroid surgery, even in the presence of additional medical comorbidities, when prepared meticulously for the surgery and anesthesia. In common with the adult population, geriatric patients may undergo outpatient thyroidectomy, without additional risks.

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Conflict of interest

Authors declare no conflict of interest

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RESEARCH

COMPARISON BETWEEN SURGICAL AND PERCUTANEOUS TRACHEOSTOMY EFFECTS ON GERIATRIC PATIENTS IN THE ICU

ABSTRACT

Introduction: Increase in life expectancy across the globe has contributed to a rise in geriatric population. This has also led to an increase in geriatric ailments, causing an increased number of geriatric patients requiring intensive care, including mechanical ventilation. Tracheostomy is commonly surgical procedures performed in geriatric patients hospitalised at intensive care unit. Studies comparing percutaneous and surgically performed tracheostomy on geriatric patients with a mechanical ventilator requirement are rare.

Materials and methods: A significant proportion of ventilator-dependent geriatric patients need a tracheostomy during an intensive care unit stay. A tracheostomy can be performed using the traditional surgical tracheostomy or percutaneous dilatory tracheostomy methods. In the current study, we retrospectively compared different tracheostomy methods in intensive care unit geriatric patients with regard to procedure duration, the safety of the procedure and complications. A total of 55 geriatric patients underwent tracheostomy and demographic characteristics and outcomes were recorded.

Results: From the 55 patients, %59.1 were women. The mean age of patient was 71 ± 15.4 years. The mean value of procedural time was significantly lower in the percutaneous dilatory tracheostomy group compared with surgical tracheostomy group ($P < 0.001$). Bleeding, accidental decannulation, air leak from the fistula were also significantly lower in the percutaneous dilatory tracheostomy group compared with the surgical tracheostomy group. Percutaneous dilatory tracheostomy is safer and simpler than surgical tracheostomy in intensive care unit geriatric patients.

Conclusion: Percutaneous dilatory tracheostomy via Griggs technique is safe, cost-effective and can be done rapidly at bedside in intensive care unit geriatric patients.

Keywords: Tracheostomy; Intensive Care Units; Geriatrics.



INTRODUCTION

Around the world, the population of people aged 65 years and older is rising, leading to an increase in the use of health services by geriatric patients. Thus, the evaluation and maintenance of elderly patients are increasingly important. With the increased life expectancy in geriatric patients, sustainably improving their quality of life and functional independence is also of increasing importance (1). This demographic change has also brought about a rise in the number of geriatric patients requiring intensive care, including mechanical ventilation (MV). Advanced age is considered an independent risk for mortality in patients admitted to the intensive care unit (ICU) (2). A tracheostomy is a standard procedure followed in the ICU for patients who require long-term MV. There are basically two approaches for performing a tracheostomy. A bedside percutaneous dilatational tracheostomy (PDT) is frequently used in the ICU, and a surgical tracheostomy (ST) is used in the operating room. A PDT is preferred over an ST in ICU patients because of its easy applicability in the ICU, and it eliminates problems that may arise during the transfer of patients under MV to the operating room. The procedure can be performed at the bedside by ICU physicians, regardless of the presence of a surgeon or availability of an operating room. An ST procedure is the traditional method in which a tracheal fistula is secured by a tracheal tube. An ST is occasionally followed by some complications, including major bleeding, surgical site infections and tracheal stenosis (3). As an alternative method, PDT was first introduced in 1985 by Ciaglia et al. described a PDT where dilatation was performed gradually from small to large blunt-ended dilators (4). Griggs modified this technique by adding guide wire dilating forceps, which are similar to blunt-edged modified Howard-Kelly forceps. Later, the Ciaglia Blue Rhino (dilatation in a single step) and PercuTwist (controlled rotational dilatation with single-screw dilatator) methods

were described. Various techniques for PDT are still used worldwide (5,6). This retrospective study aimed to evaluate the safety of PDT by comparing the rate of perioperative complications between PDT and ST procedures performed in ICU geriatric patients receiving MV and evaluate its impact on the outcomes of their clinical condition.

MATERIALS AND METHODS

Upon approval by the Ethics Committee of Elazığ Fırat University Faculty of Medicine (19-07/2019), data from 55 geriatric patients who underwent PDT or ST at the ICU of the Anaesthesiology and Reanimation Department of Elazığ Fethi Sekin City Hospital between December 2018 and December 2019 were assessed in retrospectively. All patients were over 65 years old. All tracheotomies were elective and performed by an anaesthesiologist using the PDT technique, whether at the bedside (ICU) or performed by the otolaryngologist in the operating room. In the present study, we compared ST and PDT in geriatric patients with regard to procedure duration and vital parameters. Those with unstable cervical vertebra fracture, ST, platelet count $< 60\,000\text{ mm}^3$, international normalised ratio (INR) of prothrombin time > 1.5 , fraction of inspired oxygen (FiO_2) > 0.8 and positive end-expiratory pressure (PEEP) $> 12\text{ cm H}_2\text{O}$ were excluded from the study. All the tracheostomies were performed under general anaesthesia. Emergent tracheostomy, presence of infection or mass in the site of tracheostomy, unintubated patients, difficult access to the trachea, restrictions in opening the mouth and upper airway obstruction conditions are not included in this study. Griggs method was used during PDT.

Tracheostomy Procedure

All PDTs were performed in the ICU using the technique described by Griggs et al. Bronchoscopy was not performed during the operation. However, in certain cases suspected for paratracheal insertion or tracheal injury, a confirmation

bronchoscopy was carried out immediately after the procedure. We considered absolute and relative contraindications in the geriatric patients, including uncontrolled coagulopathy (platelet count < 60 000 mm³, INR > 1.5 and/or partial thromboplastin time > 50 s), high PEEP or FiO₂ requirement, PEEP > 12 cm H₂O, difficult anatomy (morbid obesity, short and thick neck or excessive goitre) and hemodynamic instability. All STs were performed in the operating room using standard techniques described elsewhere. The surgical procedures were conducted by an otolaryngologist. The PDT procedures were conducted by an anaesthesiologist at the bedside in the ICU. All anticoagulants were discontinued at least 12 h before the procedure or after the indication of coagulopathy correction. Before starting, FiO₂ was increased to 1.0, and positive pressure ventilation was used during the procedure. An electrocardiogram, invasive or non-invasive blood pressure and pulse oximetry were monitored routinely. All tracheostomy procedures were performed under general anaesthesia with propofol 2–3 mg/kg, analgesia (fentanyl 1 µg/kg) and relaxation (rocuronium 0.8 mg/kg), and the neck was hyperextended (unless there was severe cervical spine injuries or other precautions). Skin and subcutaneous tissue were infiltrated with 2% lidocaine/epinephrine, and subcutaneous tissue was eliminated with a 1-cm horizontal incision. The trachea was perforated with a 14-gauge needle in the posterior-caudal direction, and tracheal access was confirmed upon air aspiration of the syringe that was filled with 5 cc of lidocaine. After the tracheal puncture, a J-tip guide wire was inserted according to Griggs technique. For the initiation of stoma formation, an initiating dilator was introduced over the guide wire and then removed. Afterwards, guide wire dilating forceps were placed on the guide wire, and when these were opened, soft pretracheal tissues were allowed to expand. The forceps were re-applied to the guide wire and advanced until resistance was felt and the tip of the forceps had passed into

the tracheal lumen. The forceps were then opened to stomatize the trachea and then the forceps were removed in the open position. A specially designed tracheostomy tube with an obturator and cuff was advanced over the guide wire, and an adequately lubricated introducer was added into the formed tracheal stoma. The obturator and guide wire were then removed. After placement of the tracheostomy tube, the surrounding parts of the tracheal stoma were covered with a sterile povidone-iodine sponge. The time elapsed from skin incision to the placement of a tracheostomy tube was recorded. Its position was verified by chest X-ray. Demographic variables and any perioperative or late postoperative complications were recorded. The procedural time and the duration between the first skin incision and tracheostomy tube placement were also recorded. The number of minor procedural complications, including cuff leak, posterior wall injury, difficult dilatation, intraprocedural hypoxia, hypotension and bleeding, postprocedural bleeding, several attempts at insertion, paratracheal insertion and reintubation were compared. The number of major complications, pneumomediastinum, pneumothorax and subcutaneous emphysema was also compared.

Measurements and Outcomes.

As baseline characteristics (Table 1), data were collected regarding the following variables; gender, age, height, body weight, diagnosis, acute physiology and chronic health evaluation II (APACHE II) score at ICU admission, method of tracheostomy (PDT or ST) and duration of invasive MV and blood analysis (platelet count, activated partial thromboplastin time (APTT) and international normalized ratio of prothrombin time before the tracheostomy procedure. As a baseline outcome, we compared the rates of perioperative complications occurring during the tracheostomy procedure and until 10 postoperative days in the PDT and ST groups. Complications including desaturation (SpO₂ < 85) during the tracheostomy



Table 1. Characteristics of subjects in the PDT and ST.

	PDT (n=28)	ST (n=27)	p value
Age	77(65-88)	75(65-91)	0.24
Gender (male/female)	12/16	13/14	0.56
BMI	21.6±3.6	21.8±3.3	0.15
APACHE II score at ICU admission	32.9(13-45)	34.6(14-45)	0.18
Glaskow Scale	6(4-8)	7(6-9)	0.06
Laboratory data before tracheostomy			
Platelet($10^4/mm^3$)	23 ± 10.2	24.5±11.8	0.14
Pt-INR	1.07(1.03-1.29)	1.05(0.99-1.22)	0.22
APTT (seconds)	33.3(28.0-40.7)	32.8(25.0-37.1)	0.05
Reason for ICU Admission			<0.001
Neurologic	15	8	
Respiratory failure	5	11	
Heart failure	8	8	
Sepsis	0	0	
Trauma	0	0	

PDT; percutaneous dilatory tracheostomy group. ST; surgical tracheostomy group. APACHE II; acut physiology and chronic health evaluation II

procedure, active bleeding that required some treatment such as ligation of blood vessels and blood transfusion, reintubation during the procedure, subcutaneous emphysema, pneumothrax, pneumomediastinum, cardiac arrest, extratracheal insertion were compared as intraoperative complications. Bleeding that needed some treatment, such as blood transfusion and suture, accidental decannulation, air leak from the fistula were evaluated as immediate postoperative complications and granulation of the surgical site, surgical site infection and pneumonia were also evaluated as a late postoperative complication (Table 2). The mean durations of operation times

were recorded.

Statistical Analysis

The analysis of the data was performed using the Statistical Package for the Social Sciences (SPSS, IBM Corp., Armonk, NY, US), version 20. The data were presented as simple measures of percentage, mean, range (minimum-maximum) values, and standard deviation (SD). The level of significance for the differences in the quantitative data was tested using the Student's t-test, and the level for the differences in the qualitative data, using the Pearson's chi-squared test. Values of $p < 0.05$ were considered statistically significant.

Table 2. Primary outcomes.

	PDT (n=28)	ST (n =27)	p value
All complications N(%)	5 (13.4)	11 (25.4)	0.013
Intraoperative complications N(%)	2 (3.8)	8 (13.1)	0.026
Hypoxemia	0	0	
Active bleeding	0	2	
Extratracheal insertion	0	0	
Desaturation SpO ₂ <85	1 (5.1)	3 (11.2)	
Subcutaneous emphysema	0	1	
Pneumomediastinum	0	0	
Pneumothorax	0	0	
Cardiac arrest	0	0	
Postoperative Complications N(%)	3 (9.6)	7 (34.6)	0.003
Immediate postoperative complications			
Bleeding	3	7	
Accidental decannulation	0	1	
Air leak from the fistula	0	2	
Late postoperative complications			
Pneumonia	0	0	
Granulation of surgical site	0	0	
Surgical site infection	0	0	

PDT; percutaneous dilatory tracheostomy group. ST; surgical tracheostomy group.

RESULTS

This retrospective study was performed in a 26-bed ICU of Elazığ Fethi Sekin City Hospital. During the study period (between December 2018-December 2019), 55 geriatric patients underwent tracheostomy at the bedside in ICU or operating room. Among these, there were 28 geriatric patients in the PDT group and 27 geriatric patients in the ST group. A PDT using the Griggs' technique was performed on 28 geriatric patients hospitalised at the ICU, and a traditional ST was performed on 27 geriatric patients in the operating room. As shown in Table 1, the PDT and

ST groups demonstrated no significant differences in their baseline characteristics other than APTT (PDT vs. ST: 33.3 (28.0-40.7) vs. 32.8 (25.0-37.1) seconds $p=0.05$). Gender distribution showed that 56.4% (n=30) were female and 43.6% (n=25) were male. Apache II score was (PDT vs. ST: 32.9 (13-45) vs 34.6 (14-45), $p>0.05$) and the Glasgow Scale was (PDT vs. ST: 6 (4-8) vs. 7 (6-9), $p>0.05$). Mean body mass index of the subjects was 24.07 kg/m² (Table 1). Diagnosis at ICU admission was significantly different between both groups ($p<0.001$). While the number of geriatric patients with neurological disorders who received PDT was higher than those receiving ST, the ST procedure

**Table 3.** Secondary outcomes.

	PDT (n=28)	ST (n =27)	p value
The procedural time (minute)	4,41 (4-6)	15,67 (12-19)	0.001
Length of ICU stay (days)	76.6 (10-298)	69.5 (10-275)	0.052
Duration of mechanical ventilation posttracheostomy (days)	22,78 (21-98)	17,84 (19-89)	0.171

ICU: intensive care unit

was performed more frequently in geriatric patients with respiratory failure. Some primary clinical outcomes were detected, such as 7 cases postoperative minor bleeding in the ST group and 3 cases in the PDT group ($p=0.003$) (Table 2). As secondary outcomes, we also assessed the length of ICU stay, tracheostomy procedural time, duration of mechanical ventilation after tracheostomy procedures (Table 3).

DISCUSSION

We are faced with the need for tracheostomy in both the operating room and the ICU. For this reason, our knowledge in this subject should be adequate and up to date. The PDT procedure has recently been preferred in critically ill patients when prolonged control of the airway is required. Table 4 shows the potential advantages of tracheostomy over continued translaryngeal intubation. In a follow-up study of patients who were randomised either to remain translaryngeally intubated for a prolonged period or to receive early tracheostomy, Blot et al. reported that oral comfort scores, feeling of mouth uncleanliness, perception of change in body image, feelings of safety and overall comfort were lower in the prolonged-intubation group (7). A tracheostomy provides a reduction of pulmonary dead-spaces, easy clearance of pulmonary secretion, facilitation of weaning from a mechanical ventilator and declined risk of nosocomial infections. The

bedside procedure reduces the risk of transferring an unstable and critically ill patient from the ICU to the operating room and its accompanying risks (5,6).

Table 4. Potential advantages of translaryngeal intubation versus tracheostomy

In addition, several techniques have been developed to minimise complications and ensure patient safety during percutaneous tracheostomy. After the ST, first, Ciaglia's technique was described for percutaneous tracheostomy, followed by the Griggs, Ciaglia Blue Rhino, Percu-Twist and Fantoni translaryngeal methods (8). Each of these techniques was compared with others to discuss their advantages and disadvantages (9). It is desirable to have a technique that ensures reduced PDT-related morbidity and mortality and facilitates the procedure. All these techniques have been designed to simplify the procedure to offer applicability in a bedside setting and avoid transfer into the operating room at the expense of a small incision with fewer wound complications. In a meta-analysis, Cabrini et al. compared PDT techniques performed between 1998 and 2010 and reported that Griggs technique was as safe and effective as other techniques. Covering 13 studies (five of which did not use fibre-optic bronchoscopy) and 1 030 patients, this review reported that the rate of minor complications was 31% (10). We opted for Griggs technique during the percutaneous tracheostomy procedure

Table 4. Potential advantages of translaryngeal intubation versus tracheostomy.

Translaryngeal Intubation	Tracheostomy
Ease and rapidity of initial placement of device	Safety of reinsertion after stomal maturation
Avoidance of acute surgical complications	Less skilled care environment
Bleeding	Earlier mobilization
Tracheal injury	Reduced laryngeal damage
Nerve injury	Laryngeal stenosis less likely
Barotrauma	Less voice damage
Low initial cost of device placement	Better oral hygiene
Lower resource use for placement	Better pulmonary secretion removal
Avoidance of late surgical complications	Less likely tube occlusion
Stoma infection	Better ability to communicate
Vascular erosion	Lip reading
Nerve injury	Speaking valve
Stomal stenosis	Less oral-structure injury (teeth, tongue, lips)
	Better patient comfort
	Less sedation needed
	Lower incidence of sinusitis
	Preservation of glottic competence
	Lower aspiration risk
	Less risk of ventilator-associated pneumonia
	Better swallowing function
	Earlier oral feeding
	More rapid weaning from mechanical ventilation
	Lower airway resistance to breathing
	Less dead space
	Lower work of breathing

in this study based on our extensive experience using this method. Higgins et al. reviewed 15 studies in their meta-analysis and reported lower PDT-related complication rate at the expense of a higher accidental decannulation rate (11). A meta-analysis of 17 studies by Delaney et al. indicated that PDT was associated with a lower rate of wound infection but was similar in terms of bleeding or other complications compared with ST (12). The most common complication

that we observed with Griggs technique during percutaneous tracheostomy was minor bleeding (41%), which could be controlled with compression and required no additional intervention. In this study, all minor bleeding complications were prevented simply by compressing a sterile gas. In fact, bleeding complications may be reduced either by performing the procedure after INR and platelet count follow-up and fresh frozen plasma replacement if appropriate or by



administering local anaesthetics with adrenaline to the subcutaneous tissue around the puncture site. Since PDT is an elective procedure, there is usually sufficient time to complete the required preparations. In 1989, the guidelines of the American College of Chest Physicians on artificial airways consensus conference recommended considering performing a tracheostomy in patients receiving MV for more than 21 days (13), but the proper timing to perform the tracheostomy has remained a matter of debate over the last two decades. Some international surveys record the preferable timing of tracheostomy as between 7 and 15 days post-intubation (14,15). In geriatric patients, PDT is rapidly becoming the preferred method of long-term airway control. The placement of a tracheostomy has gained popularity as a means of facilitating the weaning of patients from the respirator, as it reduces pulmonary dead space, provides access for clearing pulmonary secretions under various pathologic conditions and improves the patient's comfort. However, percutaneous tracheostomy techniques might also be associated with serious, even life-threatening complications, and any technique that reduces the morbidity and mortality associated with PDT is desirable. Therefore, efforts have been made to reduce the risks associated with the use of different PDT techniques. With advanced technology and increasing interest in minimally invasive procedures, variations on the standard open-ST have been developed over the recent years. Turkmen et al. stated that PDT is as safe and effective as ST, although the early and late postoperative complication rates were not significant with the ST method (16). Another study reported that PDT using the Blue Rhino technique is a safe, quick and effective method, while the overall complications were comparable in the two groups (ST and PDT) (17). The PDT procedure is safer, quicker and simpler than ST in ICU patients. Both the Ciaglia Blue Rhino and Griggs forceps methods are feasible techniques with similar complication rates (18), and PDT is as safe and as

effective as ST. Therefore, it seems that PDT has gained popularity to become a common method in geriatric patients. The Griggs technique is a widely performed procedure in ICUs. It is safe, cost-effective and can be done rapidly at the bedside. The difficulties and limitations of studying long-term complications include a high mortality rate among the patients. Although the early and late postoperative complication rates were not significant in the PDT group, we believe that further investigations with larger groups are necessary to establish long-term outcomes following PDT.

CONCLUSIONS

We preferred Griggs technique during bedside PDT in the ICU because of our greater experience using this technique. Studies have not been able to prove the superiority of one technique over the others. In the present study, our aim was to share our experiences rather than to make a technical comparison. The use of technologically advanced methods (e.g. fibre-optic bronchoscopy or ultrasonography) in PDT improves the success of the procedure. As in all invasive procedures, the experience of the practitioner and a procedure of shorter duration reduce complication rates. The Griggs' technique is safe and cost-effective and can be done rapidly at the bedside in ICU. The procedures performed in critically ill patients in the ICU carry substantial risks, requiring close monitoring of vital signs and mechanical ventilator parameters. In addition, checking for bleeding, assessment of airway integrity, X-ray evaluation and follow-up of late-phase complications should be performed.

CONFLICTS OF INTEREST

The authors of this article state that they have no conflict of interest.

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RESEARCH

THE EFFECTIVENESS OF PROSTATE SPECIFIC ANTIGEN DENSITY IN PREDICTING PROSTATE CANCER AND CLINICALLY SIGNIFICANT PROSTATE CANCER IN PATIENTS AGED 70 YEARS AND OVER

ABSTRACT

Objectives: To evaluate the effects of free-to-total prostate specific antigen ratio, prostate specific antigen density and prostate volume in predicting prostate cancer and clinically significant cancer in patients aged 70 years or older and in establishing eligible cut-off levels.

Materials and Method: A retrospective study was done on the data of 1848 men who underwent prostate biopsy in our clinic between January 2015 and October 2019. Patients with prostate specific antigen levels >10ng/mL were excluded. Volumes were obtained by transrectal ultrasound. A clinically significant cancer was defined as having a Gleason score of ≥ 7 .

Results: 130 patients with available data were enrolled in the study. Prostate specific antigen density, prostate volume and free-to-total prostate specific antigen ratio were significantly different in patients with or without cancer. Regarding area under curve, prostate specific antigen density and prostate volume showed similar efficacy, and both performed better than free-to-total prostate specific antigen ratio (Area under curves for prostate specific antigen density, prostate volume and free-to-total prostate specific antigen ratio were= 0.770, 0.769 and 0.627, respectively). A multivariate analysis showed that only prostate specific antigen density was an independent predictor for prostate cancer and clinically significant prostate cancer, with cut-off values of 0.11 and 0.199, respectively.

Conclusion: Prostate specific antigen density is seen as one step ahead of prostate volume and free-to-total prostate specific antigen ratio in predicting prostate cancer and clinically significant prostate cancer. Prostate specific antigen density may play an active role in deciding prostate biopsies to prevent unnecessary tests in elderly.

Key Words: Geriatrics; Prostatic Neoplasms; Prostate-Specific Antigen.

INTRODUCTION

Prostate cancer (PCa) is the second most commonly diagnosed cancer and the second leading cause of cancer-related death in men worldwide, with an estimated 1.1 million diagnoses in 2012, accounting for 15% of all diagnosed cancers (1, 2). The prostate-specific antigen (PSA) is widely used for early disease detection. However, though highly sensitive, PSA is less specific for the diagnosis of PCa, resulting in difficulties in differentiating malignant and benign prostatic conditions in men. Hence, several investigations have been done to improve cancer detection rates using various parameters including free-to-total PSA ratio (f/tPSA), PSA density (PSAD), PSA velocity and age-referenced PSA. These prediction methods developed to reduce unnecessary biopsies and to avoid false-negative biopsies, are more accurate than PSA screening alone (3). Contrarily, majority of these studies were conducted in patients aged 40–70 years. Thus, there is a limited discussion of biopsy strategy in older, referral populations with symptoms in whom the incidence of latent cancer is relatively high and age-related benign PSA elevation is common (4). Whether sole PSA, PSA-associated parameters (f/tPSA, PSAD) and prostate volume (PV) are useful tools in distinguishing PCa from benign prostatic disease in older populations, similar to the situation in younger ones, has yet to be determined.

Data from the Goteborg arm of the ERSPC trial (5) noted that the age at which early diagnosis should be stopped remains controversial, and in parallel to this situation, there is no upper age limit to perform prostate biopsy in the European Association of Urology (EAU) guidelines. Nevertheless, EAU guidelines recommend an individualised risk-adapted biopsy strategy for early detection to a well-informed man in combination with patients' wishes and at least 10–15 years of life expectancy. It is evident that there is an increasing proportion of individuals aged 70 years and older and an increasing life expectancy

worldwide (6). As a result, urologists are faced with healthier patients aged 70 years and older who are candidates for prostate biopsy. However, performing prostate biopsies in men older than 70 years is associated with a nearly fourfold increased risk of complications and longer hospitalisations (7). Thus, managing prostate biopsy in the elderly is of increasing importance.

In an effort to contribute to the existing limited data on biopsy strategy in patients 70 years or older, this study aimed to evaluate the effectiveness of PSAD, PV and f/tPSA in predicting PCa in patients of this age group, in which PSA is likely to be elevated due to above-mentioned reasons, to avoid unnecessary biopsies. In addition, since the main goal of trying to predict PCa is actually to predict clinically significant PCa, we also evaluated the parameters to predict clinically significant PCa with a Gleason score of 7 or above. Finally, it was aimed to determine the appropriate cutting values, from which we can make these separations.

MATERIALS AND METHOD

A retrospective analysis was done on the data of 1848 men who underwent transrectal ultrasound (TRUS)-guided prostate biopsy in our clinic between January 2015 and October 2019. Biopsy decisions were taken in a case-by-case basis, considering the patients' digital rectal examination (DRE) findings, PSA values according to age, comorbidities and life expectancies. Patients with PSA levels >10ng/mL, aged <70 years and with a history of 5alpha-reductase inhibitor therapy, phytotherapy or any invasive therapy for benign prostate hyperplasia (BPH) were excluded. Patients who had a cystoscopy, colonoscopy, TRUS, acute prostatitis, urinary tract infection and urinary retention a month prior to the study were also eliminated.

Serum PSA levels were measured in ng/mL using the chemiluminescent microparticle immunoassay (CMIA) and all serum samples were



drawn before any prostate manipulation such as DRE, TRUS and biopsy. f/tPSA was calculated as the ratio of free PSA to total PSA multiplied by 100. The pre-biopsy PV of the patients were obtained by measuring three dimensions of the prostate with TRUS and using the ellipsoid formula ($PV = \text{height} \times \text{width} \times \text{length} \times 0.52$). Patients who have received at least 12-core biopsies were included in the study. Histological evaluation identified each patient's prostate specimen into either cancerous (prostate adenocarcinoma) or non-cancerous (Benign prostatic hyperplasia (BPH) and/or chronic prostatitis). Clinically significant PCa was defined as having a Gleason score ≥ 7 .

The patients' age, total-free PSA value, pathology results and Gleason score were evaluated, and the impacts of PSAD, PV, and f/tPSA on the detection of PCa and clinically significant PCa were investigated.

Statistical Analysis

Data obtained in the study were analysed using SPSS version 15.0 software (SPSS, Inc., Chicago, IL, USA). The conformance of the data to the normal distribution curve was evaluated using the Shapiro-Wilk test, and the continuous and categorical data were compared using the Mann-Whitney U-test, the chi-square test and Kruskal-Wallis test, respectively. The relationship of biopsy results with age, total-free PSA, PV, f/tPSA, PSAD

and the Gleason score was investigated through a univariate analysis using the Mann-Whitney U and chi-square tests. A logistic regression multivariate analysis was done to determine independent predictive factors for malignant prostate biopsy results. The receiver operating characteristic (ROC) curve was applied to evaluate and compare the efficacy of PV, PSAD and f/tPSA for PCa diagnosis. A p-value of < 0.05 was considered statistically significant.

RESULTS

After applying the exclusion criteria, 130 patients with available data of age, total-free PSA levels and PV calculated by TRUS were enrolled in the study. PCa and BPH were detected in 40 patients (30.8%) and in 90 patients (69.2%), respectively. Table 1 shows the clinical characteristics of patients.

On univariate analysis, f/tPSA and PV was significantly lower and PSAD was significantly higher in PCa patients than in patients with benign prostatic condition, whereas PSA, free PSA and age showed no significant difference between the two groups. In ROC analysis, the order of AUCs was determined as $PSAD > PV > f/tPSA$ (Table 2).

A multivariate analysis was carried out to compare PSAD, PV and f/tPSA which were significant in a univariate analysis. The multivariate

Table 1. The clinical characteristics of patients.

	Age (years)	total PSA (ng/mL)	free PSA (ng/mL)	free/total PSA ratio	PV (cc)	PSAD (ng/mL/cc)	Biopsy results		
							PCa	BPH	Total
Mean	73.77	7.109	1.822	0.261	72.73	0.129			
±	±	±	±	±	±	±	-	-	-
SD	2.95	1.759	0.886	0.115	33.78	0.092			
Median (IQR)	73 (71-76)	7.085 (5.845-8.550)	1.695 (1.21-2.21)	0.247 (0.178-0.324)	71 (46.25-94.25)	0.101 (0.070-0.144)	-	-	-
n (%)							40 (30.8)	90 (69.2)	130 (100)

PV: prostate volume, PSA: prostate specific antigen, PSAD: prostate specific antigen density, PCa: prostate cancer, BPH: benign prostate hyperplasia, SD: standard deviation, IQR: interquartile range.

Table 2. Comparison of patients' age, total PSA, free PSA, free to total PSA ratio, PSA density and prostate volume between cancer and non-cancer groups.

Parameters	Biopsy result		p value	AUC
	Cancer	Non-cancer		
Number of patients n (%)	40 (30.8)	90 (69.2)		
Age (years) Mean±SD Median (IQR)	73.781±2.684 73 (72-75.75)	73.77±3.80 73 (71-76)	0.782	0.548
Total PSA (ng/mL) Mean±SD Median (IQR)	7.47±1.725 7.75 (6.44-8.79)	6.945±1.758 6.91(5.58-8.42)	0.093	0.639
Free PSA (ng/mL) Mean±SD Median (IQR)	1.805±1.234 1.46 (1.14-2.12)	1.829±0.687 1.795 (1.297-2.335)	0.124	0.630
Free/Total PSA ratio Mean±SD Median (IQR)	0.242±0.148 0.214 (0.146-0.289)	0.270±0.096 0.256 (0.187-0.338)	<0,021	0.627
PV (cc) Mean±SD Median (IQR)	52.28±29.01 47 (30.5-67.25)	81.82±31.835 82 (60.25-100)	<0,001	0.769
PSDA (ng/mL/cc) Mean±SD Median (IQR)	0.189±0.109 0.157(0.099-0.275)	0.102±0.068 0.085 (0.066-0.118)	<0,001	0.770

PV: prostate volume, PSA: prostate specific antigen, PSAD: prostate specific antigen density, AUC: area under curve, SD: standard deviation, IQR: interquartile range.

analysis showed that the independent predictor of PCa was only PSAD (Table 4). Moreover, ROC analysis revealed a cut-off value of PSAD as 0.11 in predicting PCa. With the cut-off value of 0.11, the sensitivity and specificity were 70% and 71.1%, respectively. Table 5 presents the number of patients with and without cancer and p-values when patients were divided based on the cut-off value of PSAD.

As regards the clinical significance of the PCa, PSAD was significantly higher and PV was significantly lower in patients with clinically significant PCa than in patients with clinically insignificant PCa, whereas PSA, free PSA, age and f/tPSA showed no significant difference between the two groups. AUCs were quite close

to each other for PSAD and PV as 0.768 and 0.770, respectively (Table 3).

These values which were found to be significant in a univariate analysis were compared by performing a multivariate analysis. The multivariate analysis revealed that only PSAD was an independent predictor for clinically significant PCa (Table 4). Moreover, ROC analysis revealed a cut-off value of PSAD as 0.199 in predicting clinically significant PCa. With the cut-off value of 0.199, the sensitivity and specificity were 68.8% and 79%, respectively. Table 5 presents the number of patients with and without clinically significant PCa and p-values when patients were divided based on the cut-off value of PSAD.



Table 3. Comparison of patients' age, total PSA, free PSA, free to total PSA ratio, PSA density and prostate volume between clinically significant cancer and clinically insignificant cancer groups.

Parameters	Clinical Significance n=40, 100%		p value	AUC
	Gleson score ≤ 6 n=24, 60%	Gleson score ≥ 7 n=16, 40%		
Age Median (IQR)	74.5 (71-76)	73 (72-74.5)	0.713	0.535
Total PSA Median (IQR)	7.78 (6.46-9.08)	7.75 (6.39-8.78)	0.989	0.501
Free PSA Median (IQR)	1.42 (1.14-2.03)	1.8 (1.1-2.17)	0.359	0.587
Free/Total PSA ratio Median (IQR)	0.20 (0.14-0.27)	0.24 (0.18-0.33)	0.233	0.615
PSAD Median (IQR)	0.12 (0.08-0.19)	0.28 (0.13-0.34)	0.004	0.768
PV Median (IQR)	53 (39-77.25)	30 (20-56)	0.003	0.770

PV: prostate volume, PSA: prostate specific antigen, PSAD: prostate specific antigen density, AUC: area under curve, IQR: interquartile range.

Table 4. Multivariate analysis of prostate volume, PSA density and free to total PSA ratio to determine independent predictors of PCa and clinically significant PCa.

	Prostate cancer			Clinically significant prostate cancer		
	OR	%95CI	P	OR	%95CI	p
PV	1.018	0.995-1.041	0.107	0.994	0.945-1.045	0.809
PSAD	0.001	0.000-0.002	<0.001	56292.21	24797-127790.545	0.006
f/tPSA	3.007	0.085-106.025	0.418	-	-	-

PV: prostate volume, PSA: prostate specific antigen, PSAD: prostate specific antigen density, PCa: prostate cancer, f/t PSA: free/total PSA ratio, OR: odds ratio, CI: confidence interval.

DISCUSSION

Uncertainties exist in cancer screening for older people. The clinical significance of prostate cancer screening is limited by a decreased life expectancy. However, in recent years, the elderly population has been found to have a longer life

expectancy (6), and this indicates an increase in the number of elderly patients who may be candidates for prostate biopsy, especially in tertiary health institutions as ours to which elderly patients with lower urinary tract symptoms and/or elevated PSA levels are referred. Nevertheless, increased PSA level alone may be an insufficient

Table 5. The number of patients with and without prostate cancer and clinically significant prostate cancer and p values when patients were separated according to determined cut-off values of PSAD.

n (%)	PSA Density n=130 (100%)		p value
	<0.11 76 (58.4%)	>0.11 54 (41.6%)	
Cancer	12 (15.8%)	28 (51.9%)	<0.001
Non-cancer	64 (84.2%)	26 (48.1%)	
n (%)	PSA Density n=40 (100%)		p value
	<0.199 24 (60%)	>0.199 16 (40%)	
Clinically Insignificant PCa (Gleason score ≤6)	19 (79.1%)	5 (31.2%)	0.006
Clinically Significant PCa (Gleason score ≥7)	5 (20.9%)	11 (68.8%)	

PSA: prostate specific antigen, PCa: prostate cancer.

parameter to make a biopsy decision in this elderly group of patients who are expected to have high age-related PSA. In this respect, Morgan et al. (8) clearly reported an age-related decline of PSA specificity. Similarly, in our study, no significant difference was noted between PSA levels of patients with and without cancer. Kobayashi et al. (9) and Yanai et al. (10) also highlighted the identical result for patients above 70 years. We are not doubtful on the use of PSA for PCa detection in older men, but other parameters that may help to predict PCa are needed. PSAD and f/tPSA have been studied extensively and PV is a relatively less studied parameter compared to the other two. To our knowledge, only three reports have focused on age and patients aged 70 years and older were examined in two of these studies (9-11).

In the current study, the cut-off value for PSAD in predicting patients with or without cancer was 0.11. Stephan et al. (12) reported a similar value of 0.1 for patients with PSA between 4 and 10 ng/mL. These cut-off values are lower than those of most other studies which usually recommended 0.15 as the PSAD cut-off level (13-14). When these

parameters were evaluated to predict clinically significant PCa, multivariate analysis again showed that only PSAD was an independent predictor and a cut-off value of 0.199 was determined for PSAD. In the literature, the recommended cut-off values for PSAD in predicting clinically significant PCa ranged from 0.08 to 0.32, and in most of these studies, the proposed cut-off value was 0.15 (11, 13, 14). On the other hand, only one of these studies focused on a specific age group. In this study, Kosaka et al. (11) reported that a cut-off value of 0.32 for PSAD was a very effective predictor of clinically significant PCa in men aged 50 years and younger. To the best of our knowledge, the PSAD cut-off value indicated in the present study is the only recommendation found in the literature on predicting clinically significant PCa in patients aged 70 years and older. PSAD <0.15, which is a suggested criteria of active surveillance in the European Association of Urology (EAU) guidelines in all age groups of PCa patients, can be readjusted for patients of different age groups, with the results of new studies targeting different age groups. In this way, evaluating patients with



regard to active surveillance with the cut-off values adjusted for their age groups will yield healthier results. We emphasise that our recommendation is also important from this perspective. Although Yanai et al. (10) did not describe a cut-off value in predicting clinically significant PCa, the median PSAD value reported in patients with clinically significant PCa was 0.27, consistent with ours (median, 0.28). However, in this study, clinically significant PCa was defined as the International Society of Urological Pathology (ISUP) grade 2 and above, whereas they defined it as ISUP grade 3 and above. Despite that, in predicting PCa, they reported a PSAD cut-off value of 0.20, which is higher than our recommendation (0.11) and many of the other studies (mostly around 0.15) (13, 14). Their median values were 0.20 for PSAD and 35.1 cc for PV while ours were 0.101 and 71 cc, respectively. We associated the difference between the median values with the fact that they obtained prostate volumes using multiparametric magnetic resonance (mpMRI) which is considered to be a more accurate measurement tool compared to TRUS. Although it is necessary to underline that mpMRI may not be suitable for every patient in terms of time and cost, its use before prostate biopsy is becoming more common today. Wilson et al reported that PSAD and mpMRI were independent predictors of clinically significant PCa at biopsy (15). Furthermore, using PSAD combined with mpMRI has been reported to improve the negative predictive value of mpMRI, perform better than mpMRI alone in predicting clinically significant PCa, and is also useful in making a biopsy decision in patients with indeterminate mpMRI lesions (16-18). Given the results of these studies and that mpMRI will be used more widely, we hope that the results we found about PSAD may be increased in importance by combining with mpMRI results.

Consistent with this study, Kobayashi et al. (9) reported that PSAD, PV and f/tPSA were significantly different for patients aged 70 years

or older with and without cancer on univariate analysis. However, contrary to our study, they found on multivariate analysis that only PV was an independent predictor for PCa. In the present study, PV was not an independent predictor for PCa. Furthermore, Erdogan et al. (19) and Shigemura et al. (20) reported that PV was an independent predictor of PCa. However, any age classification was not performed in either study. Similar to the study by Kobayashi et al. (9) and the current one, Yanai et al. (10) reported that PV was significantly different between patients with and without cancer, including patients aged 70 years or older who also had a PSA level of < 20 ng/mL, but they did not make an evaluation for PV involving a multivariate analysis. When Erdoğan et al. (19) evaluated PV for clinically significant cancer, they did not achieve a meaningful result similar to our study. When all these data are evaluated as a whole, PV appears to be a significant parameter in predicting PCa but not for clinically significant PCa. Similar to our results, there are two studies showing that f/tPSA was significant in univariate analysis in predicting PCa, but not in multivariate analysis. (9, 19). In one of these (9), contrary to our study, a significant difference for f/tPSA was found between patients with and without clinically significant cancer.

The limitations of our study included its relatively small sample size and retrospective nature. Although we aimed to minimise the errors due to sampling by including patients with at least 12-core biopsies, it is undeniable that in some patients, we may have missed PCa. Moreover, different biopsy criteria depending on patient age may cause selection biases to some degree. In this regard, we evaluated clinical parameters of biopsied patients in three age groups (70–75 years, 76–80 years and 81 years or older) and the cancer detection rates were not significantly different ($p = 0.511$). Other limitations can be considered as potential insufficiencies in the PV measurements due to TRUS measurements which

may vary depending on the practitioner and in the Gleason score assessments due to the lack of radical prostatectomy specimens. However, all pathology results were reported by experienced pathologists since it was a tertiary hospital. The fact that our study is one of three studies conducted in patients aged 70 years and older and that the cut-off value of PSAD recommended for predicting clinically significant prostate cancers have not been investigated before for this age group are the strengths of our study.

In conclusion, the results of this study demonstrated that PSAD is an effective parameter in predicting PCa and clinically significant PCa in older patients. Moreover, it was superior to the other two parameters (PV and f/tPSA). We suggest that patients with a PSAD greater than 0.11 and 0.199 should be evaluated more carefully for PCa and clinically significant PCa, respectively. Therefore, PSAD may play an active role in the decision-making for prostate biopsy in elderly men. Thereby, it was pointed out that unnecessary biopsies and possible complications can be decreased for elderly patients in accordance with

our recommendations. On the other hand, these recommendations should be confirmed with further studies.

Disclaimers

Author's statement that the views expressed in the submitted article are his or her own and not an official position of the institution or funder.

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RESEARCH

APPROACH TO CUTANEOUS LESIONS OF THE HEAD AND NECK IN THE GERIATRIC AGE GROUP: RETROSPECTIVE ANALYSIS OF 170 CASES

ABSTRACT

Introduction: The incidence of skin lesions increases with advancing age, especially in the head and neck region. The aim of this study was to evaluate the demographic data of head and neck skin lesions in the geriatric age group and the preferred surgical approaches.

Material-Method: The records of 170 patients of an age >65 years who underwent surgical excision and reconstruction for head and neck lesions in our clinic were retrospectively reviewed. The histopathological results of the lesions and the repair method used were evaluated according to age and localization.

Results: The mean age of the patients was 71.42 ± 14.20 years. The histopathologic distribution of the lesions were 75 (44.2%) basal cell carcinoma, 30 (17.6%) squamous cell carcinoma and 65 (38.2%) benign. The most frequent localizations were nose and cheeks, and the most preferred reconstruction methods were primary closure and advancement flap. None of the patients had serious complications.

Conclusion: Basal cell carcinoma is the most common lesion in the head and neck region in elderly individuals. The lesions in this region can be detected in the early stage since they are in the visible region. The Surgical excision and repair with local flaps in the treatment provide very successful cosmetic results.

Keywords: Skin Neoplasm; Aged; Head neck surgery.



INTRODUCTION

Skin lesions are frequently encountered in the geriatric population, especially in the head and neck regions, due to the skin ageing. Even though these lesions are often benign, it is widely known that the prevalence of cutaneous malignant lesions increases with age (1). In this respect, the most frequent malignant pathology is basal cell carcinoma (BCC), followed by squamous cell carcinoma (SCC), and malignant melanoma (MM). The long-term exposure of the head and neck regions to the ultraviolet (UV) rays is an essential risk factor for the development of skin cancer in the geriatric patients (2). BCC and SCCs are often observed as local invasive ulcers (3). The treatment options for the skin lesions in this region are surgical excision, medical immunomodulator creams, cryotherapy, cauterisation and photodynamic therapy (4,5). After the detection of affected region, the defect is repaired by using primary repair, local flaps, or free tissue grafts in the excision process (6). The skin elasticity is high in the elderly population, which allows the defects to be repaired with primary and local skin flaps. Additionally, in order to avoid possible complications of general anaesthesia, it is advantageous to perform such operations with local anaesthesia in this age group.

Although there are studies on the skin diseases in the elderly population in the literature, detailed studies on the surgical results of lesions in the head and neck regions in this age group are very few (7,8). The purpose of this study is to evaluate and analyse the demographic data and surgical reconstruction methods employed for the geriatric patients who underwent surgery for the treatment of skin lesions that were located in the head and neck regions.

MATERIALS AND METHOD

In this study, we retrospectively analysed the medical records of 170 patients who are older

than 65 years and underwent the excision of skin lesions in the head and neck regions (excluding the lips) in Sakarya University Medical Faculty ENT clinic between January 2015 and March 2019 were. The ethical approval of study was obtained from the ethics committee of Sakarya University Medical Faculty (715224473/050.01.04. Date : 02.12.2019). All the patients included in the study had a follow-up period of longer than six months after excision. In addition, we also examined the initial examination findings, age, gender, area of lesion, long diameter, surgical repair technique, histopathological findings, complications, postoperative follow-up duration and recurrence data.

Before the surgery, all the patients received dermatologic consultation, and a diagnostic punch biopsy was performed on the suspected lesions. Based on the histopathological diagnosis, patients with suspected metastatic lymph nodes underwent neck ultrasonography examinations. According to the histopathologic diagnosis, the lesions were categorised into three subgroups: benign, BCC and SCC. The histopathological diagnosis of the patients was statistically analysed according to age, gender and regional distribution. The participants in the study were also divided into two age groups: between 65 and 75 years and older than 76 years. The lesions were grouped according to the size: greater than 1 cm, 1–2 cm and greater than 2 cm. In terms of localisation, the head–neck region was further divided into eight basic subunits: the facial area, forehead, nasal unit, upper and lower eyelid units, cheek unit, perioral unit, mentum unit, auricular unit, and neck (9). This study did not include the lesions on the lip because they require different treatment and surgical repair principles. The defect repair techniques employed in this study were recorded as primary closure, advancement flap (single/bilateral, V–Y), rotation flap (Figure 1), transposition flap (bilobed and rhomboid flaps), interpolation flap (nasolabial, forehead), free flap and Z-plasty.

Operative Techniques

All the patients provided their detailed consent. The examination of excision technique records revealed that if the pre-diagnosis was benign, then it was normal skin margin of 1–2 mm; if the pre-diagnosis was BCC, then the normal skin margin was of 4 mm; and if the pre-diagnosis was SCC, then the normal skin margin was of 7–10 mm. The size and localisation of the lesion determine the basic excision principle for these cases. Full-thickness excision including the lesion with a number of 15 scalpels had been noted in the records. Suturing data for closure had been recorded as 3/0 vicryl, and 4/0-5/0 prolene sutures were used. According to the file records of patients, the postauricular area and the supraclavicular region were mostly preferred for free skin grafts. The applied surgical method is provided in detail in the medical files of each patient.

Postoperative Follow-up

All the patients underwent postoperative follow-up under the supervision of physicians in our clinic. The patients were mostly discharged on the first postoperative day, which was recorded on the medical file. Each patient had been recalled to the clinic on the second postoperative day or at seventh or tenth postoperative days for the removal the sutures according to the charts. All patients had been re-evaluated for an average of four to six weeks based on their histopathological diagnosis. The cosmetic outcomes were evaluated at the end of the sixth month to obtain clearer results. The follow-up and planning of each patient had been managed according to the histopathological diagnosis, complications and excision margins.

Statistical Analysis

We used descriptive statistics, such as mean (SD) and distribution for the analysis of patients' characteristics. The categorical data were provided as numbers (n) and percentages (%). The Kolmogorov–Smirnov test was performed

for the normality distribution analysis, whereas the nonparametric tests were conducted according to the results. The categorical variables were compared by the chi-square test. A correspondence analysis was undertaken to determine the treatment techniques utilised for the lesions according to localisation. In addition, p values less than 0.05 were accepted as significant. All the statistical analyses were performed by using the commercial software (IBM SPSS Statistics. Version 23.0. Armonk. NY: IBM Corp.)

Table 1. General data and characteristics of patients and lesions.

Parameter	n (%)	P
Gender		0,711
Female	69(40,6)	
Male	101(59,4)	
Age		0,056
65-75	98 (57,64)	
>75	72 (42,34)	
Diagnosis		0,197
Benign	65 (38,2)	
BCC	75 (44,1)	
SCC	30 (17,6)	
Lesion Localization		0,001*
Forehead	15 (8,8)	
Nasal	50 (29,4)	
Eyelid	10(5,9)	
Cheek	34 (20,0)	
Perioral	16 (9,4)	
Mentum	5 (2,9)	
Auricula	26 (15,3)	
Neck	14 (8,2)	
Size of Lesions		0,000**
<1 cm	72 (42,4)	
1-2 cm	63 (37,1)	
>2 cm	35 (20,6)	

*Statistically significant difference considering the localization distribution of lesions

**Statistically significant difference considering the size of lesions



RESULTS

General Patient Data

Table 1 presents the descriptive data of 170 patients included in the study. The total number of female patients was 69 (41%), whereas the number of male patients was 101 (59%). The overall mean age of the patients was 71.42 ± 14.20 years (min 65–max 88). Furthermore, 98 patients (57, 64%) were between 65 and 75 years, whereas 72 patients (42, 35%) were older than 76 years. There was no statistically significant difference between the female and male patients in terms of age distribution ($p > 0.05$). The mean follow-up period was $26 \pm 12,36$ (min 12–max 48) months. According to the regional distribution of the lesions, the most frequent localisation was observed in the nasal ($n = 50$; 29.4%), cheek ($n = 34$; 20%), and auricular ($n = 26$; 15.3%) units. The mean size of the lesions was 1.78 ± 1.02 cm (min 0.3 cm–max 7 cm). When the lesion size was evaluated according to the long diameter, 62 (36.47%) patients had a lesion size smaller than 1 cm, 73 (42.94%) patients had a lesion size of 1–2 cm, and 35 (20.58%) patients had a lesion size larger than 2 cm (Table 1).

Histopathological Results

The histopathological data revealed that BCC

was diagnosed in 83 cases (48.88%), SCC in 32 (18.8%), and some benign pathologies in 55 cases (32.35%). The most common diagnosis among the benign lesions was nevus that had been reported in 12 patients, followed by keratoacantoma in nine patients, actinic keratosis in eight patients, lentigo simplex in seven patients, verruca vulgaris in seven patients, and atypical polypoid tubular apocrine adenoma, calcified trichilemmal cyst, angiofollicular hyperplasia, dermatofibroma, pilomatrixoma and epidermal inclusion cyst in one patient each. Lymph node metastasis was not recorded in the patients who had malign diagnosis. The mean age of the patients with a benign diagnosis was statistically significantly lower ($p = 0.023$). Age did not statistically significantly differ between the patients with different malignant diagnoses (SCC or BCC) ($p = 0.647$). While there was no significant difference in the malignant and benign diagnosis rates in women ($p = .07$), a significant difference was observed in the male patients in the favour of malignancy ($p = 0.01$) (Table 2).

The evaluation of the distribution of diagnoses among the eight subunits determined that the lesions with a diagnosis of BCC were more predominantly located in the second and fourth regions than in the remaining regions ($p = -0.003$),

Table 2. According to histopathological results of the lesions, sex, age, regional placement frequency and average size are specified.

Parameter	Benign	BCC	SCC	P
Gender (n,%)				
Male	29(52,72)	46(55,42)	21(65,62)	023*
Female	26(47,27)	37(44,57)	11(34,37)	.083
Age	66,25±20,84	76,83±12,71	77,67±14,00	032**
Localization(n,%)	Nasal (14,21.5) Cheek (14,21.5)	Nasal (28,56)	Perioral (9,56,2)	003*** .004***
Diameter(mm) (Mean±St.Deviation)	1,66±1,27	1,46±0,86	1,71±0,75	0,197

*Statistically significant difference considering the gender distribution of malignancy **Statistically significant difference considering the mean age for benign pathologies ***Statistically significant difference considering the most frequent localization

and the SCC diagnosis was more frequent in the fifth region ($p = 0.004$). The lesions diagnosed as benign were mostly located in the nasal unit (21.5%) and in the cheek (21.5%). There was a significant difference between the malignant and benign diagnoses in terms of lesion diameters. Most of the patients diagnosed with benign lesions had the diameter of these lesions to be 2.00 cm and over. In total, 65% of the patients diagnosed with BCC had a lesion size in the range of 1–2 cm, whereas this value was less than 1.00 cm in 30% of those diagnosed with SCC ($p = 0.019$). The diameter of lesions in the cheek and forehead was significantly greater than the remaining regions ($p = 0.001$). (Table 2)

Surgical approach

The surgical repair methods that had been preferred after excision were as follows: primary closure in 62 patients (36.5%), advancement flaps in 24 (14.1%), rotation flaps in 44 (25.9%), transposition flaps in 28 (16.4%), free flaps in 4 (2.4%), interpolation flaps in 4 (2.4%), and Z-plasty in 4 (2.4%). By considering the age distribution of the patients, the mean age of the patients that underwent primary closure was statistically significantly higher ($p = 0.001$) (Table 3). According to the results of correspondence analysis, there was a significant relationship concerning the preferred reconstruction method according to the region of the lesions ($p = 0.005$). In the nasal lesions, transposition flaps (bilobed) were used at

a statistically significant rate ($p = 0.003$). In mentum and neck regions, the lesions had been treated with the primary closure technique. Another notable finding of the analysis stated that free and interpolation flaps had been mostly utilised for the ear and nose regions. There was no significant difference in the distribution of the remaining method according to the lesion localisation.

Figure 2 presents the results of the correspondence analysis of 'procedure', which represents the treatment technique applied to the lesions, and 'localisation', which refers to the subunit on which the lesion was located.

Complications

Recurrence was not recorded in the patients with malignant lesions during the follow-up of a maximum period of 48 months. Complication data were not observed except for partial necrosis in 11 (6.47%) patients (5 females and 6 males). In fact, these cases showed improvement with postoperative debridement and wound care. Additionally, according to the data in the patient files, flap losses, which would require the repetition of flap repair, were not observed. Functionally, in the cases where the eyelid was involved, no ectropion had been occurred, and the margins were recorded as well aligned and stable which had been explained as 'adequate eyelid closure, without any exposure sequelae'.

Table 3. Distribution of surgical repair methods by regions and age.

Surgical Technique	n (%)	Age (Mean±St.Deviation)	P
Primary Closure			
Advancement flaps	62 (36,5)	78,02±21,27	
Rotation flap	24 (14,1)	69,38±17,13	
Bilobe flap	44 (25,9)	70,11±8,74	
Free flaps	28 (16,5)	66,46±17,16	
z- plasty	8 (4,7)	68,00±5,98	
	4 (2,4)	73,50±5,75	.001*

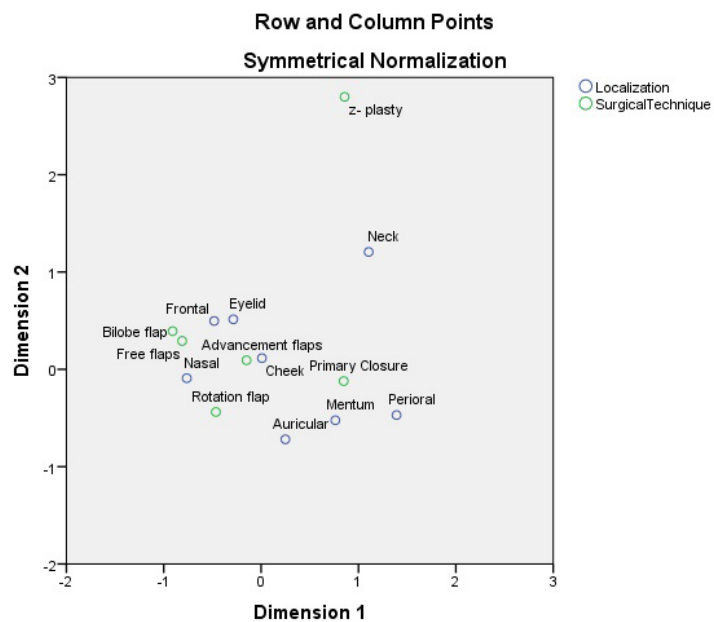
*Statistically significant considering the age distribution



Figure 1. Rotation flap design for the lesion located on the nasal dorsum.



Figure 2. Frequency of surgical repair methods according to regions.



DISCUSSION

The incidence of skin lesions increases with age as it depends on the long-time UV exposure, especially at head and neck regions (4). Although the skin cancer rates of elderly patients have been reported between 9 and 12% in the studies conducted in the dermatology clinics, it is difficult to accurately determine the incidence of skin cancer in this age group (10,11). This may be due to the fact that patients presenting for suspicious skin lesions are not directed to surgical excision, which led to the avoidance of possible complications; hence, the differential diagnosis of benign lesions is not possible. In this study, we analysed the data of 170 geriatric patients who had undergone surgery for skin lesions located in the head and neck regions in our otolaryngology clinic. The most common histopathologic diagnosis was BCC in our study group, which was consistent with the literature (11). In the cohort studies, a high increase in the incidence of BCC had been reported in white patients over 65 years. Again, more than 80% of cutaneous SCC cases occur in the elderly patients and the average age at diagnosis is 70 years (12). Benign pathologies were detected in 32.35% of the patients included in our study, and the most common diagnosis was nevus. Even so, it was noteworthy that our sample included rare benign pathologies, such as tubular apocrine adenoma, calcified trichilemmal cyst, angiofollicular hyperplasia and pilomatrixoma. The mean age of the patients with a malignant diagnosis in our study group was statistically significantly higher ($p = 0.001$). From a gender point of view, the rate of malignant diagnosis was significantly higher in men ($p = 0.01$), which is a consistent finding in the literature (7,11,12).

SCCs occurring at the head and neck regions and lymph node metastases are at a higher risk of recurrence than SCCs located on the trunk and extremities (13,14). BCCs of the head and neck are also more likely to recur than those on the trunk and extremities. BCCs are much less likely

to metastasise than SCC (15). In our study, none of the patients with malignancies were diagnosed with lymphoid and distant metastasis.

We also evaluated whether the excised lesions were different in the regional distribution according to the histopathological diagnosis because in the literature, there is no similar grouping for the head and neck regions in this age group. The diagnosis of BCC was found to be significantly higher in the nasal and cheek areas ($p = 0.003$). This was considered to be due to the more protruding characteristics of these locations and the longer exposure to the sun with age. Although there is no similar study in this age group, Dalal et al. reported the most common localisation for BCC as the nose and cheek regions in their study (16). Concerning the rate of SCCs, a significantly higher number of lesions were located in the perilabial region ($p = 0.004$). Although the lip lesions were excluded from our study, the diagnosis of SCC, which was predominant around the lip region, presents similar data to lip cancer (17).

Medical treatments may be the first choices in the elderly patients for the treatment of head and neck lesions. However, as it is believed, surgical excision is not as difficult and complicated. To minimise the cosmetic deformities, local flaps serve as a good alternative in the head and neck regions. The four basic factors should be considered in the surgical treatment: total removal of the tumour or lesion, maximal preservation of normal tissue, preservation of function and optimal cosmesis (18). Even if the lesion diameter is large in certain regions, the elasticity of skin tissue allows for primary repair in elderly patients. In our study group, it was observed that primary repair was the reconstruction method used as the first choice, especially in the cheek and neck areas ($p = 0.004$). Although, the excision and repair of periorbital lesions may result in an increased risk of ectropion in the elderly patients, other similar studies have showed that the most challenging region was the auricle (19,20). For



these areas, the more preferable methods are pedicle flaps, free flaps or pedicle flaps extended from the postauricular region. In our study group, free flaps were used in the repair of 2 of the 26 auricular lesions, whereas the advancement flaps were preferred for the lesions on the helix and postauricular pedicle flaps for those located in the cavum conchae region. Bilobed flaps are easy to apply and very effective in the closure of the defected area in the nasal lesions (21). Similarly, in this study, these flaps were more utilised in the nasal region. The advancement flap design is relatively simple and can be successfully applied to repair a wide variety of small- or moderate-sized cheek defects (22). This group of flaps is based on an incision that allows the "sliding" movement of the tissue. In particular, the V-Y advancement flap is equally effective for the coverage of large cheek wounds and small defects of those approximating the lid or lateral cheek (23).

The most important advantage of local flaps is that they do not cause any secondary morbidity by allowing the simultaneous closure of the defect and flap donor area usually under the local anaesthesia. In order to prevent the complications of general anaesthesia due to concomitant diseases in elderly patients, it is advantageous to administer local anaesthesia.

All the patients in our study group received dermatologic consultation before excision. The lesions that were clinically suspected of malignancy or had signs of malignancy in the punch biopsy were referred to be surgically excised. Therefore, the mean lesion diameter was relatively small, which was attributed to the consultation provided to the patients at an early stage. We also investigated the relationship between the lesion diameter and the regional distribution of lesions and diagnoses, which was quite different from the literature. According to the results, the rate of malignancy increased ($p = 0.001$) with the decrease of lesion diameter. Furthermore, the lesions located in the cheek and forehead subunits were

found to be larger than those in the remaining subunits ($p = 0.001$). It is also noteworthy that the patients reported no cosmetic dissatisfaction and no recurrence occurred in the long-term period. In similar studies conducted with local flaps, it was emphasised that the cosmetic expectations of the patients were well satisfied (24).

An observational study reported complications in 7.9% of 247 patients over 85 years of age who underwent surgery for cutaneous lesions (24). No major complications were observed in our study, except for local necrosis, and the complication rate (6.47%) was consistent with the literature. In a review, for a group of patients older than 75 years, male gender, histologic type and inadequate initial resection were identified as the high risk factors for complications (25). Additionally, the high rates of anticoagulation use and the possibility of comorbidity such as diabetes may increase the likelihood of bleeding and infection of surgical area in the postoperative period. No serious complications were observed in our patient group. There are no reports directly comparing the postoperative complications of cutaneous surgery between older and young patients in literature. Our study also contributes to the literature regarding the complication rates, which is not significantly different in the elderly patients.

CONCLUSIONS

Cutaneous head and neck lesions are the primary diseases of the geriatric population. General physicians, dermatologists and otorhinolaryngologists dealing with geriatric patients frequently encounter this condition. Most head and neck cutaneous lesions are relatively small, but the excision is often required in this age group due to the high risk of malignancy. Although there are perioperative risks associated with many comorbidities present in the geriatric population, reconstruction with small local flaps is

easily possible after excision.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no competing interests.

Financial disclosure information

No financial disclosures.

Ethical standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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RESEARCH

EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS, TREATMENTS, AND COMORBIDITIES IN ELDERLY PATIENTS WITH PSORIASIS AND THE EVALUATION OF PATIENTS ACCORDING TO THE AGE OF ONSET

ABSTRACT

Introduction: There is limited data regarding epidemiological and clinical characteristics of psoriasis in the elderly population. We sought to demonstrate epidemiological and clinical features, treatments, and comorbidities in elderly patients with psoriasis. Additionally, we evaluated whether the age at disease onset had an impact on disease characteristics.

Materials and Method: We performed a retrospective review of 508 psoriasis cases and evaluated 89 patients, older than 65-years-old, with psoriasis. Patients were divided into two groups according to the age at disease onset: early-onset psoriasis (before age 40) and late-onset psoriasis (after age 40). All data were compared for the two groups.

Results: Elderly patients with psoriasis comprised 17.6% of all patients. The median age was 70-years-old, with a male to female ratio of 1.4. Past family history was known for 25% of patients. The primary subtype was plaque-type psoriasis and 78.7% of patients had moderate-severe psoriasis. The two common comorbidities were hypertension (57.3%) and diabetes mellitus (33.7%). In total, 32.5% had early-onset psoriasis and 67.5% had late-onset psoriasis. Patients with early-onset psoriasis had a significantly higher prevalence in their family history ($p=0.020$). There was no significant difference between clinical subtypes, disease severity, nail and joint involvement, or treatment modalities, according to the age at disease onset. Nevertheless, we found a statistically significant correlation between late-onset psoriasis and hypertension ($p=0.014$).

Conclusion: This study underlined epidemiological and clinical features of psoriasis in the elderly. Excluding hypertension, the age at disease onset did not show an impact on disease characteristics or comorbidities.

Keywords: Risk Factors; Comorbidity; Aged; Psoriasis; Age of Onset.



INTRODUCTION

Psoriasis is a chronic autoimmune inflammatory condition that primarily affects the skin and joints. Moreover, psoriasis has a high genetic predisposition (1). The onset of psoriasis may occur at any age; however, there are two peaks with regard to the age of onset, one of which is between 15–25-years-old, and the other at 50–60-years-old (2). Although the exact prevalence and incidence of psoriasis in the elderly population is unknown, psoriasis is the sixth most common skin disease in the geriatric population (3). Over the next several decades the incidence of psoriasis is expected to increase, due to its chronic progression in a larger aging and longer living population. There is minimal data about the epidemiological, clinical, and genetic aspects of psoriasis in the elderly. In addition, it has been reported that the age of onset of the disease gives rise to distinct epidemiological and clinical characteristics (4). Furthermore, managing psoriasis in the elderly can be difficult due to comorbidities and possible drug interactions (3). The purpose of this study was to analyze whether psoriasis has a clinical, epidemiological, and therapeutic profile in elderly patients; as well as to evaluate if the age at disease onset has an influence on clinical aspects and comorbidities in elderly patients with psoriasis.

MATERIALS AND METHOD

After the Institutional Review Board approved the protocol (10-664-18), we retrospectively evaluated all cases of patients with psoriasis at our psoriasis center between the years 2000 to 2018. Among the patient population with psoriasis, those older than 65-years-old were included in the study. We classified patients into two groups, according to the age at the disease onset; for example, the early-onset psoriasis (EOP) group was defined as patients who developed this condition before the age of 40, and the late-onset psoriasis (LOP) group as patients who developed this condition after the age of 40. The cut-off age of 40 was

established for early and LOP classification, according to the study by Henseler and Cristophers (2). Clinical data including age, sex, family history (including first-degree relatives), disease severity, clinical characteristics, nail and joint involvement, treatment modalities, and comorbidities were collected. Patients who had previously received traditional systemic treatment (i.e., acitretin, methotrexate, or ciclosporin) or a biological therapy, were considered as having moderate to severe psoriasis. Clinical phenotypes were classified as the plaque-type, guttate-type, pustular-type or erythroderma-type, and if the patient had a special involvement area that included the scalp, palmoplantar area, and/or flexural area, it was recorded. Nail involvement was defined as morphological changes in fingernails and/or toenails during the disease course. Joint involvement was considered upon diagnosis by a rheumatologist or dermatologist. Patient comorbidities that were recorded included hypertension, diabetes mellitus, cardiovascular events (e.g., angina pectoris or myocardial infarction), and malignancies. Data regarding previous treatments and treatment-type of patients at their last admission were also collected.

Statistical analysis

Quantitative data were expressed as mean \pm standard deviation, while qualitative data were expressed as n (%). Missing values were not included in statistical calculations. Pearson's chi-square test was used to compare categorical variables, which were expressed as numbers and percentages. Comparisons between two independent groups were performed using independent sample t-test for normally distributed variables and Mann–Whitney U test for non-normally distributed variables. Fisher's exact test was used to test the analysis of contingency tables. The McNemar test was used to determine if there are differences on a dichotomous dependent variable between two related groups. For all analyses, probability values of 5% or less were regarded as being statistically significant.

RESULTS

Eighty-nine patients with psoriasis over the age of 65 were included in the study. Elderly patients with psoriasis constituted 17.6% (89/503) of all psoriatic patients in our outpatient psoriasis clinic. The epidemiological and clinical profile, treatments, and comorbidities that were evaluated are summarized in Table 1. The most common comorbidities were hypertension (57.3%), diabetes mellitus (33.7%), dyslipidemia (22.5 %), and atherosclerotic heart disease (22.5 %). Of the patients, 15 (16.8%) had a history of autoimmune disease including Hashimoto's thyroiditis (n:5), rheumatoid arthritis (n:3), ankylosing spondylitis (n:3), Sjogren's syndrome (n:1) and autoimmune dermatological disease (n:2, vitiligo in one patient and bullous pemphigoid in one patient). Inflammatory bowel disease was not detected in any patient.

According to the age at disease onset, 29 patients had EOP and 56 patients had LOP. The age of onset was not specified in four patients, and were excluded from EOP/LOP characteristic comparisons. Table 2 summarizes the comparison of epidemiological and clinical features of patients with EOP or LOP. The male to female ratio was 1.41 in EOP patients and 1.43 in LOP patients. The difference between the two groups with regards to gender was not statistically significant ($p>0.05$). Family history was positive in 41.7% and 15.4% of EOP patients and LOP patients, respectively. Patients with EOP had a significantly higher family history of psoriasis ($p=0.020$). The chronic plaque-type was the most common clinical type in both groups. No significant difference was detected between the age at disease onset and clinical forms of psoriasis or the involvement of the scalp, palmoplantar area, or flexural area ($p>0.05$). While a higher incidence of joint and nail involvement was detected in patients with EOP, the difference between the two groups was not statistically significant. A statistically significant difference was not shown between the two groups according to

disease severity ($p>0.05$).

Among 89 patients, 71.9% received systemic treatment in during the follow-up period, but at the last admission only 24.7% of patients were receiving systemic treatment. There was no significant difference between EOP and LOP patients according to treatments they had received previously and at last admission ($p>0.05$). We found a statistically significant correlation between LOP and hypertension ($p=0.014$), while it was not shown for others (i.e., diabetes mellitus, dyslipidemia, atherosclerotic heart disease, malignancy and autoimmune disease) ($p>0.05$).

DISCUSSION

Psoriasis causes several challenges including high prevalence, chronicity, and associated comorbidities. Due to its chronic nature and a growing number of elderly in the general population, it is expected that psoriasis will increasingly affect the geriatric population. Yap et al. found that the prevalence of psoriasis was 3.1%, based on a review of 2,571 outpatients, aged 65-years and above (5). Gligora et al. (6) reported that psoriasis cases accounted for 3.1% of elderly hospitalized patients over a 10-year period. Liao et al. found a similar prevalence rate of 3.9% in their cohort of 1,6924 geriatric outpatients over a 7-year period (7). Different studies demonstrated that the prevalence of geriatric psoriasis varied from 5% to 34.5% in all psoriasis patients (4, 8-10). In our study, elderly patients with psoriasis accounted for 17.6% of the psoriatic population at our center.

The age of patients during the disease course may be associated with different epidemiological and clinical aspects. Apart from specifically considering disease onset, clinical studies on psoriasis have been rarely conducted in geriatric patients. One study has reported that females and late disease onset were much more frequent and familial history was less frequent in elderly patients with psoriasis compared to adult patients. Phan et



Table 1. Epidemiological and clinical characteristics, treatments and comorbidities of elderly psoriasis patients.

	All patients (n:89)
Male, n (%)	52(58.4)
Mean age (year) mean± SD	72.17±7.18
Range (year)	(65-96)
Mean of disease duration mean± SD	23.6±17.3
Range (year)	(1-80)
Family history, n (%)	16 (25)
Age of onset(year) mean± SD	48.4 ±15.9
Range (year)	(14-76)
Main clinical subtypes, n (%)	
Plaque type	79 (88.7)
Guttate type	6 (6.7)
Pustular type	3 (3.4)
Erythrodermic type	1(1.2)
Special involvement area, n (%)	
Scalp psoriasis	33 (37.1)
Palmoplantar psoriasis	11 (12.4)
Inverse psoriasis	3 (3.4)
Nail involvement, n (%)	36 (40.4)
Psoriatic arthritis, n (%)	11 (13.5)
Disease severity, n (%)	
Mild	19 (21.3)
Moderate to severe	72 (78.7)
Previous treatments, n (%)	
Topical	89 (100)
Phototherapy	61(68.5)
Systemic	64(71.9)
Methotrexate	53(59.6)
Acitretin	31(34.8)
Cyclosporine	23(25.8)
Biological	12 (13.5)
Treatment at last admission, n (%)	
Without treatment	10(11.2)
Topical	34 (38.2)
Phototherapy	11 (14.6)
Systemic	27(30.3)
Methotrexate	14(15.7)
Acitretin	8(8.9)
Cyclosporine	1(1.1)
Biological	4(4.4)
Lost to follow-up	7(7.8)
Comorbidities	
Hypertension	51(57.3)
Type 2 Diabetes Mellitus	30(33.7)
Dyslipidemia	20(22.5)
Atherosclerotic Heart Disease	20(22.5)
Malignancy	8(8.9)

al. also reported that plaque-type psoriasis is the most common type in elderly patients, but higher frequencies of the guttate-type and inverse-type of psoriasis were observed in elderly patients compared to adults (4). Inverse psoriasis in this age group may be related to bed-ridden elderly

patients and persistent occlusion and friction at the body folds due to obesity and/or immobility (11). In our cohort, chronic plaque-type psoriasis was the most common type, similar to previous reports, but only 6.7% of patients had the guttate-type and 3.4% of patients had inverse psoriasis.

Table 2. Comparison of epidemiological and clinical aspects, treatments and comorbidities of elderly psoriasis patients with regard to age at disease onset (cut-off: 40 years).

	EOP patients n:29	LOP patients n: 56	p-value
Male, n (%)	17(58.6)	33(58.9)	0.978
Mean age (year) mean± SD	72.4±8.8	71.6±6.0	0.561
Mean disease duration mean± SD	42.6±10.7	14.7±11.7	<0.001
Family history, n (%)	10(41.7)	6(15.4)	0.020
Age of onset (year) mean± SD	29.67± 8.5	57.8± 8.8	<0.001
Main clinical subtypes, n (%)			
Plaque type	25(86.2)	51(91.1)	0.483
Guttate type	2(6.9)	4(7.1)	1.000
Pustular type	2(6.9)	0	0.114
Erythrodermic type	0	1(1.7)	-
Special involvement area, n (%)			
Scalp psoriasis	14(48.3)	19(33.9)	0.198
Palmoplantar psoriasis	2(6.9)	7(12.5)	0.712
Inverse psoriasis	1(3.4)	1(3.6)	
Nail involvement, n (%)	14(50)	20(38.5)	0.319
Psoriatic arthritis, n (%)	5 (17.2)	3 (5.6)	0.085
Disease severity, n (%)			
Mild	7 (24.1)	11(19.6)	0.631
Moderate to severe	22(75.9)	45(80.4)	
Previous treatments, n (%)			
Topical	29 (100)	56(100)	1.000
Phototherapy	19(65.5)	39(69.6)	0.699
Systemic	21(72.4)	39(69.6)	0.790
Treatment at last admission, n (%)			
Without treatment	3(10.3)	7(12.5)	
Only Topical	11(40.7)	21(41.2)	0.970
Phototherapy	4 (13.8)	6 (10.7)	0.729
Systemic	7(25.9)	18 (35.3)	0.399
Comorbidities			
Hypertension	11(44)	37(69.8)	0.014
Type 2 Diabetes Mellitus	6(24)	23(43.4)	0.068
Dyslipidemia	4(16)	16(30.2)	0.142
Atherosclerotic Heart Disease	5(20)	15(28.3)	0.359
Malignancy	3(10.3)	5(9.4)	0.832
Autoimmune disease	4(12.1)	11(19.6)	0.360

EOP: Early onset psoriasis (before age 40); LOP: Late onset psoriasis (after age 40). SD: Standard deviation



Psoriatic arthritis can be severely disabling for elderly patients with psoriasis. A multicenter trial in Europe on 1,560 psoriasis patients estimated that 31% of patients would develop psoriatic arthritis after 30 years of psoriasis. It may cause more frequent follow-up clinic visits, or limit the patient's ability for self-care and medication compliance. It was reported that 47.1% of patients with psoriatic arthritis were over 60-years-old (9). The prevalence of psoriatic arthritis was found to be 19.4% in elderly psoriasis patients (4). In our study, we determined that 13.5% of the elderly patients had joint involvement.

Psoriasis pathogenesis is driven by pro-inflammatory cytokines, and psoriasis is associated with an increased risk of comorbidities, including cardiovascular disease, diabetes mellitus, hypertension, obesity, inflammatory bowel disease, and non-alcoholic fatty liver disease compared to general population. As expected, comorbidities are more common in elderly psoriasis patients compared to younger patients (4, 10). In a nationwide population-based cohort study, dyslipidemia (15.4%), hypertension (14.4%) and diabetes mellitus (12.6%) were found to be the most common cardiovascular risk factors in psoriasis patients older than age 60, and there was no significant association with cardiovascular disease or mortality in subjects older than age 60. However, subjects aged between 20-39 with psoriatic arthritis had a higher risk of stroke and many CV risk factors (9). Another study was reported that psoriasis is not associated with acute coronary syndrome in patients aged 75 or older (12). In the present study, the most commonly observed comorbid diseases were hypertension (57.3%) and type 2 diabetes mellitus (33.7%).

Traditional systemic and biological therapies are less frequently chosen in the elderly group due to comorbidities and possible drug interactions, or may be related with the decrease in disease severity or improvement in patients' subjective sensation of disease course in elderly patients (13).

From another aspect, it has been suggested that despite the need for closer clinical monitoring, older patients should be treated with systemic drugs when required (10). Therefore, recent studies suggest that reversing existing inflammatory damage, improving signs, and symptoms of inflammatory comorbidities could also be possible with early treatment (14). In this study, only 30.3% of elderly patients were receiving systemic treatment at the time of last admission, and the number of patients receiving systemic therapy decreased at the time of last admission compared to previous treatment. We believe this may be due to several reasons: the patient and relatives may not accept systemic treatment because it requires frequent hospital visits, the physician may not prefer systemic treatment because of side effects and comorbidities, or it may be related to clinical findings that do not require systemic treatment.

It has been proposed that two forms of psoriasis exist: one being EOP, characterized by the onset age of ≤ 40 , more likely to be familial, severe, and strongly associated with HLA-Cw6. The other form LOP, which occurs after the age of 40, and is more likely to be sporadic (15, 16). In our study, we divided our patients into 2 well-defined groups, according to the age at onset of psoriasis. Our study confirmed that family history was more frequent in patients with EOP, which parallels the findings of previous studies (2, 4, 13). Plaque-form psoriasis vulgaris was the most prevalent clinical pattern in both groups. We could not elicit any relationship in clinical subtypes with the age of onset in geriatric psoriasis patients. Ejaz et al. (17) observed similar results as we did. However, it was reported that guttate-type psoriasis has a strong relationship with EOP (13, 18-20). Ferrandiz et al. (18) and Guinot et al. (21) have shown a significant association between LOP and palmoplantar psoriasis and palmoplantar pustulosis, respectively. However, in our study, the number of patients with these clinical subtypes was insufficient to reveal a significant result.

Increased incidence of joint involvement in EOP has been suggested by various researchers (21), while others have found no age-related difference in joint disease (1, 17, 18, 20). We detected a higher incidence of joint and nail involvement in patients with EOP, but the difference between the two groups was not statistically significant. Psoriasis onset at a younger age has been shown to have a higher inflammatory reaction, extensive cutaneous involvement, and a more severe clinical course compared to LOP (1, 2, 13, 18). We did not show any statistically significant difference between the two groups with regard to disease severity. Furthermore, similar to our results, other studies have reported that there was no significant correlation between disease severity and the age of onset (17, 20). EOP is believed to have the highest risk for comorbidities (22). Subclinical atherosclerosis was found to be related with early age of onset in moderate to severe psoriasis patients (23). With regard to major cardiovascular events such as myocardial infarction or stroke, it may be that these events need a longer time to manifest (24). Hypertension and diabetes mellitus were the most common comorbidities in both EOP and LOP patients in this study. Additionally,

we found a statistically significant correlation between LOP and hypertension. There was no significant difference in other cardiovascular risk factors (type 2 diabetes mellitus and dyslipidemia), atherosclerotic heart disease, and malignancy between the two groups. Similar to our results, Querio et al. reported that hypertension was associated with increased age at the onset of psoriasis, and a higher body index in psoriatic disease (25).

In this study, we investigated the demographic and clinical characteristics and prevalence of comorbidities in 89 geriatric psoriatic patients, by performing a comparison between early-onset and late-onset patient development. It is apparent that the age at disease onset is not related to specific clinical and epidemiological characteristics in elderly patients with psoriasis. However, this is a retrospective study, and the number of patients is limited due to being single center study. Elderly patients with psoriasis may need special attention and further investigation with larger cohorts will help to identify patients of this age group.

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RESEARCH

PREDICTING THE RISK OF DYSKINESIA DEVELOPMENT IN PARKINSON'S DISEASE

ABSTRACT

Background: Parkinson's Disease is a neurodegenerative disease characterized by motor and non-motor findings. Motor findings generally start with involvement of a single extremity and progress throughout life; asymmetrical involvement continues with clinical findings typically predominant in the first involved side. Parkinson's Disease is divided into two phenotypes, tremor dominant, and non-tremor dominant.

We aimed to investigate and compare the incidence of dyskinesia development and other clinical parameters such as age, gender, disease duration, and treatment between the tremor dominant and non-tremor dominant phenotypes of idiopathic Parkinson's Disease.

Methods: We conducted a retrospective study of 502 patients (183 females, 319 male) with idiopathic Parkinson's Disease.

Results: Two hundred eighty-five (56%) patients had tremor dominant phenotype and 217 (44%) had non-tremor dominant. Dyskinesia was observed in 29% of the patients overall, 24% of the tremor dominant patients, and 35% of the non-tremor dominant patients. Dyskinesia incidence was significantly greater in the non-tremor dominant group than the tremor dominant group ($p=0.006$). Average age at diagnosis in patients who developed dyskinesia 57 ± 12.9 years and who did not 64 ± 11.1 years. Thirty-four (24 tremor dominant, 10 non-tremor dominant) patients had a family member with Parkinson's Disease. Thirteen patients (5 tremor dominant, 8 non-tremor dominant) with a positive family history developed dyskinesia. The incidence of dyskinesia development according to clinical phenotype was independent from family history and was greater in the NTD group ($p=0.02$). Levodopa treatment was received by 421 (83%) patients; the incidence of dyskinesia development who used levodopa was 33% ($p<0.001$).

Conclusions: Patients with non-tremor dominant phenotype of Idiopathic Parkinson's Disease have a significantly higher risk of developing dyskinesia and should be closely clinically followed.

Keywords: Parkinson disease; Dyskinesias; Neurodegenerative diseases.



INTRODUCTION

Idiopathic Parkinson's Disease (PD) is the most frequently observed neurodegenerative disease after Alzheimer's disease, affecting approximately 1% of people over the age of 65 and 5% of people over the age of 85 (1). Significant motor findings in PD include resting tremor, bradykinesia, rigidity, and postural instability. These are generally progressive and asymmetric with predominance in the first involved side (2). In 1990, the Parkinson's Study Group divided PD patients into two clinical phenotypes, tremor dominant (TD) and non-tremor dominant (NTD) (3). Non-tremor dominant (akinetic-rigid type) PD proceeds more progressively than TD and develops more functional disability (4,5).

Tremor in PD emerges typically during rest and is observed in 60–75% of patients (2). The tremor characteristically involves the thumb and is referred to as a "money counting tremor" or "pill rolling tremor." In patients with NTD, rigidity, walking disorder, stiffening, and postural instability are the primary symptoms. Bradykinesia is a characteristic clinical finding in both phenotypes and manifests as generally slow movement and impaired fine motor movements that require skill.

Dyskinesia is a common motor complication of treatment and presents as hyperkinetic involuntary movements that are frequently choreiform in nature. The most important dyskinesia risk factors are levodopa (LD) dose and treatment duration. Treatment-related dyskinesias are classified based on their temporal relationship with medication level (e.g., peak dose, end dose). Although dyskinesia in PD has been well-described, there is no clear consensus on its pathophysiologic mechanism. Therefore, in this study, we evaluated demographic and clinical features between the TD and NTD phenotypes of PD and their effect on dyskinesia development.

METHODS

Study approval was obtained from the ethics

committee of our hospital (378 no and 29/11/2019 date) and principles of the Declaration of Helsinki Declaration were followed. All study patients provided written informed consent.

We retrospectively identified patients diagnosed with idiopathic PD using hospital medical records for inclusion in this study. Data regarding patient demographics and clinical characteristics, clinical stage of PD as defined by the Modified Hoehn and Yahr (H&Y) Staging Scale, clinical phenotype of PD (TD and NTD), treatment, and dyskinesia incidence were recorded. Patients with mixed (undefined dominant) phenotype were not included for analysis.

Statistical analysis was conducted using SPSS for Windows, version 20.0 software (IBM Corp., Armonk, NY, USA). The chi-square test was used for comparison of categorical variables. Normal distribution of continuous data was determined using the Kolmogorov-Smirnov test. For comparison of continuous variables between groups, the Student's t-test was used for normally distributed data and the Mann-Whitney U test for non-normally distributed data. For correlation analysis, the Spearman test was used for non-parametric data and the Pearson test for parametric data. $P < 0.05$ was considered statistically significant.

RESULTS

Five hundred two patients, including 183 (36%) women and 319 (64%) men were included in this study. Detailed clinical data are shown in Table 1. Dyskinesia was observed in 144 (29%) patients (55 women, 89 men). Average age at PD diagnosis was 62.3 ± 11.97 years overall. Average age at diagnosis was younger in patients who developed dyskinesia than those who did not (57 ± 12.9 years vs. 64 ± 11.1 years). Two hundred eighty-five (56%) patients had TD clinical phenotype and 217 (44%) had NTD phenotype. Of the 285 TD patients, 68 (24%) developed dyskinesia and 35 % (76) did not. Seventy-six (35%) of the 217 NTD patients

Table 1. Clinical Properties and Phenotype Relationship.

	Patients Number	Gender F/M (n)	Age (SD)	PDBA (SD)	Familial PD +	LD	DA	MAO-B inh	H&Y grade (SD)	Dementia	On-off	Wearing off	Dyskinesia	DDS
Tremor dominant	285 (%56)	113/172	68,35 (10,62)	62,20 (11,85)	24	219	187	177	2,27 (0,92)	87	40	35	68	33
Non-Tremor dominant	217 (%44)	70/147	68,19 (11,26)	62,46 (12,13)	10	202	141	132	2,57 (0,93)	84	49*	46**	76***	29

*p=0,046 **p=0,024 ***p=0,006

PDBA: Parkinson's Disease Beginning Age F: Female M:Male PD: Parkinson's Disease LD: Levodopa DA: Dopamine Agonist MAO-B inh: Monoamine Oxidase B inhibitor(rasagiline) DDS: Dopamine Dysregulation Syndrome

developed dyskinesia, whereas 141 (65%) (141) did not. The incidence of dyskinesia development was significantly higher in the NTD group than the TD group ($p = 0.006$) (Table 2).

Most study participants (217) were H&Y stage 2. Thirty-four (17%) patients had a family member with PD; of these, 24 (70%) had TD clinical phenotype and 10 (30%) had NTD. Thirteen (38%) patients with a positive family history developed dyskinesia (5 TD patients, 8 NTD patients). The incidence of dyskinesia development according to clinical phenotype was independent from family history and was greater in the NTD group

($p = 0.02$). LD treatment was received by 421 (83%) patients; the incidence of dyskinesia development was significantly greater in these patients compared to those who did not receive LD (33% vs. 2.5%; $p < 0.001$). We detected no significant differences in dyskinesia incidence between the other treatments (dopamine agonists (DA), and monoamine oxidase type B inhibitors).

DISCUSSION

Pathophysiological mechanisms

PD is a movement disorder characterized by

Table 2. Parameters Affecting Dyskinesia.

	Patients number (F/M)	PDBA. (SD)	TD	NTD	Use of LD		Familial PD +	
					yes	no	Yes(TD/NTD)	No(TD/NTD)
Dyskinesia +	144 (55/89) (%28)	57,98 (12,93)	68 (%24)	76* (%35)	142** (%34)	2 (%3)	13(5/8) (%38)	76(36/40)*** (%44)
Dyskinesia -	358(128/230) (%72)	64,06 (11,10)	217 (%76)	141 (%35)	279 (%66)	76 (%97)	21(19/2) (%62)	95(52/43) (%56)
Total	502(183/319) (%100)	62,31 (11,96)	285 (%100)	217 (%100)	421 (%100)	78 (%100)	34 (%100)	171 (%100)

*p=0,006 **p=0,000 ***p=0,02.

PDBA: Parkinson Disease Beginning Age TD: Tremor Dominant NTD: Non-tremor Dominant LD: Levodopa.



involvement of the basal ganglia and other structures of the extrapyramidal system (e.g., cerebellum). Histopathologically, dopaminergic neuron loss, and Lewy particles, which are eosinophilic intracytoplasmic protein inclusions, are observed in the substantia nigra pars compacta (SNc) (6). Although both TD and NTD phenotypes of PD exhibit these pathologic findings, previous studies have shown many histopathologic and pathophysiologic differences between the two. In an autopsy study that included 27 NTD and 18 TD cases, neuron loss in the SNc and locus coeruleus was less in TD cases (7). A similar 2012 study also showed less locus coeruleus involvement in TD cases (8). Differences between TD and NTD phenotypes have been shown in living patients as well. A functional magnetic resonance imaging study of 17 PD patients (9 TD, 8 NTD) and 14 control patients that evaluated striatohalamocortical and cerebellothalamocortical circulation showed greater circulation in both anatomic territories in TD patients than the other groups (9). The presynaptic dopaminergic system can be evaluated by calculating the amount of striatal dopamine transporters using single-photon emission computed tomography (SPECT) scanning. In a previous SPECT study, a significant relationship was found between striatal iodine-123 (123I) fluoropropyl (FP) carbomethoxy-3 β -(4-iodophenyl)tropane (CIT) uptake and the severity of disease in akinetic-rigid patients (NTD phenotype), but not in patients with tremor (TD phenotype) (10). The above findings suggest that the two PD phenotypes have different underlying pathologic mechanisms.

To date, there is no clear consensus regarding the pathophysiologic mechanisms of dyskinesia development. One theory based on dopamine-depleted animal models and human PD studies postulates that dyskinesia develops as a result of dysfunction of the glutaminergic transmission from the cortex to striatal medium spiny neurons (MSNs) (11). MSNs are characterized by thorn-like structures projecting to dendrites that receive excitatory glutaminergic impulses from the

cerebral cortex. These projections are in contact with post-synaptic D1/D2 receptors. In the pre-synaptic area, the decreased dopamine and increased glutamate resulting from PD provide a basis for dyskinesia development as a result of increased sensitivity to dopamine (12).

Clinical features

Tremor is observed in approximately 2/3 of PD patients (4), and the progression of PD is slower and functional loss is less in this subgroup (5). In our study, 56% of the patients had TD phenotype. Dyskinesia can develop in both TD and NTD phenotypes; we found dyskinesia incidence rates of 24% in TD patients, 35% in NTD patients, and 28% in all patients. This study additionally showed that dyskinesia incidence is higher in patients with NTD phenotype ($p = 0.006$), similar to a previous 2013 study (13), and in agreement with a 2014 123I-FP-CIT SPECT study that determined that dyskinesia risk is greater in NTD patients and suggested that TD and NTD patients require different therapeutic approaches to dyskinesia (14).

We also considered other parameters that may affect the development of dyskinesia such as gender, duration of diagnosis, patient age at diagnosis, and treatment. Patients with dyskinesia in our study were diagnosed at an earlier age: the average age of those who developed dyskinesia was 57.9 years, compared to 64 years in those without dyskinesia. This suggests that individuals diagnosed with PD at an early age are more prone to dyskinesia development. In the aforementioned 2013 study, dyskinesia developed in 58% of the patients aged 25–40 years and 23.5% of the patients aged ≥ 40 years old, further supporting the notion that young patients are at higher risk for developing dyskinesia (13). We additionally hypothesize that dysfunction of glutamate transmission, which is considered the first step in dyskinesia development, started at the moment of diagnosis or even before in individuals who were diagnosed at an early age. In other words, the younger age of individuals with dyskinesia leads

us to believe that a mechanism unrelated to LD, which is the main agent triggering dyskinesia, previously set the stage.

LD generally results in significant recovery of PD symptoms in the first years after treatment initiation. However, after 5 years, side effects such as motor complications (dyskinesias, on-off and wearing off symptoms), autonomic disorders, and psychosis are commonly observed. Until recently, there was consensus about starting early treatment with DA or MAO-B inhibitors and delaying the transition to LD as late as possible to decrease the risk of dyskinesia. However, in a 2018 compilation, LD was emphasized as the most effective agent for motor symptoms and early transition to LD was suggested; this compilation also emphasized that dyskinesia may be related to the dose and posology of the medication rather than treatment duration (15). In our study, we examined the relationship between treatments and dyskinesia and detected that LD has a dominant effect on rasagiline (MAO-B inhibitor) and DA for dyskinesia. One hundred forty-two patients had dyskinesia among the 421 patients receiving LD and only 2 patients had dyskinesia among the 81 patients not using LD ($p < 0.001$). We also obtained the same result when we evaluated the relationship between diagnosis duration (≤ 5 years vs. > 5 years), LD and dyskinesia. In other

words, LD is a strong risk factor for dyskinesia independent from duration of disease. In a 2014 multicenter study, LD dose reduction resulted in decreased severity and frequency of dyskinesia (16). This result suggests that increased sensitivity to dopamine in D1 receptors keep continue in long term period thanks to LD or glutamate collection keeps induced dyskinesia to continue alone.

In conclusion, we examined numerous clinical parameters as potential risk factors for dyskinesia development in PD. Patients with NTD phenotype appear to have a significant and independent risk and should be closely clinically followed.

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Statement of Ethics

The study was approved by the Ethics Committee of University of Health Sciences, Diyarbakır Gazi Yasargil Education and Research Hospital. The study complied with the Declaration of Helsinki.

Disclosure Statement

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RESEARCH

THE EFFECTS OF 1.5 TESLA CONTRAST-ENHANCED TEMPORAL BONE MRI ON THE AUDITORY FUNCTIONS AND COMPLAINTS OF GERIATRIC PATIENTS WITH TINNITUS

ABSTRACT

Introduction: Temporary hearing threshold shift might develop after noise exposure due to magnetic resonance imaging. We aimed to investigate the effects of acoustic noise during 1.5 Tesla temporal bone MRI on audiometric tests and disturbance self-reports in patients with tinnitus.

Materials and Method: Sixty-three symptomatic ears of 55 patients with persistent tinnitus were included in this study. Sound level recordings of imaging room were made with dosimeter. Two age groups (<65 years and > 65 years) were created. Hearing thresholds were measured before, 24 hours after and 1 month after performing magnetic resonance imaging. Visual analogue scale, tinnitus handicap inventory and the Beck depression inventory were applied to all patients before and 24 hours after the imaging.

Results: The mean intensity of acoustic noise during imaging was recorded as 99.3 ± 3.4 dBA (109.9 ± 4.1 dB). The threshold shifts were statistically higher in patients aged ≥ 65 than the ones aged <65 for 2000 and 4000 frequencies ($p < 0.05$). The mean temporary shifts in tinnitus loudness were 5.00 ± 6.495 dB and 10.17 ± 11.179 dB for the patients with age <65 and age ≥ 65 respectively ($p = 0.018$). While majority of the time dependent effects were significant for audiometric tests; they were insignificant for self-reported questionnaires, except visual analogue scale 5, which was higher in patients aged <65 ($p = 0.012$).

Conclusion: Acoustic noise due to 1.5 Tesla temporal bone magnetic resonance imaging caused hearing threshold shifts and deterioration in intensity and disturbance of the tinnitus especially in elderly. Hearing protection is essentially required for all patients, when it is indicated.

Keywords: Hearing Loss; Magnetic Resonance Imaging; Noise; Quality Of Life; Tinnitus.



INTRODUCTION

Magnetic resonance imaging (MRI) is widely used in the differential diagnosis of auditory pathologies accompanied by tinnitus, especially in the presence of unilateral, asymmetrical, high-frequency sensorineural hearing loss. In spite of new technology, noise exposure in a high-intensity, wide-frequency range is still experienced in this imaging technique, which is used for the exclusive diagnosis of pathologies such as tumors located in the cerebellopontine angle and internal acoustic canal region (1).

High acoustic noise levels during MRI may temporarily disrupt hearing thresholds and could possibly cause a temporary threshold shift (TTS) that reverses after noise exposure is discontinued (2). The acoustic noise associated with MRI procedures is due to the rapid alterations of currents within the gradient coils. These currents produce significant acoustic noise that manifests as loud tapping, knocking, or chirping sounds and can cause temporary or, sometimes, permanent injury to the cochlea (3,4). Several previous studies have reported an increase in MRI-induced hearing thresholds and even cases of hearing loss (5,6). However, for patients using foam earplugs, the noise generated by a 3T MRI procedure did not cause any TTS during high-frequency hearing measurements in another study (7).

During daily practice, we noticed that some geriatric patients reported that their tinnitus increased immediately after MRI. Therefore, we hypothesized that the auditory functions are disturbed and that complaints regarding tinnitus become more evident after 1.5 Tesla contrast-enhanced MRI of the temporal bone.

The primary aim of this study was to determine the effects of acoustic noise during 1.5 Tesla contrast-enhanced temporal bone MRI on the intensity and frequency of tinnitus and degree of complaints, especially in geriatric patients.

MATERIALS AND METHODS

The present study was conducted in the Department of Otorhinolaryngology and Head & Neck Surgery of a tertiary clinic after approval was received from the ethics committee of the local council (no. FSMEAH-KAEK 2019/1-18). The study was performed in accordance with the most recent version of the Helsinki Declaration. Written informed consent was obtained from all subjects included in the study.

Patients

All patients who presented with a complaint of tinnitus to the outpatient clinic of the otorhinolaryngology department of a tertiary center between February 2019 and August 2019 were prospectively included in this study. After the patients' medical history was taken, physical examinations regarding the ear, nose, throat, head, and neck were performed together with neurological examinations. Routine laboratory tests were conducted to rule out potentially treatable causes of tinnitus. Pure-tone audiometry (PTA) and tinnitus matching (TM) tests for pitch and loudness were used. Contrast-enhanced temporal bone MRI was performed in patients with tinnitus and asymmetric hearing loss of 10 dB or more compared with the other ear at frequencies of 4,000 to 8,000 Hz.

Inclusion criteria

1. Individuals 18–75 years of age.
2. Patients with tinnitus who required investigation via MRI.
3. Patients who were fully capable of communicating with the researchers and obeying simple commands.
4. Patients admitted to outpatient clinics without any morbidity.

Exclusion criteria

1. Patients younger than 18 years and older than 76 years.

2. Patients with MRI requested for reasons other than tinnitus.
3. Patients who were not capable of communicating with the researchers and obeying simple commands.
4. Patients with a history of inner ear pathology and ototoxic drug use.
5. Patients with a tumor in the cerebellopontine angle and internal acoustic canal, peripheral, or central vestibular disease, cardiovascular disease, previous head trauma, neurological disease, metabolic disease, or pregnancy.
6. Bedridden patients.

Initially, 101 patients, who had been free of medical agents that could cause tinnitus or had been prescribed for tinnitus were enrolled in the study. Two patients with vestibular schwannoma and six patients with vascular loop syndrome were excluded following examinations that revealed certain pathologies. One patient with a tinnitus frequency of 250 Hz and two patients with a tinnitus frequency of 500 Hz were also excluded to homogenize the high-frequency tinnitus sample of this research. Thereafter, 57 patients who met the above inclusion and exclusion criteria were selected for inclusion in the study.

Contrast-Enhanced Temporal Bone MRI Procedure

The MRI scan used in this study was performed by a device with a 1.5 Tesla magnetic field density (GE Healthcare Signa™ Explorer, United States). The standardized steps performed for MRI of the temporal bone were as follows: 1) localization (10 sn); 2) Ax T2 prop (full brain) (100 sn); 3) Cor 3D Fiesta (110 sn); 4) Ax 3D Fiesta (110 sn); 5) Ax T1 FSE (Thin) (90 sn); 6) Ax DWI b1000 Prop (185 sn); 7) Cor T1 FSE (90 sn); 8) +C Cor T1 FSE (90 sn); and 9) +C Ax T1 FSE (Thin) (118 sn). All MRI scans of the temporal bone lasted 15 minutes and 5 sn per session. The patients were scanned without any hearing protective equipment during MRI.

Sound Pressure Level Measurements During the MRI Scan

Average sound pressure level (SPL) measurements were gathered in both unweighted (dB) and A-weighted (dBA) decibels for the MRI scans. The sound level recordings were taken with a dosimeter containing a sound level meter and microphone (CEM DT 805 L, Shenzhen, China) that had a sound level measurement range of intensity 30–130 dB and frequency 31.5–8 kHz. The device was mounted within 50 cm of each patient's head position. The background noise in the room before and during the MRI scans was recorded by the calibrated dosimeter.

Audiometric Tests

The results of the PTA and TM tests for pitch and loudness were analyzed for the symptomatic ears. The PTA and TM test results were evaluated on the basis of test results on admission before the MRI (test 1), within 24 hours after the MRI (test 2), and 1 month after the MRI (test 3). Any change of 10 dB or more was accepted as a significant threshold shift.

PTA

The PTA tests were performed blindly in sound-proof booths (AC40, Interacoustics, Middelfart, Denmark) and revealed air and bone conduction hearing thresholds at frequencies of 250, 500, 1,000, 2,000, 3,000, 4,000, and 8,000 Hz for each ear (on admission, within 24 hours after MRI, and 1 month after MRI). A threshold change above 10 dB from baseline recordings was considered significant to define TTS and permanent threshold shift (PTS).

Tinnitus Pitch Matching and Tinnitus Loudness Matching

The tinnitus severity and frequency pairing tests (on admission, within 24 hours after MRI, and 1 month after MRI) were performed blindly in sound-proof booths as well (AC40, Interacoustics, Middelfart, Denmark). Any frequency change and



threshold change above 10 dB from the baseline record was considered significant.

Self-Report Test for the Daily Life Effects of Tinnitus

As tinnitus is a subjective phenomenon and difficult to evaluate; we analyzed disturbances caused by tinnitus according to the VAS, THI, and BDI scales upon admission before the MRI (test 1) and 24 hours after the MRI (test 2) for the symptomatic ears. The third test was not implemented, as 1 month would not have been suitable for relating the daily effects of tinnitus to MRI imaging via subjective self-reports.

VAS Assessment for the Favourability of Tinnitus

To understand the degree of tinnitus-related disturbance or daily life effects of tinnitus, the VAS was used upon admission before the MRI and 24 hours after the MRI (8). All patients were asked to rate their tinnitus from 0 (most favorable) to 10 (least favorable) for each of the five questions listed below:

VAS 1: Please mark the severity/intensity of your tinnitus.

VAS 2: Please mark the frequency/duration of your tinnitus.

VAS 3: Please mark the degree of disturbance caused by your tinnitus.

VAS 4: Please mark the degree of attention deficit caused by your tinnitus.

VAS 5: Please mark the degree of sleep problems caused by your tinnitus.

THI for the Disability Induced by Tinnitus

The validated Turkish version of the THI was used to address the degree of disability experienced by patients due to tinnitus upon admission before the MRI and 24 hours after the MRI (9). The THI was composed of 25 questions, each of which was scored on a scale of 0 to 4. With respect to the functional, emotional, and catastrophic responses

due to tinnitus, the minimum total score was 0, and the maximum total score was 100. A test score of 0–16 meant "no or slight handicap", 18–36 meant a "mild handicap", 38–56 meant a "moderate handicap", 58–76 meant a "severe handicap", and 78–100 meant a "catastrophic handicap" (10).

BDI for a Depressive Mood Related to Tinnitus

The BDI was used to determine the extent of patients' depressive symptoms with tinnitus (11). This 21-question multiple-choice self-report inventory was given to the patients upon admission before the MRI and 24 hours after the MRI. The question scoring ranked the severity of each item from zero to three. A score of 0–13 indicated minimal depression, 14–19 mild depression, 20–28 moderate depression, and 29–63 severe depression (11).

Statistical Analysis

The data in the present study were collected and analyzed by using SPSS 20.0 software package (IBM® SPSS® Statistics 20.0, Armonk, NY, U.S.A.). The Shapiro-Wilk test for skewness and kurtosis showed normally distributed data except for the PTA and TM threshold shifts. Numeric variables were presented as mean \pm standard deviation, and categorical variables were presented as frequency (n) and percentage (%). The comparisons of the pre- and post-MRI PTA and TM thresholds and VAS, THI, and BDI scores within the same group were performed via a paired-sample t-test. Student's t test was used to compare the PTA and TM thresholds, and Mann-Whitney U test was used to compare the TTS and PTS results between the groups. Repeated-measures analysis of variance (ANOVA) was used for time-dependent measurements to compare the PTA and TM test results and VAS, THI, and BDI scores before and after the MRI scans between the groups. Pearson or Spearman correlation analyses and chi-square or Fisher's exact tests were performed to determine the relationships between the VAS, THI, and BDI

results and PTA and TM results. A two-sided P value of ≤ 0.05 was deemed significant.

RESULTS

The background noise in the room was 52.8 dBA (58.3 dB) on average. The mean intensity of the acoustic noise during the MRI scan was recorded as 99.3 ± 3.4 dBA (109.9 ± 4.1 dB). Higher noise levels with a peak of 118 dBA (126 dB) were recorded as well, especially when the slice thickness declined and the coronal planes were examined.

A total of 63 symptomatic ears of 55 patients (mean age 56.3 ± 10.3 years, 38 males and 17 female) were included in the analyses before and after the MRI procedure. The patients were divided into two age groups, i.e., <65 years old ($n = 33$ ears of 29 patients) and ≥ 65 years old ($n = 30$ ears of 26 patients). The left ear was symptomatic in 57.58% (19/33) and 53.3% (16/30) of ears in patients aged <65 and ≥ 65 , respectively. Eight patients had bilateral tinnitus.

Moreover, TTS and PTS in the PTA hearing thresholds were observed in 28.6% (18/63) and 23.8% (15/63) of the ears, respectively. The highest threshold shifts within 24 hours after the MRI were observed as 15 dB at 4 kHz and 25 dB at 8 kHz. In one patient, the frequency of tinnitus changed from 2,000 Hz to 4,000 Hz.

One patient (a 70-year-old male) with left-sided tinnitus developed right-sided tinnitus just after an MRI with a loudness of 55 dB at a frequency of 8,000 Hz. The patient developed PTS of 10 dB, 10 dB, and 15 dB for the 2,000, 4,000, and 8,000 Hz frequencies. Additionally, the tinnitus remained persistent with a loudness of 40 dB at an 8,000-Hz frequency 1 month after the MRI.

Another patient (a 57-year-old male) with bilateral tinnitus of 45 dB at 6,000 Hz for the left side and 75 dB at 8,000 Hz for the right side developed a temporary rise of 30 dB and a permanent rise of 20 dB in tinnitus intensity for the right side after

the MRI. The loudness of his tinnitus was 65 dB and 70 dB for the left and right ears, respectively, 1 month after the MRI.

Table 1 compares the audiometric measurements before and after 24 hours and 1 month after the MRI, as well as the self-reported questionnaire results before and 24 hours after the MRI between the patients in the two age groups. Almost all PTA thresholds were significantly different between the two age groups, whereas the tinnitus loudness and VAS, BDI, and THI scores were not (Table 1).

Table 2 depicts the comparisons of the mean PTA, TM thresholds, and VAS, BDI, and THI scores across time within each age group and between the two age groups (<65 versus ≥ 65 years) before and after the MRI scan. Significant deteriorations were observed in the PTA thresholds and tinnitus intensity and related disturbances in the paired-sample t-test, especially in the patients aged ≥ 65 years. The tinnitus loudness displayed a significant rise from baseline in the symptomatic ear for both groups following the MRI scan ($p < 0.001$). While the time-dependent effects were significant for the PTA thresholds, the TM for loudness thresholds and self-reported tinnitus-related questionnaire scores were not statistically different before and after the MRI scan between the groups (Table 2), except for VAS 5 (item regarding sleep disturbance caused by tinnitus).

The baseline hearing thresholds were significantly different between the two age groups; therefore, analyses of threshold shifts were needed as well (Table 3). The TTSs (PTA threshold on the first day post-MRI minus baseline) and the PTSs (PTA threshold at the first month post-MRI minus baseline) differed statistically between patients aged <65 and aged ≥ 65 for frequencies of 2000 and 4000 Hz ($p = 0.012$, $p = 0.004$ for 2,000 Hz respectively; $p = 0.006$, $p = 0.004$ for 4,000 Hz respectively). Whereas the mean PTA threshold shifts at 8,000 Hz were not statistically different



Table 1. Comparison of basal and post-MRI audiometric and self-reported questionnaire results between the patients with tinnitus according to the age groups.

	Age<65 years		Age ≥ 65 years		
Baseline Audiometry					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
Air Conductance					
500 Hz	14.24±12.76	5-65	20.33±7.18	10-35	0.025
1000 Hz	14.70±11.86	5-70	24.33±8.58	15-45	0.001
2000 Hz	18.64±13.42	5-60	28.33±10.99	10-50	0.002
4000 Hz	34.85±25.14	5-95	46.00±18.69	15-85	0.052
8000 Hz	42.42±25.04	10-100	57.33±16.85	20-85	0.008
Tinnitus Loudness	49.85±16.56	20-95	50.83±19.08	0-90	0.827
Post-MRI (24 Hours) Audiometry					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
Air Conductance					
500 Hz	14.24±12.75	5-65	20.33±7.18	10-35	0.025
1000 Hz	14.70±11.86	5-70	24.33±8.58	15-45	0.001
2000 Hz	19.24±13.47	5-60	31.50±11.61	10-55	<0.001
4000 Hz	35.15±26.18	5-95	50.17±21.31	15-90	0.016
8000 Hz	45.30±25.12	10-100	63.83±19.68	20-90	0.002
Tinnitus Loudness	54.85±17.48	30-100	61.00±18.12	35-105	0.175
Post-MRI (1 month) Audiometry					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
Air Conductance					
500 Hz	14.24±12.75	5-65	20.33±7.18	10-35	0.025
1000 Hz	14.70±11.86	5-70	24.33±8.58	15-45	0.001
2000 Hz	18.64±13.42	5-60	29.83±10.30	10-50	<0.001
4000 Hz	34.70±25.76	5-95	49.00±20.57	15-90	0.019
8000 Hz	44.70±25.52	10-100	63.17±19.63	20-90	0.002
Tinnitus Loudness	52.27±16.34	20-95	56.50±17.92	30-100	0.335
Basal Self-report Tests					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
VAS 1	4.91±1.99	2-9	4.53±2.40	0-10	0.500
VAS 2	4.82±1.86	2-9	4.33±1.88	0-10	0.308
VAS 3	4.94±2.08	2-9	4.60±2.86	0-10	0.589
VAS 4	3.79±1.83	1-7	3.63±1.87	0-7	0.741
VAS 5	3.55±1.94	1-7	3.17±2.63	0-9	0.515
BDI	3.24±4.58	0-19	4.30±2.78	0-9	0.278
THI	33.33±19.54	0-74	35.67±14.60	11-68	0.596
Post-MRI (24 Hours) Self-report Tests					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
VAS 1	5.33±2.38	2-10	5.07±2.07	3-10	0.638
VAS 2	5.61±2.34	2-10	5.10±1.37	3-10	0.306
VAS 3	5.82±2.63	2-10	4.93±2.23	2-9	0.157
VAS 4	4.48±1.99	2-8	4.13±2.27	1-9	0.515
VAS 5	4.79±2.40	1-9	3.73±2.52	1-8	0.094
BDI	4.06±5.11	0-21	6.10±3.67	0-12	0.063
THI	37.00±21.85	4-84	40.40±15.83	14-84	0.486

BDI: Beck Depression Inventory, MRI: Magnetic Resonance Imaging, SD: Standard Deviation, THI: Tinnitus Handicap Inventory, VAS: Visual Analogue Scale.
p*: Student's T-test.

Table 2. Comparisons of mean thresholds in audiometric tests and mean scores in self-report questionnaires across time within each age group and between two age groups before and after MRI scan.

	Group 1 (Age<65)				Group 2 (Age≥ 65)				p**
	Baseline (mean±SD)	1 st day (mean±SD)	1 st month (mean±SD)	p*	Baseline (mean±SD)	1 st day (mean±SD)	1 st month (mean±SD)	p*	
PTA (dB)									
500 Hz	14.24±12.76	14.24±12.75	14.24±12.75	-	20.33±7.18	20.33±7.18	20.33±7.18	-	0.025
1 kHz	14.70±11.86	14.70±11.86	14.70±11.86	-	24.33±8.58	24.33±8.58	24.33±8.58	-	0.001
2 kHz	18.64±13.42	19.24±13.47	18.64±13.42	0.044	28.33±10.99	31.50±11.61	29.83±10.30	0.001	0.001
4 kHz	34.85±25.14	35.15±26.18	34.70±25.76	0.535	46.00±18.69	50.17±21.31	49.00±20.57	0.001	0.024
8 kHz	42.42±25.04	45.30±25.12	44.70±25.52	0.001	57.33±16.85	63.83±19.68	63.17±19.63	0.000	0.003
TM (dB)									
Loudness	49.85±16.56	54.85±17.48	52.27±16.34	<0.001	50.83±19.08	61.00±18.12	56.50±17.92	<0.001	0.385

PTA: Pure Tone Audiometry, TM: Tinnitus Matching; SD: Standard Deviation.

Paired samples T-test, within each group, between the baseline and the first month measurements (p*).

Repeated measures ANOVA (group×time×frequency), between the subject effects (p**).

Test	Baseline (mean±SD)	1 st day (mean±SD)	p*	Baseline (mean±SD)	1 st day (mean±SD)	p*	p**
VAS 1	4.91±1.99	5.33±2.38	0.011	4.53±2.40	5.07±2.07	0.011	0.558
VAS 2	4.82±1.86	5.61±2.34	<0.001	4.33±1.88	5.10±1.37	<0.001	0.288
VAS 3	4.94±2.08	5.82±2.63	0.007	4.60±2.86	4.93±2.23	0.134	0.304
VAS 4	3.79±1.83	4.48±1.99	0.005	3.63±1.87	4.13±2.27	0.007	0.601
VAS 5	3.55±1.94	4.79±2.40	<0.001	3.17±2.63	3.73±2.52	<0.001	0.012
BDI	3.24±4.58	4.06±5.11	<0.001	4.30±2.78	6.10±3.67	<0.001	0.130
THI	33.33±19.54	37.00±21.85	<0.001	35.67±14.60	40.40±15.83	<0.001	0.535

BDI: Beck Depression Inventory, SD: Standard Deviation, THI: Tinnitus Handicap Inventory, VAS: Visual Analogue Scale.

Paired samples T-test, within each group, between the baseline and the first day measurements (p*).

Repeated measures ANOVA (group×time×frequency), between the subject effects (p**).

between the two age groups ($p = 0.271$, $p = 0.363$ for TTS and PTS, respectively). The mean TTSs between tinnitus loudness on the first day post-MRI and baseline were 5.00 ± 6.495 dB and 10.17 ± 11.179 dB for patients aged <65 and aged ≥65 respectively; this difference was statistically significant ($p = 0.018$). However, this significance disappeared for PTSs (2.42 ± 5.019 dB and 5.67 ± 7.739 dB for patients aged <65 and ≥65, respectively) ($p = 0.063$).

When Table 4 was examined, it revealed that the frequency of TTS and PTS at PTA that occurred from baseline to post-MRI measurements was higher for the geriatric group (36.7% vs. 21.2% for

TTS and 33.3% vs. 15.2% for PTS, in patients aged ≥65 and aged <65 respectively), even though the difference was not statistically significant. The results were similar for the TM test for loudness, i.e., the frequency of TTS and PTS was higher for the geriatric group (50% vs. 27.3% for TTS and 26.7% vs. 12.1% for PTS in patients aged ≥65 and <65, respectively).

We defined a level change as follows: at least a one-point increase on a minimum of three items for the VAS; a ≥1 level class change for the BDI (minimal, mild, moderate, and severe); and a ≥1 level class change for the THI with respect to the functional, emotional, and catastrophic classes.



Table 3. Comparison of mean threshold shifts in pure tone audiometry between two age groups of patients with tinnitus.

	Age<65 years		Age ≥ 65 years		
Temporary Threshold Shift					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
PTA Frequency					
500 Hz	0±0.00	0-0	0±0.00	0-0	1.000
1000 Hz	0±0.00	0-0	0±0.00	0-0	1.000
2000 Hz	0.61±1.66	0-5	3.17±4.64	0-15	0.012
4000 Hz	0.76±2.21	0-10	4.17±5.89	0-20	0.006
8000 Hz	3.33±4.95	0-15	6.33±8.60	0-25	0.271
Permanent Threshold Shift					
	Mean±SD	Minimum-Maximum	Mean±SD	Minimum-Maximum	p*
PTA Frequency					
500 Hz	0±0.00	0-0	0±0.00	0-0	1.000
1000 Hz	0±0.00	0-0	0±0.00	0-0	1.000
2000 Hz	0±0.00	0-0	1.50±2.98	0-10	0.004
4000 Hz	0.30±1.21	0-5	3.00±4.66	0-15	0.004
8000 Hz	2.73±4.16	0-15	5.67±8.28	0-25	0.363

PTA: Pure Tone Audiometry, SD: Standard Deviation. p*: Mann-Whitney U test.

The rates of level changes were 43.3% for the VAS, 10% for the BDI, and 33.3% for the THI for geriatric patients. However, the incidence of self-report test deteriorations was not statistically significantly different between the two patient age groups ($p > 0.05$ for all).

In the correlation analysis, the continuous variables of the PTA thresholds at the 4,000 and 8,000 Hz frequencies were strongly correlated with the VAS (especially VAS 1 and 5), BDI, and THI scores at the 0.01 level of significance (two-tailed). The mean THI score shift was correlated with the mean threshold shift in the PTA at the 2,000, 4,000, and 8,000 Hz frequencies before and after the MRI ($r = 0.319$, $p = 0.012$; $r = 374$, $p = 0.003$; $r = 417$, $p = 0.001$ for TTS at 2,000, 4,000, and 8,000 Hz, respectively, and $r = 0.294$, $p = 0.019$; $r = 350$, $p = 0.005$; $r = 470$, $p < 0.00$ for PTS at 2,000, 4,000, and 8,000 Hz, respectively). Interestingly, the PTA threshold shifts at 8,000 Hz for TTS plus both 4,000 and 8,000 Hz for PTS were correlated with the THI

score shifts in the geriatric group, whereas the correlations were significant only for TTS in the PTA at 4,000 Hz in patients aged <65. However, the positive correlations between the THI and TM threshold shifts from baseline were statistically significant in patients aged <65 ($r = 439$, $p = 0.011$ for TTS, and $r = 0.362$, $p = 0.039$ for PTS), in contrast to geriatric patients ($p > 0.05$).

DISCUSSION

The most important outcome of the current study was that geriatric patients were more vulnerable to MRI-related noise induced hearing threshold changes. However, they did not tend to acknowledge this effect in the self-report questionnaires as much, which might be due to their decreased attention to the directed questions and diminished mental cooperation with these subjective tests.

Although the majority of the time-dependent

Table 4. Descriptive analysis regarding the presence of temporary and permanent threshold shifts in audiometric tests and the presence of level changes in self-report questionnaires between the age groups.

		Age Group		n (total)	p
		Age<65 (%)	Age ≥ 65 (%)		
TTS-PTA	absent	26 (78.8)	19 (63.3)	45	0.175*
	present	7 (21.2)	11 (36.7)	18	
	n (total)	33	30		
PTS-PTA	absent	28 (84.8)	20 (66.7)	48	0.081**
	present	5 (15.2)	10 (33.3)	15	
	n (total)	33	30		
TTS-TM	absent	24 (72.7)	15 (50)	39	0.064*
	present	9 (27.3)	15 (50)	24	
	n (total)	33	30		
PTS-TM	absent	29 (87.9)	22 (73.3)	51	0.126**
	present	4 (12.1)	8 (26.7)	12	
	n (total)	33	30		
VAS-difference	absent	22 (66.7)	17 (56.7)	39	0.414*
	present	11 (33.3)	13 (43.3)	24	
	n (total)	33	30		
BDI-difference	absent	33 (100)	27 (90)	60	0.102**
	present	0 (0)	3 (10)	3	
	n (total)	33	30		
THI-difference	absent	26 (78.8)	20 (66.7)	46	0.279*
	present	7 (21.2)	10 (33.3)	17	
	n (total)	33	30		

BDI: Beck Depression Inventory, PTA: Pure Tone Audiometry, PTS: Permanent Threshold Shift, THI: Tinnitus Handicap Inventory, TM: Tinnitus Matching, TTS: Temporary Threshold Shift, VAS: Visual Analogue Scale.
p*: Chi-Square test, p**: Fisher's Exact test.

analyses for the PTA, TM, VAS, BDI, and THI were insignificant and crosstabs for the presence of threshold shifts and level changes were indifferent statistically between two age groups, impairment was observed in the numbers and percentages in the patients aged>65 years after MRI.

Temporal bone MRI is required in patients with unilateral unexplained tinnitus with or without hearing loss, patients with bilateral symmetric and asymmetric hearing loss suspected of retrocochlear pathology, and patients with

suspected intracranial tumors. During an MRI scan, various types of noise at different pitches and intensities occur. This leads to symptoms of discomfort for both patients and health care workers, including being unable to communicate, anxiety, claustrophobia, and hearing loss or any kind of acoustic trauma (3–5,12–14).

The sensitivity of the human ear to sound begins at 0 dB (hearing threshold), and disturbance occurs when the SPL exceeds 120–140 dB (pain threshold). In 1.5 Tesla MRI scans, 81–117 dB SPLs



are common and may reach as high as 131 dB for high-speed echo planar imaging (4,15). Both the auditory and vestibular labyrinths may be damaged by high acoustic sound levels. Golz et al. reported that unilateral or bilateral hearing loss might be associated with the abnormal vestibular functions that result from noise (16).

Several otological conditions, especially asymmetric hearing loss, fall under the etiology of tinnitus. Although otological anomalies may be the source of initial tinnitus, it is more likely to continue due to subsequent neural changes in the central auditory system (17,18). While 17% of the general population has been reported to have tinnitus, this rate could be as high as 33% in the geriatric population (19). Presbycusis is responsible for the majority of the etiology of tinnitus, but acoustic trauma also holds a significant place.

In recent years, there has been a growing interest in MRI systems, which has resulted in an increased frequency of requested MRI examinations, which consequently might influence the acoustic characteristics of the inner ear and the incidence of MRI-induced hearing loss or tinnitus (20). The characteristics of the frequency spectra (generally between 0.2 and 1.5 kHz) of acoustic noise generated by MRI depend on the equipment composition and system protocol (21). In particular, Cho et al. (22) found that under loud noise (100 dB), the frequency range occurs in a wide range up to 4 kHz, with a peak at around 2.4 Hz.

The present study also demonstrated that the acoustic noise induced by 1.5 Tesla MRI of the temporal region has a negative impact on the audiometric and self-reported quality measures of tinnitus. Previous studies have reported on depression or anxiety caused by MRI and the bidirectional relationship between such depression and MRI-induced tinnitus (12–14). Furthermore, herein, the MRI noise itself was detected at peak levels of 118 dBA (126 dB) to clearly address

the cause-and-effect relationship with post-MRI tinnitus.

In patients with tinnitus, the severity is associated with the severity of anxiety and depression (23). The literature has shown that tinnitus causes more dissatisfaction in older patients, as it may alter sleep patterns and emotional states (24). In this study, sleep disturbances caused by tinnitus (VAS 5) were more evident in patients aged <65, which might be explained by the fact that sleep deprivation could be less tolerable for younger or more socially active people. The numeric values of all VAS scores were higher in patients aged <65 in contrast to the BDI and THI scores, which were higher in geriatric patients. Moreover, the frequency of deterioration on the BDI and THI scales was also higher for the latter group of patients in the present study.

To the best of our knowledge, this is the first study to address the threshold shifts in frequency-specific hearing and tinnitus loudness together with self-reported tinnitus disturbance tests between geriatric and non-geriatric patients. Since exposure to acoustic noise has been found to cause hearing loss, even in a small group of patients, acoustic noise should be assumed to be one of the MRI safety-first parameters. Therefore, hearing protection should be required for all patients, geriatric or not, with the use of earplugs to avoid the undesired effects of this equipment.

CONCLUSION

It may be inferred from this study that 1.5 Tesla contrast-enhanced MRI of the temporal bone might cause deterioration of the hearing and increase tinnitus loudness thresholds and discomfort caused by tinnitus especially in geriatric patients. Therefore, we must consider further the indications of its necessity and take measures to protect the hearing of all patients undergoing an MRI scan.

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RESEARCH

EXPECTATIONS OF ELDERLY PEOPLE REGARDING URBAN RENEWAL BASED ON THEIR CULTURAL CAPITAL: THE CASE OF ISTANBUL

ABSTRACT

Introduction: This study analyzes expectations of the elderly (over 65 years of age) residents of İstanbul regarding urban renewal on the basis of their cultural capital. The literature review indicated that a very limited number of studies existed that focused on urban renewal while considering elderly people's views. In those studies, the elderly often is either treated as a homogenous group or separated on the basis of their ethnicity and/or socioeconomic status. Therefore, this study was conducted to fill an important gap in the literature, namely that the analysis of the differentiation of urban renewal expectations of the elderly based on their cultural capital.

Materials and Methods: The data were collected via face-to-face surveys conducted with 1818 elderly people in 20 districts. In this study, cultural capital was operationalized in line with the embodied and institutionalized aspects as well as the taste dimension. Moreover, an urban renewal expectations scale was developed, and a one-way analysis of variance was carried out among the elderly based on their cultural capital and their scores in the urban renewal expectations scale.

Results: The study highlights elderly people's expectations of urban renewal with regard to their economic profits and the physical and social improvement of the housing and environment in which they live.

Conclusion: The low-cultural capital group has been identified as the most fragile group, and the negative consequences of urban renewal that may result in displacement, family division, and isolation have been emphasized.

Keywords: Aged; Population dynamics; Loneliness; Urban renewal; City planning.

INTRODUCTION

This study analyzes how individuals' (over 65 years of age and living in Istanbul) expectations regarding urban renewal (UR) differ on the basis of their cultural capital (CC). Istanbul provides valuable information in this respect because of both the proportion of the elderly living there and the rapid and large-scale experience of UR in the city. According to 2018 data, 1,006,545 people over the age of 65 live in Istanbul, corresponding to a share of 14% of the total elderly population in Turkey (1).

While the elderly spends a significant part of their daily lives at home, they are more sensitive to the effects of transformation. Few studies discuss the issue of UR and the elderly, and they belong to the post-2000 period. Several studies underlined the negative effects of UR on the body and the mind caused by effects such as large-scale displacement, dormant buildings, closure of local enterprises, and long-term and large uncertainties of transformation (2,3). The consequences of displacement include the elderly's loss of social networks and supportive relationships, loss of sense of belonging and commitment to the place, and loneliness (4,5). Few studies analyze the impact of old age on quality of life. For example, Scharf et al. (6,7) conducted their study with 600 people over the age of 60 in Liverpool, London, and Manchester, and they found that the elderly had a strong sense of exclusion, that almost half of the elderly they interviewed experienced poverty, and that a considerable proportion of the elderly experienced loneliness. The elderly who belong to ethnic minorities face more disadvantages. The insecurity among the elderly living in poor neighborhoods is more intense because of high crime rates in such neighborhoods, limited access to services, and poor physical environmental conditions, consequently making it more difficult for them to go out.

International studies treat the elderly as a

homogenous group and rarely pay attention to ethnicity and/or socioeconomic status. Therefore, analyzing the elderly's expectations of UR on the basis of their CC is bound to make a significant contribution to the literature. The data analyzed in the present study were collected via surveys administered face-to-face with 1818 elderly residing in 20 different districts of Istanbul.

The study consists of three sections. In the first section, the definition and indicators of CC and details regarding the research population and sample are explained. In the next section, the UR expectations scale is presented, and the results of its validity and reliability analyses are described. In addition, the results of statistical analyses conducted between the CC and the UR expectations scale are provided. The low-CC group is identified as the most fragile. Moreover, the negative consequences of UR that can lead to displacement and isolation are emphasized. In the Conclusion section, findings of the present study are compared with the literature and their implications are highlighted.

MATERIALS AND METHOD

Cultural Capital

Bourdieu defines CC as "the styles of knowledge, talent, taste, and education that one acquires and the benefits that one achieves thanks to them." CC, according to Bourdieu, has three forms: embodied CC (e.g., the knowledge of a foreign language or speech and writing style); objectified CC (e.g., pictures, books, and paintings); and institutionalized CC (e.g., diplomas and certificates) (8).

Sociology research has generally adopted two different approaches to measure CC (9). The first approach is the measurement of CC regarding the level of completed education, which is an institutionalized form. This approach, however, was criticized because it ignores the issue of



taste. The second approach is the definition and measurement of traditionally elite cultural consumption practices. Indicators such as visiting museums, going to operas, visiting galleries, and going to classical music concerts are considered. Naturally, these elements of high culture are based on the assumptions of cultural legitimacy, and the nature of this cultural legitimacy can change from one period of time to another and from one geography to another.

Arun (10) examined CC in two dimensions. The first dimension was measured by the level of education, foreign language knowledge, participation in training/courses, place of living, and living opportunities (e.g., taking vacations, going out for dinner, and possibilities for cultural expenditure). The second dimension was measured by participation in political and cultural activities and level of social bonding (10). For example, in the Antalya Old Age Survey conducted in 2013, it was found that the elderly who were in upper-class positions had higher levels of self-respect and will-to-live, participated in the high cultural events extensively, and used technological items more frequently in their lives (11).

In the present study, the variables that relate to the measurement of CC were determined as the following: learning status, foreign language knowledge, budget allocation to sociocultural expenditures, vacation places, the frequency of going out for cultural purposes, and the frequency of participation in cultural activities such as sports–cinema–theater–concert–art gallery. In terms of education; 0 points were given to those who were illiterate or only literate; 1 point was given to primary and secondary school graduates; and 2 points were given to those with a high school diploma and qualifications above that. In addition, 2 points were awarded to those who reported being able to speak a foreign language and 2 points were given to those who spend their holidays abroad or in a resort/hotel. In terms of

participation in cultural events; participants were awarded 0, –1, or –2 according to how frequently they participated in those events. It has been observed that the scoring table is compatible with the education level table.

In addition, the birthplace variable was added to determine access to educational opportunities; those born in Istanbul and those who came to Istanbul between 1930 and 1950 were given 1 point and the others were given 0 points (10). As a variable showing lifestyle habits, the question focusing on “the most frequent place to meet with friends” was considered. Consequently, those who answered the question as “restaurant and café” received 1 more point, and the rest received 0 points for their total CC score. In this framework and within the scope of all variables, the CC score was defined as “low” for those who scored between 1 and 5 points; “medium” for those who scored between 6 and 10 points, and “high” for those who scored between 11 and 22 points.

Population, Sampling, and Data Collection Tools

The population of the research consisted of elderly individuals (aged 65 and over) residing in Istanbul. The creation of the sample ($N = 1818$) included the stages of calculating the minimum sample size for Istanbul first and then recruiting participants following a stratified sampling strategy in line with the elderly population ratio in different districts. Afterwards, the purposive sampling method was utilized on the basis of individuals’ experiences of UR (realized, ongoing, public-decision-based, or individual-decision-based UR). The districts and related neighborhoods were identified in line with this data, and the sample distribution was made on the basis of their elderly ratios.

In addition to the literature review, the data collection tool was developed on the basis of 59 in-depth interviews with actors in Istanbul, such as municipal authorities and neighborhood

representatives. Following the approval of the data collection tool by the Ethics Committee of Istanbul University on 26th December in 2016 (Decision no: 29), 17 expert researchers on old age, aging, and UR were consulted. The data collection tool was revised according to experts' opinions, tested in a pilot study, and revised in consideration of the problems encountered. Field researchers were trained, and they were tasked with data collection. They started from a specific starting point in their neighborhood and moved on to another building when they managed to conduct the survey with an appropriate participant. Interviews were conducted in homes and/or gardens of elderly individuals. The data obtained from the field study were analyzed using the SPSS Quantitative Data Analysis Software.

Urban renewal expectations scale

When creating the UR expectations scale, the answers of the 1818 people who constituted the sample were considered and factor analysis was carried out by considering all the variables thought to measure expectations. Multi-stage exploratory factor analyses (EFA) showed that the KMO value of the scale was 0.889, indicating the suitability of the data for EFA. According to Tabachnick and Fidell (12), the closer the KMO value is to 1, the more suitable the data becomes for factor analysis. Multi-stage factor analysis processes performed following principal component analysis and the Varimax rotation technique indicated that a number of items loaded onto multiple factors. Among these items, those with less than 10% factor load difference were eliminated, and the factor analysis was repeated. The final scale was found to consist of seven factors with an eigenvalue of more than 1.00, explaining 52.589% of the total variance. The seven factors that constitute the scale were distinguished and identified (Table 1). Subsequently, the reliability analysis of the scale was completed. Accordingly, the internal consistency reliability of the scale was calculated

using the Cronbach Alpha coefficient, and the value was found to be 0.590.

RESULTS

Descriptive analyses of the sample concerning different variables based on their cultural capital

In total, 70.2% of the elderly were found to have low CC; 20.7% had medium CC; and 9.1% had high CC (Table 2).

While 1.2% of the elderly in the low-CC group were never married or single, the proportion of this subgroup among the high-CC owners increased to 7.4%. In addition, the 32.6% of the elderly in the low-CC group and 25.9% of the elderly in the high-CC group were either divorced or their partners had passed away.

More than three-quarters of those in the low-CC group had three or more children, while 76.4% of the elderly in the high-CC group did not have any children or had up to two children. It is worthwhile to note that those in the low-CC group had multi-children families.

Of those in the low-CC group and those in the high-CC group, 93.6% and 67.7% were immigrants, respectively.

Of those in the high-CC group, 56.9% were employed in professional jobs, while 37% had worker/employee status. A total of 62.7% of employers were in the low-CC group, while 85.6% of housewives were in the low-CC group.

Overall, 89% of those earning 1000TL and below; 80.8% of those earning between 1001TL and 2000TL; 42.2% of those earning between 4001 and 5000TL; and 28.6% of those earning 5001TL or more were in the low-CC group. Thus, this relationship between average monthly income and CC indicates that the convertibility of the economic capital and the CC is considerably high.

Moreover, 16.9% of those in the low-CC group



Table 1. Urban Renewal Expectations Scale.

Items	Sub-dimension titles
E10h Urban renewal (UR) makes me feel valuable	The expectation of improvement in socio-spatial relations dimension (6 items)
E10e I have a better time in my neighborhood thanks to UR	
E10g UR creates places where I can spend more time with my family	
E10b UR improves the neighborhood culture	
E10m I can host my guests better thanks to UR	
E10j UR brings new neighbors in	
E10z UR changes my habits	Anxiety about change dimension (7 items)
E10d It is hard to get used to the lifestyle after the UR	
E10r I am disturbed by the new residents who came after the UR	
E10y UR destroys my memories	
E10s UR worries me	
E10c I feel worthless when I'm not asked for my opinion on UR	
E10t Neighborhood security decreases with newcomers	The dimension of alienation-decreasing acquaintance (3 items)
E10ab UR causes many people to relocate	
E10aa The number of people I know locally decreases after UR	
E10p UR increases the distance with existing neighbors	Displacement dimension (2 items)
E10ar I return to my hometown after UR	
E10o I leave my neighborhood due to UR	Economic profit dimension (2 items)
E10k UR does not make any financial contribution to my budget	
E10ah I do not care about the increase in the economic value of my house after UR	Rejuvenation dimension (2 items)
E10ag UR is only beneficial for young people	
E10ao UR rejuvenates the neighborhood's population	Population density dimension (3 items)
E10am The number of common areas should increase following UR	
E10l UR increases the crowdedness	
E10a Crowds make it difficult to live in the city	

and 3.2% of those in the high-CC group suffered from poor overall health.

Findings of one-way analysis of variance

One-way analysis of variance (ANOVA) was conducted between CC scores and UR expectations of participants (see Table 3). After determining whether there was any significant difference following the administration of ANOVA, complementary post-hoc analysis techniques were utilized to identify the groups that were the origins of significant differences. To decide upon which post-hoc multiple comparison technique to use,

the hypothesis as to whether the variances of the group distributions were homogeneous was tested using Levene's test. It was found that the variances were homogeneous. Afterwards, the LSD multiple comparison technique, which is widely used when variances are homogeneous, was preferred (Table 4). The findings can be summarized as follows:

1. The expectation of socio-spatial improvement after UR varies significantly by participant score of CC ($p < 0.05$). The difference is present between the low- and medium-, low- and high-, and medium- and high-CC

Table 2. Cultural Capital Group.

Groups	F	%	Valid%	Cumulative %
Low	1277	70,2	70,2	70,2
Medium	376	20,7	20,7	90,9
High	165	9,1	9,1	100,0
Total	1818	100,0	100,0	

Table 3. Results of ANOVA Analysis.

Scores	Groups	N	\bar{x}	ss	sh	F	p
1 The expectation of improvement in socio-spatial relations	Low	1220	2,17	,63	,02	21,200	,000
	Medium	409	2,05	,65	,03		
	High	189	1,86	,65	,05		
	Total	1818	2,11	,64	,02		
2 Anxiety about change	Low	1220	2,15	,54	,02	14,570	,000
	Medium	409	2,00	,56	,03		
	High	189	1,99	,56	,04		
	Total	1818	2,10	,55	,01		
3 Alienation effect	Low	1220	2,50	,57	,02	4,477	,011
	Medium	409	2,44	,62	,03		
	High	189	2,38	,61	,04		
	Total	1818	2,47	,59	,01		
4 Displacement effect	Low	1220	1,41	,59	,02	4,520	,011
	Medium	409	1,33	,53	,03		
	High	189	1,31	,52	,04		
	Total	1818	1,38	,57	,01		
5 Expectation of economic profit	Low	1220	2,11	,69	,02	3,564	,029
	Medium	409	2,01	,75	,04		
	High	189	2,01	,74	,05		
	Total	1818	2,07	,71	,02		
6 Young-age suitability	Low	1220	2,12	,64	,02	19,092	,000
	Medium	409	2,00	,63	,03		
	High	189	1,83	,62	,05		
	Total	1818	2,06	,64	,02		
7 Density/crowd perception	Low	1220	2,80	,33	,01	7,347	,001
	Medium	409	2,85	,31	,02		
	High	189	2,87	,29	,02		
	Total	1818	2,82	,32	,01		



- groups. The elderly grouped under low CC expect the most and the elderly grouped under high CC expect the lowest socio-spatial improvement. The expectation of socio-spatial improvement is influenced by factors such as the improvement of the neighborhood culture after UR; the increase in the potential to have a good time with the family; hosting guests more comfortably; and feeling the self to be more valuable. The low average scores in this dimension for the elderly in the high-CC group are interrelated with the neighborhood in which they live, housing comfort, and (dis)satisfaction they feel from those.
2. The anxiety regarding the change caused by UR based on CC scores of the elderly differs significantly ($p < 0.05$). This differentiation is present between low and medium and between low and high-CC groups. Accordingly, the average concern of those in the low-CC group in relation to UR is higher than the average concerns of those in the other two groups. These concerns include the change of habits because of UR, the difficulty of adjusting to a new lifestyle, the disappearance of memories, and the disturbance caused by the newly arrived residents.
 3. The alienation-diminishing acquaintance effect of UR varies significantly on the basis of participants' CC scores ($p < 0.05$). This difference is present between the low- and medium-CC groups and the low and high-CC groups. Accordingly, the elderly in the low-CC group are the ones who expect the alienating effect of UR the most. This indicates the decrease of acquaintances and neighbors of elders with low CC in newly produced urban spaces and their conviction that they will not be able to adapt to the new neighborhood. It is also important to note that family sizes change after UR and that families of 4, 5, and 6 people have to return to apartments designed for 1, 2, or 3 people. This is caused by the reduction of housing sizes.
 4. The displacement effect that may develop from UR varies significantly based on the elderly's scores of CC ($p < 0.05$). This difference is present between the low and medium and the low- and high-CC groups. The elderly in the low-CC group are more likely to relocate as a reaction.
 5. The expectation of economic profit varies significantly across different CC groups ($p < 0.05$). This difference is present between the low- and medium-CC groups, and the economical expectations of the elderly in the medium-CC group are higher than those of the elderly in the low-CC group.
 6. Opinions on the suitability of UR for young people vary significantly across different CC groups ($p < 0.05$). This difference is present between the low- and medium-, the low- and high-, and the medium- and high-CC groups. The elderly from the low-CC group most strongly and the elderly from the highest CC group least strongly believe that UR is more suitable for the youth.
 7. Participants' expectations regarding the crowd/density effect of UR differ significantly across different CC groups ($p < 0.05$). Accordingly, the average scores of the elderly in the low-CC group regarding the expectation that UR will produce crowdedness and condensation are lower than those of the elderly in the medium- and high-CC groups. No significant difference was found between the scores of the elderly in the low- and high-CC groups.

CONCLUSION

The present study investigated how the expectations of individuals over 65 years of age differ on the basis of their CC. The results of other studies on UR overlap with some of the findings of

Table 4. LSD Multiple Comparisons Analysis

Scores	Group (I)	Group (J)	Avg. Diff. (I-J)	sh	p
1 The expectation of improvement in socio-spatial relations	Low	Medium	,12	,04	,001
		High	,30	,05	,000
	Medium	Low	-,12	,04	,001
		High	,18	,06	,001
	High	Low	-,30	,05	,000
		Medium	-,18	,06	,001
2 Anxiety about change	Low	Medium	,14	,03	,000
		High	,16	,04	,000
	Medium	Low	-,14	,03	,000
		High	,01	,05	,795
	High	Low	-,16	,04	,000
		Medium	-,01	,05	,795
3 Alienation effect	Low	Medium	,06	,03	,073
		High	,12	,05	,007
	Medium	Low	-,06	,03	,073
		High	,06	,05	,223
	High	Low	-,12	,05	,007
		Medium	-,06	,05	,223
4 Displacement effect	Low	Medium	,08	,03	,013
		High	,09	,04	,035
	Medium	Low	-,08	,03	,013
		High	,01	,05	,796
	High	Low	-,09	,04	,035
		Medium	-,01	,05	,796
5 Expectation of economic profit	Low	Medium	,09	,04	,024
		High	,10	,06	,071
	Medium	Low	-,09	,04	,024
		High	,01	,06	,896
	High	Low	-,10	,06	,071
		Medium	-,01	,06	,896
6 Young-age suitability	Low	Medium	,12	,04	,001
		High	,29	,05	,000
	Medium	Low	-,12	,04	,001
		High	,17	,06	,003
	High	Low	-,29	,05	,000
		Medium	-,17	,06	,003
7 Density/crowd perception	Low	Medium	-,05	,02	,003
		High	-,07	,03	,003
	Medium	Low	,05	,02	,003
		High	-,02	,03	,484
	High	Low	,07	,03	,003
			,02	,03	,484



the present research. For example, it is shown that UR in Istanbul, in general, has become operational as an economic gain-oriented process; it is known that all sides of this process also see their residences as investment tools and their main motivation is to increase their economic profit as much as possible (13). This motivation, which is established by the income axis of UR in Istanbul, does not differ among the elderly. However, it can be said that this motivation is embraced slightly more by people who belong to the high-CC group.

Although UR is encouraged by economic profits, it is also perceived as a process that increases fears and anxieties of the elderly. It can be argued that what makes the UR more acceptable for the elderly could be related to the fact that the elderly evaluates the benefits for their children more than they do for themselves.

In line with their CC, it is assessed that two types of displacement tendencies may occur among the elderly. The first trend is the tendency of low CC owners to be displaced more forcefully owing to the fact that they also mainly belong to the lower economic classes. The possible reasons for displacement are predicted to be the following:

- a) The downsizing of the houses might not be compatible with the existing family structure,
- b) They could be motivated to buy housing from more peripheral locations to utilize the decreased expenses for a smaller house so that they could make their children a homeowner, or
- c) They might rent or sell their house because of the expected lifestyle differences between the current and the new one.

The other trend is voluntary displacement, which can be observed mostly among the elderly in the high-CC group. Those who live in the city center or the inner city can permanently move to the places at the periphery during and after the UR so as to avoid negative effects such as noise,

traffic congestion, air pollution, and crowds. Moreover, they could then rent their old dwellings to the middle classes, thereby increasing their income. Another result of such a process is that the high-CC group ends up contributing to the gentrification of the periphery. For the elderly, displacement means the loss of the familiar physical and social environment and relationships. The negative effects of displacement caused by UR become more visible when one pays attention to research on spatial practices and the benefits of getting older in the same place, such as easier everyday life (14).

The elderly from the low-CC group are the ones who expect the alienation effect of UR the most. This means that those people expect that they will be lonelier in the newly produced space; will have fewer neighbors; and will be unable to conform to the newly formed neighborhood. In addition, it should be stated that family sizes change after UR in that drastic reduction of housing sizes leads to this outcome by causing families of 4, 5, or 6 people to return to apartments designed for 1, 2, or 3 people. This might cause more loneliness for the elderly belonging to the low-CC group. The alienating and isolationist effect of UR on the elderly is also compatible with international literature (15).

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RESEARCH

THE EFFECT OF DEATH ANXIETY ON PERCEIVED PAIN LEVELS IN ELDERLY PATIENTS

ABSTRACT

Introduction: The purpose of the present study was to examine the relationship between death anxiety—a significant issue for the elderly—and the pain levels in these individuals with increasing complaints of diseases with ageing.

Materials and methods: This descriptive cross-sectional study included geriatric patients who presented to the Gaziantep University Faculty of Medicine between 15.12.2018 and 15.02.2019 for outpatient treatment and scored over 25 in the Mini-Mental test (MMT). Geriatric Pain Measure (GPM) and Turkish Death Anxiety Scale (TDAS) were used for assessment.

Results: Of the 315 individuals, aged 65 years and above, who participated in the study, 58.4% were in the 65–69 age group with 52.7% males. A positive and statistically significant relationship was observed between GPM total score and TDAS total score, as well as its subscales, namely ambiguity of death, exposure to death and agony of death. A positive and statistically significant relationship was determined between the TDAS total score and GPM subscales, namely disengagement, pain intensity, pain at ambulation and pain during vigorous activities.

Conclusion: A positive relationship was observed between death anxiety and perceived pain in the elderly. The strongest relationship was determined between pain and anxiety because of the ambiguity of death. Many sociodemographic factors are related to death anxiety and the level of perceived pain. Therefore, death anxiety and pain may affect the quality of life for the elderly and should be promptly treated.

Keywords: Aged; Death; Anxiety; Pain Perception.

INTRODUCTION

Ageing is an inevitable and irreversible physiological process that involves both physical and mental regression of an individual (1). World Health Organization considers individuals aged 65 years and above to be geriatric (1).

The world population continues to age rapidly owing to the increase in life expectancy, increase in birth rates, decrease in mortality rates and advancements in medical care (1). It is estimated that the geriatric population will increase from 524 million in 2010 to about 1.5 billion in 2050, with the highest increase occurring in developing countries (2). Notably, the elderly population in our country increases more rapidly compared with other age groups. The proportion of elderly population in Turkey will reach 10.2% in 2023, and Turkey will be among the countries with a 'too old' population (3).

Death anxiety refers to an emotion that develops from the awareness of nonexistence and of losing himself/herself and his/her world that was a part of one's life, and these thoughts form the foundation of all fears. Death anxiety can be evaluated as a multi-dimensional concept and can vary based on various factors, such as age, gender, religious beliefs, depression and other anxiety symptoms (4).

With the rapid increase in the elderly population worldwide and in Turkey, a corresponding increase has been observed in health problems related to old age, thereby making this topic significant. Age-related chronic diseases lead to a decrease in physical abilities as well as regressions in cognitive functions and daily life activities (5). Moreover, pain problems increase in the elderly alongside all the other factors (5). Elderly individuals frequently complain of acute and chronic pain. Despite most elderly individuals having several chronic diseases and using multiple medications, a pain assessment is not given sufficient importance in the elderly compared with the adult population in the society. However, society-based studies have revealed that the pain prevalence in individuals aged 60

years and above is twice that of the individuals aged below 60 years (6). Notably, untreated pain adversely affects the quality of life, resulting in physical or psychological problems besides increasing the rate of health care centre visits as well as healthcare expenses (6,7). Nevertheless, healthcare professionals do not typically perform pain assessment and treatment despite the significant findings of pain prevalence in the elderly (6).

Even though literature survey revealed that most studies focussed on factors increasing anxiety and a positive relationship was observed between anxiety and perceived pain (8), we could find no study that focussed on establishing a connection with the concept of pain, which is a critical issue for the elderly. The present study has been conducted to determine whether death anxiety in the elderly affects their pain level, and it is hoped that the study findings shall pave the way for future studies and treatment applications.

MATERIALS AND METHODS

This descriptive study analysed the effect of death anxieties on pain levels in elderly individuals aged 65 years and above. Overall, 315 geriatric patients who presented to the Geriatrics Polyclinic of the Gaziantep University Faculty of Medicine for outpatient treatment between 15.12.2018 and 15.02.2019 were included in the study.

The purpose of the study was explained to the elderly participants, and they were informed that participation was entirely voluntary, and they could opt out whenever they wished to do so. Subsequently, they were asked to fill in the 'Informed Consent Form,' 'Personal Information Form,' as well as the Turkish Death Anxiety Scale (TDAS) and the Geriatric Pain Measure (GPM).

Written approvals were obtained from the Gaziantep University Clinical Research Ethics Committee and the Ministry of Health of the hospital where the study was conducted. Participants included in the study were informed



regarding the study, and oral and written consents were obtained from those who accepted to participate.

Data Acquisition Tools:

Standardised Mini-Mental Test

Standardised Mini-Mental Test (SMMT) is a scale used for assessing cognitive functions, identifying dementia and determining its severity, and can be applied by doctors, nurses and psychologists after a short training. The best threshold value was determined as 25/26 during a study conducted to assess the validity of the test in diagnosing Alzheimer type dementia, whereas it was observed that a threshold value of 23/24 was accepted as an indication that SMMT has high sensitivity and specificity for diagnosing light dementia in the elderly Turkish population. SMMT was first performed on all individuals who participated in the study, and those with a score of above 25 were included (9).

Turkish Death Anxiety Scale

The TDAS developed by Sarikaya and Baloglu is a five-point Likert type scale comprising 20 items. Scale scores vary between 0 to 100, and high scores indicate high death anxiety (10). Its subscales are Ambiguity of Death (AmD), Exposure to Death (ETD) and Agony of Death (AgD). The first component of the scale, AmD, concentrates on the unknown or unpredictable nature of death. ETD covers encountering dead, death or dying in the form of seeing, watching, talking, reading about or visiting. AgD component seems to elicit the fear of suffering as a result of death or dying.

Geriatric Pain Measure

GPM is a 24-item multi-dimensional scale developed by Ferrell BA et al. GPM is an easily applicable scale developed for outpatient geriatric individuals. The scale comprises five dimensions, namely disengagement (D), pain intensity (PI), pain at ambulation (PA), pain during vigorous activities (PVA) and pain during other activities (PDOA). The scale includes three open-ended questions on pain. The total score is calculated by summing up

the 'Yes' answers and varies between 0–42. The GPM defines the pain of patients and evaluates the resulting physical, emotional, cognitive and behavioural responses. The scale contains several components that evaluate the effects of pain in the daily lives of patients to develop coping strategies and define various factors, such as the location, intensity and characteristic of the pain (7). Reliability and validity studies for this scale have been documented in Turkish (11)

Statistical Analysis

The quantitative variables were indicated using centralisation and variance measurements namely mean \pm SD. The internal consistencies of the scale were evaluated using Cronbach's alpha. ANOVA t-test was used to assess the behavioural differences of group mean values when normality and equal distribution assumptions are met, whereas non-parametric tests, such as Kruskal–Wallis H Test (group number >2) and Mann–Whitney U test (group number = 2), were performed for the other cases. Spearman's Rank Correlation test was used for measuring the strength and direction of the relationship between two continuous variables. Statistical significance was determined as $p = 0.05$ for all cases. Statistical analyses were performed using IBM SPSS (Statistics for Windows, Version 21.0, Armonk, NY, IBM Corp).

RESULTS

Descriptive Results

Of the 315 geriatric individuals, 58.4% were in the 65–69 years age group, 52.7% were males, 85.4% were married, 50.2% were literate, 79% were unemployed and 92.1% were living with their family. It was also determined that 23.2% had chronic cardiovascular disease, 45.4% had chronic diabetes, 37.1% had chronic hypertension and 7% had other chronic diseases (Table 1).

SMMT, TDAS and GPM Results

SMMT mean value was determined as 26.61 ± 1.28 .

TDAS total score mean value was determined as 30.41 ± 19.83 . Upon subscale assessment, AgD was determined as 5.55 ± 3.31 , AmD as 15.77 ± 10.42 and ETD as 9.1 ± 7.47 .

GPM total score mean value was determined as 53.09 ± 25.36 . Upon subscale assessment, D was determined as 27.98 ± 15.43 , PI as 11.64 ± 4.87 , PDOA as 6.48 ± 4.31 , PA as 6.2 ± 3.94 and PVA as 3.61 ± 2.52 .

TDAS and Subscales; GPM and Subscales Correlation Results

A positive and statistically significant relationship was observed between GPM total score and TDAS total, as well as its subscales AmD, ETD and AgD ($p < 0.05$) (Table 2).

A positive and statistically significant relationship was observed between TDAS total score and GPM total score, as well as its subscales D, PI, PDOA, PVA and PA ($p < 0.05$) (Table 2).

Comparative Results for the TDAS Scale Based on Sociodemographic Characteristics of

Patients

A statistically significant difference was observed between education level and the subscale ETD ($p < 0.05$). Subscale score decreased with increasing level of education.

The mean value of TDAS total score and the mean values for subscales AD, ETD and AC were statistically significantly higher for female participants ($p < 0.05$). (Table 3)

No statistically significant difference was observed between the mean value of TDAS total score and age ($p > 0.05$).

Comparative Results for the GPM Scale Based on Sociodemographic Characteristics of Patients

A statistically significant difference was determined between the education levels of the elderly and the GPM total score mean value and the mean values of subscales ($p < 0.05$). Scale scores decreased with increasing level of education.

Table 1. Distribution of the Socio-Demographic Characteristics of the Elderly .

Characteristics	N	%
Age		
65-69	184	58.4
70-74	83	26.3
75+	48	15.2
Gender		
Male	166	52.7
Female	149	47.3
Marital Status		
Single	46	14.6
Married	269	85.4
Education Level		
Illiterate	158	50.2
Primary School – Secondary School	121	38.4
High School – University	36	11.4
Living With Someone		
Alone	25	7.9
Family	290	92.1

**Table 2.** Correlations between Turkish Death Anxiety Scale (TDAS), Geriatric Pain Measure (GPM).

	TDAS Total	TDAS AmD	TDAS -ETD	TDAS AgD	GPM total	GPM-D	GPM -PI	GPM GPM-PA	GPM -PVA	GPM-PDOA
TDAS Total	1									
TDAS AmD	0.97*	1								
TDAS ETD	0.91*	0.8*	1							
TDAS-AgD	0.84*	0.8*	0.66*	1						
GPM total	0.3*	0.3*	0.28*	0.23*	1					
GPM-D	0.33*	0.32*	0.29*	0.27*	0.94*	1				
GPM-PI	0.17*	0.18*	0.15*	0.1	0.79*	0.64*	1			
GPM-PA	0.19*	0.16*	0.22*	0.14*	0.71*	0.55*	0.58*	1		
GPM-PVA	0.23*	0.22*	0.23*	0.12*	0.67*	0.51*	0.56*	0.52*	1	
GPM-DOA	0.24*	0.23*	0.24*	0.17*	0.84*	0.7*	0.74*	0.67*	0.65*	1

Disengagement (D), pain intensity (PI), pain at ambulation (PA), pain during vigorous activities (PVA), pain during other activities (PDOA), Ambiguity of Death (AmD), Exposure to Death (ETD) and Agony of Death (AgD).

A statistically significant difference was observed between age and GPM total score mean value, as well as the mean value of total score and the mean values of subscales ($p < 0.05$). Scale scores increased with increasing age. (Table 4).

No statistically significant difference was observed between the mean value of TDAS total score and marital status ($p > 0.05$)

DISCUSSION

Notably, pain problems increase with ageing (6), and anxiety plays a crucial role in increasing the level of perceived pain clinically (8). Even though some studies have indicated that death anxiety decreases with ageing, several large-scale studies have reported that death anxiety increases with age (12). Death anxiety significantly affects the lives of the elderly. The

present study did not select healthy participants but those who presented to the polyclinic with medical conditions, not to measure the death anxiety intensity in the elderly but to examine its relationship with sociodemographic factors and pain. Our study results concluded that death anxiety and perceived pain are weakly correlated at a statistically significant level. Moreover, it was observed that several sociodemographic factors are related to death anxiety and the level of perceived pain. Study results were grouped and discussed under different titles.

Relationship between Death Anxiety and Pain Levels

Anxiety increases the perception of pain, especially in individuals with high anxiety and sensitivity (13). Expectedly, death anxiety can increase pain perception, like the other forms

Table 3. Comparison of Mini Mental Test (MMT), Turkish Death Anxiety Scale (TDAS) in terms of Sociodemographic Characteristics.

	Mean (x)-Std (ss) Min-Max				
	MMT	TDAS_AmD	TDAS_ETD	TDAS_AgD	TDAS_Total
Literacy					
Illiterate (158)	26.34±1.1	17.11±10.94	10.03±7.69	5.92±3.34	33.06±20.67
Primaryschool (121)	26.64±1.29	14.45±9.81	8.35±7.11	5.19±3.33	27.98±18.81
High School – University (36)	27.67±1.41	14.31±9.49	7.53±7.29	5.11±3.02	26.94±18.26
P	<0.001	0.103	0.07	0.145	0.107
Alcohol					
Yes (15)	26.53±1.06	14.07±9.59	5.93±6.23	5.67±3.24	25.67±16.79
No (300)	26.61 ±1.29	15.85±10.47	9.26±7.5	5.54±3.32	30.65±19.96
P	0.826	0.656	0.089	0.688	0.044
Gender					
Male (166)	26.74 ±1.27	11.61 ±8.96	6.36±6.05	4.41±3.07	22.38 ±16.55
Female (149)	26.46±1.27	20.4±9.99	12.15±7.73	6.82±3.12	39.36 ±19.38
P	0.027	<0.001	<0.001	<0.001(m)	<0.001
Smoking					
Yes (98)	26.59±1.23	13.54±9.17	7.59±6.68	4.95±3.2	26.08±17.44
No (217)	26.61±1.3	16.77±10.8	9.78±7.71	5.82±3.34	32.37±20.56
P	0.953	0.02	0.02	0.034	0.014

of anxiety. When considered conversely, death anxiety was determined to be statistically significantly higher in patients with fibromyalgia compared with the control group (14). Notably, the disengagement scale was observed to have the strongest relationship with death anxiety when correlations were examined. Our study observed death anxiety to be directly proportional to pain. Notably, a clear relationship exists between pain anxiety and mobility. A study found that death anxiety significantly predicted symptom severity. Even though the strongest relationship with pain was observed in the AmD subscale, theorists consider intolerance of uncertainty and anxiety sensitivity to be conceptually similar (15). Therefore, AmD may indicate high anxiety and pain.

Relationship between Death Anxiety and Sociodemographic Data

Death anxiety was determined to be inversely related to education level, health status and having social support. Generally, high education level may act as a protective factor against anxiety and depression (16).

Nonetheless, a relationship could not be determined between age and death anxiety. Typically, death anxiety peaks at approximately 20 years of age in males and females (17). However, death anxiety decreases with age in general (12). Because all patients included in our study were above the age of 65 years, observing no differences among the age groups was an expected result. Notably, a second peak occurs at age 50 years for females, with anxiety disorders observed more

**Table 4.** Comparison of Turkish Death Anxiety Scale (TDAS) in terms of Sociodemographic Characteristics.

	Avg (x)-Std (ss) Min-Max					
	Geriatric Pain Measure (GPM) Sub-Scales					
Education	GPM-D	GPM -PI	GPM-PDOA	GPM-PVA	GPM-PA	GPM total
Illiterate	31.53±13.59	13.12±4.13	7.61±4.17	3.86±2.54	6.9±3.74	59.73±22.44
Primary School	25.14±16.22	10.72±4.95	5.39±4.18	3.48±2.46	5.53±4.04	47.86±26.13
High School – University	21.95±16.84	8.2±5.23	5.16±4.08	2.98±2.57	5.36±4.0	41.58±27.2
P	<0.001	<0.001	<0.001	0.14	0.004	<0.001
Alcohol						
Yes	12.22±13.79	9.84±5.23	3.33±4.1	2.86±2.24	3.33±4.0	29.83±22.98
No	28.77±15.1	11.73±4.84	6.63±4.26	3.65±2.53	6.34±3.89	54.26±24.94
P	<0.001	0.125	0.005	0.234	0.004	0.001
Gender						
Male	22.67±15.1	10.41±5.22	5.32±4.29	45.31±10.51	5.51±4.12	44.89±25.73
Female	33.9±13.57	13.0±4.04	7.76±3.96	45.11±9.3	6.96±3.6	62.23±21.61
P	<0.001	<0.001	<0.001	p=0.75	0.003	<0.001
Smoking						
Yes	23.41±15.72	10.73±4.65	5.44±4.21	3.5±2.58	5.83±3.9	46.65±25.74
No	30.04±14.88	12.04±4.92	6.94±4.27	3.66±2.5	6.36±3.96	56.0±24.7
P	0.001	0.004	0.003	0.619	0.151	0.003
Age						
65-69 (134)	25.24 ± 15.56	10.36 ± 5.13	5.6 ± 4.37	3.26 ± 2.46	5.37 ± 4.12	47.26 ± 25.82
70-74 (83)	32.09 ± 15.38	13.31 ± 3.86	7.25 ± 4.09	4.07 ± 2.45	6.94 ± 3.61	60.62 ± 23.41
75+ (48)	31.39 ± 12.85	13.64 ± 3.83	8.48 ± 3.5	4.16 ± 2.71	8.08 ± 2.77	62.43 ± 20.53
P	0.002	<0.001	<0.001	0.014	<0.001	<0.001

in females than males (18). Our study observed higher death anxiety in females compared with males.

Death anxiety was higher in patients with chronic diabetes, chronic hypertension or chronic coronary diseases. Cardiovascular diseases are the primary causes of death for diabetic individuals and several factors, including hypertension, contribute to the high prevalence of cardiovascular diseases. The two-way relationship between these diseases and anxiety disorders has been studied for decades (19). Even though death anxiety was

higher in individuals with chronic diabetes, chronic hypertension or chronic coronary diseases, it was not related to other chronic diseases, probably because anxiety has a two-way relationship with these diseases.

Death anxiety was lower for smokers. It is possible that smoking decreases stress level by reducing the level of arousal. However, death anxiety was higher for alcohol users. A related theory indicates that individuals with high anxiety sensitivity resort to using alcohol to suppress negative emotional experiences (20).

Understandably, high anxiety sensitivity causes death anxiety.

Relationship between Perceived Pain and Sociodemographic Data

The underlying causes for the cognitive modulations of pain have not yet been fully understood. Pain perception is a subjective state determined through expectations and learning modification (21), and it is expected to be affected by personal factors. Our study observed a decrease in pain score with a higher education level. Therefore, education level could be a significant predictor for pain.

Pain score increased with ageing and it was higher in females. In general, it has been reported that perceived PI varies with gender and advanced age (22).

Perceived pain was lower in smokers and alcohol users—a finding non-concordant with other studies. Notably, alcohol was observed not to have a pain-reducing effect. However, chronic pain is higher in chronic alcoholics (23). Nevertheless, the patients included in our study were not alcohol consumers at an addictive level. Therefore, the relationship between alcohol and pain concerning causality should be studied in more detail in the elderly. It has been put forth that smoking results in perceiving PI more in children and adults (24). However, it is unclear how smoking affects pain

perception. This pain perception is considered to be probably related to the effect of smoking on nicotinic Ach receptors in SSS. Notably, chronic smoking opens paths in these receptors through desensitisation. However, the different result for the elderly in our study could be related to the reduced number of nicotinic Ach receptors with ageing (25).

Limitations

The major limitations of the present study were that it lacked a control group and that elderly individuals with the same disease were not examined. However, separate evaluations were performed based on diagnoses. Moreover, a causality relationship could not be discussed owing to the cross-sectional nature of the study.

In conclusion, the level of education, gender, smoking and alcohol use are factors that affect death anxiety. Education level, age, gender, alcohol use and smoking are sociodemographic factors that influence perceived pain. A positive relationship is observed between death anxiety and perceived pain in elderly individuals. The pain had the strongest relationship with the anxiety caused by AmD. The prognosis of the individuals may be affected adversely if this anxiety is not treated in the elderly because anxiety and pain adversely affect the quality of life. Nonetheless, further comparative studies involving a wide range of patients with similar diagnoses are warranted.

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RESEARCH

PHYSIOTHERAPY STUDENTS' ATTITUDES TOWARD AGEISM AND RELATED FACTORS

ABSTRACT

Introduction: Recently, ageism has been recognised as an important factor affecting the quality of rehabilitation services provided to older adults. This study aimed to identify the ageism attitudes of physiotherapy students and investigate the factors associated with these attitudes.

Materials and Methods: This descriptive study was conducted on 417 students enrolled in the School of Physical Therapy and Rehabilitation of a state university in İzmir, Turkey. The authors evaluated the sociodemographic and family characteristics, experiences and opinions about living with older adults, and ageism attitudes of participating students. The Ageism Attitude Scale (AAS) is employed to assess the ageism attitudes.

Results: The mean of total AAS score of the 417 students is 81.0 ± 9.5 , whereas the mean scores of 'restricting the life of the elderly', the 'positive ageism' and the 'negative ageism' dimensions are 34.3 ± 4.0 , 28.7 ± 5.2 , and 18.0 ± 3.4 , respectively. Higher positive ageism attitude scores are reported in the female students along with those students who reported higher economic status (family), higher quality of relationships with older people, desire to cohabitate with a parent in the future, and desire to work in institutions serving older adults.

Conclusion: These findings suggest that interactions with older adults can increase positive ageism attitudes. To improve the ageism attitudes of physiotherapy students, they should be allowed to practice in elderly care units. Considering that the elderly population will increase gradually, physiotherapy students' having a positive attitude towards the elderly might increase the quality of the health services they will provide.

Key words: Ageism; Attitude; Aged.



INTRODUCTION

Factors such as decreased fertility, scientific and technological advances in healthcare, implementation of early diagnosis and treatment methods, increased measures to protect and improve health, and the promotion and adoption of healthy lifestyles have contributed to the growth of the older population (1,2). The proportion of older adults in the general population is increasing worldwide, also including Turkey (1,3). This rapid growth of the elderly population may cause major problems in the family and social life in the coming years; however, the scale of these problems may vary by country (1,4).

Ageism is a multidimensional concept that encompasses myriad assumptions, prejudices, attitudes, behaviours and actions subjected to a person because of their age (1,2). Ageism is also described as the interpretation of deficiencies, limitations and unfavourable changes that come with age (1). Thus, both positive and negative attitudes must be addressed together in the evaluation of the data on ageism. A positive societal attitude towards the older adults enables the members of that society to regard ageing as a natural process (2,4). In particular, positive attitude towards older adults among health workers is an important factor in increasing the older adults' quality of life and providing high-quality healthcare services (1,4).

In recent years, Turkey has experienced a phase of social transformations, such as population growth, developments in economic and social structure, changes in family structure due to urbanisation, and a shift from the traditional extended family structure to the nuclear family (5). Determining the impact of this transformation period on young peoples' attitudes towards older adults is a critical issue. While some studies in the literature indicate that university students from various fields of study have negative attitudes towards older adults (6-10), other studies have

reported that students have positive attitudes (5,11-20).

Ageism leads to poor health care for older adults. Identifying the possible determinants of healthcare workers' and students' attitudes toward older adults is necessary to prevent ageism. In the literature, sociodemographic and family characteristics, perceived economic status of the family, experience in living with older adults, desire to live with parents in the future, desire to work in institutions that provide services to older adults after graduation, and attitudes towards older adults have been reported as possible determinants of ageism (8,9,14,15,18,19).

Physiotherapists are among the health workers who interact with older adults on a frequent basis while maintaining and improving older adults' health during the rehabilitation process. Having a negative attitude towards older adults may affect the quality of the healthcare services rendered to the older adults. Thus, it is essential to determine the ageism attitudes of physiotherapy students, who represent the next generation of healthcare providers. To the best of our knowledge, there has been no study investigating the physiotherapy students' attitudes against ageism.

The objective of this study is to identify the ageism attitudes of physiotherapy students and investigate the factors associated with these attitudes.

MATERIALS AND METHOD

Study Sample

This descriptive study included 605 students who were attending at Dokuz Eylul University School of Physical Therapy and Rehabilitation (SPTR), which is located in Izmir, Western Turkey. All students (98 first-year, 111 second-year, 257 third-year and, 139 fourth-year students) were invited in the study, with no sampling. Hundred and forty-six students refused to participate in the study. Forty-two

students did not participate in the study because they did not attend school. As a result, a total of 417 students participated in the study. This study was conducted between October 2018 and March 2019.

Data Collection and Variables

Data were collected by using a questionnaire that was developed based on the literature (6,7,12-17,21-25) and the Ageism Attitude Scale (AAS). The questionnaires were distributed to the students in the classroom and collected in the sealed envelopes. The students have completed theirs under the supervision of the authors.

The AAS was used to identify the attitudes of students towards older adults. Developed by Vefikuluçay in 2008 (11), the AAS includes 25 items scored on a 5-point Likert-type scale. The scale includes both positive and negative attitude statements. Positive attitude statements are scored as follows: 5=Strongly agree, 4=Agree, 3=Undecided, 2=Disagree and 1=Strongly disagree. Negative attitude statements are reverse scored. The total score of the AAS ranges between 23 and 115, with higher scores corresponding to more positive ageism attitudes (11). The scale has three subdimensions:

- 1) Restricting the life of the elderly: this subdimension reflects the beliefs and perceptions related to the restriction of older adults' social lives. Scores are in between 9 and 45 points.
- 2) Positive ageism: this subdimension reflects the positive beliefs and perceptions towards older adults. Scores are in between 8 and 40 points.
- 3) Negative ageism: this subdimension reflects the negative beliefs and perceptions towards older adults. Scores are in between 6 and 30 points (11).

Variables considered in this study included sociodemographic characteristics (age, gender, place where participant resided the longest,

current place of residence), family characteristics (family structure, paternal and maternal education, parental relationship status, sibling status), perceived economic status of family, experience in living with older adults, desire to live with parents in the future, desire to work in institutions that provide services to older adults after graduation, and attitudes towards older adults.

Ethical issues

This study was approved by the Non-invasive Research Ethics Committee of Dokuz Eylül University, Izmir, Turkey (2018/11-08). All students were informed about the purpose and nature of the study. The students who volunteered to participate were included.

Statistical analysis

Continuous variables were presented in form of mean \pm standard deviation values. We analyzed the normality of the data with the Kolmogorov-Smirnov test. Whereas our data were normally distributed ($p>0.05$), we used parametric tests to compare the groups. Associations between sociodemographic characteristics and the students' ageist attitudes and behaviours were analysed by t-test. One-way analysis of variance (ANOVA) was employed for the variables of more than two groups. When there was a significant difference between the groups in ANOVA, Tukey test was used as a post hoc analysis. Statistical analyses were performed by using SPSS version 20.0. P-values less than 0.05 were accepted as statistically significant.

RESULTS

A total of 417 students were included in this study (response rate, 68.9%), in which 243 (58.3%) participants were female, and the mean age of the participants was 22.0 ± 2.1 (18–38) years. Table 1 has shown the sociodemographic characteristics of the students.

The mean of total AAS score was 81.0 ± 9.5 , whereas the mean scores of 'restricting the life of

**Table 1.** The sociodemographic characteristics of the students.

Variables		N	%
Year of study	First	78	18.7
	Second	93	22.3
	Third	197	47.2
	Fourth	49	11.8
Age group (years)	≤20	97	23.3
	≥21	320	76.7
Gender	Female	243	58.3
	Male	174	41.7
Family structure	Nuclear family	365	87.5
	Extended family	52	12.5
Place where participant resided the longest	Urban area	365	87.5
	Rural area	52	12.5
Paternal education	≤Middle	162	38.8
	≥High school	255	61.2
Maternal education	≤Middle	260	61.4
	≥High school	157	37.6
Parental relationship status	Together	381	91.4
	Divorced / deceased	36	8.6
Current place of residence	Dormitory	190	45.6
	With family	94	22.5
	With friends / alone	133	31.9
Perceived family economic status	High	144	34.5
	Middle	255	61.2
	Low	18	4.3

the elderly', the 'positive ageism' and the 'negative ageism' dimensions were 34.3 ± 4.0 , 28.7 ± 5.2 and 18.0 ± 3.4 , respectively.

Female students had significantly higher total AAS score and restricting the life of the elderly subscale score as compared to the male students ($p < 0.01$). Students who perceived their family's economic status as high scored higher on the positive ageism subscale than those who rated the economic status of their families as middle or low ($p < 0.05$, Table 2). No significant difference was observed in the mean values of total and subdimension scores in terms of the

other characteristics (age, place where participant resided the longest, current place of residence, family structure, paternal and maternal education, parental relationship status, sibling status). Also, there was no significant difference in the mean values of total and subdimension scores based on the year of study, marital status, parental occupations ($p > 0.05$) (data not shown in tables).

Students who had high-quality relationships with older adults had a higher total AAS score, along with higher scores of restricting the life of the elderly and positive ageism subdimensions as compared to the students who did not had

Table 2. Comparison of the AAS and subscale mean scores of the students according to sociodemographic characteristics.

Variables		n	Restricting life		Positive ageism		Negative ageism		Total AAS score	
			Mean \pm SD	p*	Mean \pm SD	p*	Mean \pm SD	p*	Mean \pm SD	p*
Age group (years)	≤ 20	97	33.6 \pm 4.9	0.098	28.4 \pm 6.4	0.539	17.7 \pm 3.8	0.342	79.6 \pm 12.5	0.199
	≥ 21	320	34.5 \pm 3.6		28.8 \pm 4.7		18.1 \pm 3.2		81.4 \pm 8.3	
Gender	Female	243	34.4 \pm 3.1	0.003	29.0 \pm 4.5	0.175	18.3 \pm 3.1	0.082	82.1 \pm 7.8	0.010
	Male	174	33.6 \pm 4.8		28.3 \pm 6.0		17.7 \pm 3.6		79.5 \pm 11.2	
Family structure	Nuclear family	365	34.3 \pm 3.9	0.783	28.6 \pm 5.1	0.312	18.1 \pm 3.3	0.922	80.9 \pm 9.5	0.526
	Extended family	52	34.4 \pm 4.3		29.4 \pm 5.1		18.1 \pm 3.6		81.8 \pm 9.3	
Place where participant resided the longest	Urban area	365	34.3 \pm 3.9	0.726	28.5 \pm 5.2	0.095	18.1 \pm 3.8	0.592	80.9 \pm 9.5	0.385
	Rural area	52	34.5 \pm 3.9		29.8 \pm 5.2		17.8 \pm 3.4		82.1 \pm 9.1	
Paternal education	\leq Middle	162	34.2 \pm 3.7	0.632	29.0 \pm 4.9	0.352	18.0 \pm 3.6	0.955	81.2 \pm 9.1	0.769
	\geq High school	255	34.8 \pm 4.1		28.5 \pm 5.3		18.0 \pm 3.2		80.9 \pm 9.7	
Maternal education	\leq Middle school	260	34.3 \pm 4.1	0.880	29.1 \pm 5.3	0.154	18.1 \pm 3.5	0.748	81.3 \pm 9.7	0.405
	\geq High school	157	34.3 \pm 3.8		28.2 \pm 5.0		17.9 \pm 3.2		80.5 \pm 9.1	
Parental relationship status	Together	381	34.3 \pm 4.1	0.506	28.6 \pm 5.3	0.218	18.1 \pm 3.3	0.924	80.9 \pm 9.6	0.357
	Divorced/deceased	36	34.7 \pm 3.5		29.7 \pm 4.4		18.1 \pm 3.9		82.4 \pm 8.5	
Sibling status	Yes	390	34.6 \pm 3.9	0.248	28.8 \pm 5.1	0.168	18.0 \pm 3.4	0.696	81.2 \pm 9.3	0.168
	No	27	33.4 \pm 4.7		27.4 \pm 6.1		17.8 \pm 3.3		78.6 \pm 11.9	
Current place of residence	Dormitory	190	34.4 \pm 3.6	0.838#	29.0 \pm 4.8	0.434#	18.1 \pm 3.5	0.956#	81.4 \pm 9.1	0.715#
	With family	94	34.1 \pm 4.1		28.6 \pm 5.3		18.1 \pm 3.3		80.8 \pm 9.0	
	With friends/alone	133	34.3 \pm 4.4		28.3 \pm 5.6		18.0 \pm 3.2		78.8 \pm 10.4	
Perceived family economic status	High	144	34.5 \pm 3.9	0.827#	29.5 \pm 4.7	0.037#	17.9 \pm 3.5	0.807#	81.9 \pm 9.3	0.385#
	Middle	255	34.2 \pm 3.9		28.3 \pm 5.4		18.1 \pm 3.3		80.6 \pm 9.5	
	Low	18	34.4 \pm 4.5		27.3 \pm 5.2		18.1 \pm 3.7		79.8 \pm 10.5	

*t-test; #One-way ANOVA; SD: Standard deviation


Table 3. Comparison of the AAS and subscale mean scores of the students according to ageism attitudes and behaviours

Variables		n	Restricting life		Positive ageism		Negative ageism		Total AAS score	
			mean \pm SD	p*	mean \pm SD	p*	mean \pm SD	p*	mean \pm SD	p*
Have you ever lived with older adults?	Yes	158	34.4 \pm 3.7	0.768	29.0 \pm 5.6	0.351	18.4 \pm 3.5	0.055	81.8 \pm 9.4	0.167
	No	259	34.3 \pm 4.1		28.5 \pm 5.0		17.7 \pm 3.2		80.5 \pm 9.4	
Are you satisfied with your relationships with older adults?	Yes	371	34.6 \pm 3.5	0.006	29.3 \pm 4.6	0.001	18.1 \pm 3.3	0.286	82.0 \pm 8.4	0.001
	No	46	31.9 \pm 6.3		24.1 \pm 6.8		17.5 \pm 4.0		73.4 \pm 13.7	
Do you want to live with your mother/father in the future after marriage?	Yes	148	34.5 \pm 4.3	0.561	29.7 \pm 4.9	0.002	18.2 \pm 3.3	0.478	82.4 \pm 9.5	0.030
	No	269	34.2 \pm 3.8		28.1 \pm 5.2		17.9 \pm 3.4		80.3 \pm 9.4	
Do you want to work in institutions that provide services to older adults after you graduate?	Yes	268	34.6 \pm 3.8	0.038	29.6 \pm 4.8	0.001	18.2 \pm 3.4	0.076	82.5 \pm 9.0	0.001
	No	149	33.7 \pm 4.2		27.1 \pm 5.4		17.6 \pm 3.3		78.5 \pm 9.7	

*t-test; SD: Standard deviation

high-quality relationships with older people ($p < 0.01$). Those who wanted to live with their mother/father in the future after marriage had higher positive ageism and total scores ($p < 0.01$). Desire to work in institutions serving older adults after graduation was associated with higher scores of restricting the life of the elderly and positive ageism subdimensions along with higher total AAS score ($p < 0.05$) There were no correlation between having lived in the same household with older adults and positive ageism (Table 3).

DISCUSSION

The determination of the ageism attitudes of students in the field of physiotherapy and rehabilitation is essential in ensuring the quality of rehabilitation services rendered to the older adults. The results of this study may help guide the

education and training regarding elderly health and rehabilitation for these students.

We observed a statistically significant difference in the mean values of total and subscale scores of AAS between the genders and between students with different perceived economic levels of families. Students in our study who reported high-quality relationships with older adults scored higher in restricting the life of the elderly and positive ageism subscales and had higher total scores. Desire to live with a parent after marriage and desire to work in institutions that serve older adults were associated with more positive ageism attitudes.

Our findings show that the physiotherapy students in our study had an overall positive attitude towards the elderly people. The students' mean subscale scores for restricting the life of the elderly, positive ageism and negative ageism

subdimensions were 34.3, 28.7 and 18.0, respectively. We were unable to find any studies examining the ageism attitudes among physiotherapy students in our literature search. However, among nursing students, which represent another group of future healthcare professionals in Turkey, similar scores (range: 79.5–87.2) were reported in three studies (13,15,25), whereas a lower score (68.8) was found in only one study (12). Although several studies conducted with nursing students in different countries revealed positive attitudes towards the older adults (7,20,22,23), two different studies involving college students in the USA, however, showed that the students had a negative attitude towards older adults (8,9). As compared to other studies conducted among students in various different fields at universities across Turkey, the mean AAS total score obtained in our study was similar to those reported in some studies (5,11,16) and higher than in some others (6,14). The mean score obtained in a study of the general young adult population was 80.2 (19), whereas a mean score of 86.9 was reported in a study conducted among physicians (25). Researchers who obtained results similar to ours stated that these scores reflected positive ageism attitudes among the participants (5,13,15,16,18,19,25). In general, such an attitude among young people suggests the influence of various aspects of traditional Turkish culture, such as respect and obedience to one's elders and protection of older adults.

In the present study, we found that gender significantly affected the students' scores of restricting the life of the elderly and total AAS, with female students demonstrating more positive ageism attitudes than male students. Although some studies indicate that gender associated with positive attitudes toward ageism, several studies found inconsistent results. Gender was not associated with ageism attitudes in three different studies of nursing students (13,15,18) and a study by Ridgway et al. (20). However, a systematic review by Samra et al. (24) and studies conducted

in Greece (23) and the USA (9) showed that female students had more positive attitudes towards older adults, which is consistent with our findings. Of the research conducted in Turkey, two different studies indicated that male students had a more positive attitude (6,14), whereas other studies reported results similar to ours (5,12,16,19). The effect of sex may be attributable to women's role as a protector and caregiver in these societies (1). Although in the present study we found that female students demonstrated more positive attitudes toward ageism than male students, both groups have a higher total AAS score. The higher AAS scores of both groups can be interpreted as preserving traditional values for the elderly in Turkish society.

In our study, positive ageism was associated with a higher perceived economic level of family. A previous study reported that students with low income had a more positive attitude than students whose income was equal to or greater than their expenses (19). Two studies conducted among nursing students found no correlation between family economic status and the student's attitude towards older adults (13,18). Therefore, our results are not consistent with the literature. Individuals with high family income may believe that they can care for older adults more comfortably. The students in our study might have taken their parents' positive attitudes towards older adults as an example since families with high income voluntarily assume the responsibility of caring for elderly family members.

One of the factors which may influence students' ageism attitudes are having lived in the same household with an elderly individual at some point in their lives (24). However, we observed no correlation between cohabitation with older adults and positive ageism in our study. While some studies in the literature reported findings consistent with our study (6,13,18,23,25), others determined that students who had lived with the



elderly had a more positive attitude (9,14,24). Inconsistent results in the studies may result from the characteristics of the groups participating in the study. Intergenerational contact might have pros and cons. Some people may not be able to gain the pros of intergenerational contact.

In our study, we found that students who were satisfied with their relationships with older adults had more positive ageism attitudes than the students who did not have such relationships. In a randomised controlled study evaluating empathy and positive attitudes towards older adults among students, Lagana et al. detected no difference between the intervention groups (who were shown a documentary film entitled 'Understanding Pain in Older Age') and a control group in terms of empathy or positive attitudes (10). In the literature, it has been reported that students who enjoy interacting with older adults have a more positive attitude towards older adults (9,24). In the study by Guest et al., when the university students were asked to describe 'old person' with one word, the majority of the students used the word 'love/loving' (8). Another study of nursing students reported that students who stated that the first concept that came to mind when talking about the elderly was 'affection' had a more positive attitude towards older adults (12). Young people's positive feelings towards older adults and the favourable qualities they associate with the old age may also affect their positive attitudes (2). Encouraging students to participate regularly in activities such as spending time with older adults in nursing homes can help them have a positive attitude towards the elderly.

Students in our study who stated they wanted to live with their mother and/or father after marriage were found to have more positive ageism attitudes. Some studies in the literature have revealed no correlation between the desire to cohabitate with a parent in the future and ageism attitudes (6,13), whereas other studies

have yielded results consistent with ours (19,21). Demir et al. determined that students who wanted to live with their parents to support them had more positive ageism attitudes (21).

A systematic review examining the attitudes of medical students and doctors towards older patients in recent years has revealed a connection between intrinsic motivation and attitude towards older patients (24). It was recommended that intrinsic motivation screening should be performed to identify the medical students with a greater tendency to work with older patients in healthcare services (24). In our study, we found that the students who want to work in institutions that serve the elderly after graduating from SPTR had more positive ageism attitudes. In two studies conducted among nursing students, no correlation was detected between the desire to serve elderly patients and positive ageism attitudes in the first study (13), whereas the other study yielded results consistent with ours (12). Another study involving students in various healthcare fields overserved more positive ageism attitudes among those who wanted to work with geriatric patients (6). Kose et al. reported that students who want to work with geriatric patients think that serving a large patient population will provide more benefits to their professional development (6). The results of our study and supporting studies suggest that the students who want to work in healthcare services for older adults have grasped the importance of serving without discrimination.

The present study has certain limitations, including the fact that it was limited to the physiotherapy students attending one public university in a specific region of Turkey. In addition, the findings have limited generalisability due to the small sample size. The overall response rate was moderate. Moderate participation may be due to the students' lack of interest. The collection of data within five months may be a limitation, as some students' education may change their view

of the subject. Students participating in the study may be interested in geriatric physiotherapy and rehabilitation and may already have a more positive attitude towards older adults. However, this study is crucial, as it is first study on physiotherapy students studying at a public university. Previous studies in Turkey and other countries have usually included medical or nursing students.

In conclusion, our study showed that physiotherapy students have generally positive ageism attitudes. More positive ageism attitude was associated with females, high economic status of families, quality of relationships with older people, desire to cohabitate with a parent in the future and desire to work in institutions

serving older adults. These findings suggest that interactions with older adults can increase positive ageism attitudes. To improve the ageism attitudes of physiotherapy students, they should be allowed to practice in elderly care units. Considering that the elderly population will increase gradually, physiotherapy students' development of positive attitudes and behaviours towards ageism and ageing may be beneficial when providing services to older adults and improving the quality of healthcare in their future professional lives.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

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RESEARCH

ATTITUDES OF FAMILY PHYSICIANS TOWARDS THE ELDERLY

ABSTRACT

Introduction: It is stated that negative attitudes towards the elderly affect the diagnosis and treatment processes negatively. Nevertheless, there are not enough recent studies examining the attitudes of family physicians who provide widespread healthcare to the elderly. The aim of this study was to evaluate the attitudes of family physicians towards the elderly.

Material and Methods: Participants of this descriptive study are family physicians working actively in primary care. Data were collected through the software program, between January and June 2018. The link to the questionnaire was sent to the participants via e-mail. The questionnaire consisted of two parts: the sociodemographic data and University of California at Los Angeles Geriatrics Attitude (UCLA-GA) scale.

Results: A total of 401 family physicians, 216 of whom (53.9%) were women, participated in the study. The mean age of the participants was 41.19 ± 8.51 years. On evaluation of both the mean total score (42.36 ± 3.42) and mean subscale score (3.02 ± 0.24), it was observed that female participants scored significantly higher ($p = 0.001$). Moreover, the UCLA-GA medical care subscale score raised with increased working time at family medicine ($r = 0.151$, $p = 0.002$) or being a medical doctor ($r = 0.14$, $p = 0.005$) and with growing age ($r = 0.15$, $p = 0.003$).

Conclusion: The results of our study showed that those with longer professional experience, being older age, and women are associated with positive attitude towards the elderly. However, intervention studies are required to improve family physicians' attitudes towards the elderly.

Keywords: Aged; Attitude; Family Physician.



INTRODUCTION

In the last quarter century, due to a significant reduction in the birth rates and an increase in the life expectancy, a relatively rapid increase in the percentage of elderly population has been witnessed in Turkey, as well as across the world (1). This rapid change has an important effect on the emergence of different requests, both in the application to the health institutions and the services provided there (2). Although the demographic change in the countries is rapid, unfortunately, developments in both sociological and elderly health are not at the same pace (3). The conditions such as chronic health problems, requirement of more complex treatments, multiple drug usage, etc. in the elderly population, directly affect the healthcare services provided by health workers to the elderly (4).

It is important to recognize the attitudes of physicians, the important stakeholders of healthcare and the first contacts in primary care, towards aging and old age, since age-related discriminatory attitudes may adversely affect the quality of healthcare received by the elderly (5). Moreover, negative attitudes towards the elderly in the field of healthcare have exerted negative effects on the diagnosis and treatment processes (6).

Although aging and old age have become more recognized phenomena among doctors, many studies show that health professionals, including doctors, have a negative attitude towards the elderly (7,8). This situation is more clearly observed especially towards the oldest ages and dependent elderly (9). It was shown that 16% of general practitioners in some cases decided not to refer older patients for further treatment because they suspected that the patients will not be treated due to their age (10).

Some recent studies demonstrate more mixed attitudes of the healthcare professionals towards the older people (8, 9, 11). Although, in 1985, the

elderly were thought to be uninterested, close, conservative and irritable in their beliefs and daily practice by family physicians (12), there were no sufficient studies investigating the factors that may contribute to the evaluation of the general attitude of family physicians towards the elderly. The aim of this study was to: (i) investigate attitudes of family physicians towards the elderly and (ii) determine the factors (age, gender, work experience, etc.) that could guide further studies among other health professionals.

MATERIAL AND METHODS

Selection of participants

Family medicine system has been piloted in Turkey since 2005. This system was fully implemented in January 2011 throughout the country. The universe of this descriptive study is 24,428 family physicians, actively working in the family medicine system in the country according to 2017 data. Turkey has no general database consisting e-mail addresses of family physicians. The e-mail addresses of approximately 2500 family physicians obtained after extracting duplications from different communication channels were determined as the target audience. A questionnaire was sent to these registered e-mail addresses in a one-month period, and reminders were sent a total of 2 times after the respondents were removed. At the end of this period, a total of 407 family physicians answered the questionnaire. 6 of them were excluded from the statistical analysis since containing missing data. Analysis was performed on a total of 401 people.

Data collection

Data were assimilated through the software survey program. The link to the questionnaire was sent to the participants via e-mail. The questions we wanted the participants to answer were mentioned in this questionnaire, and the participants were not allowed to skip any of the questions. The data were collected between January and June 2018.

Instruments

The questionnaire consisted of two parts: the sociodemographic data and the University of California at Los Angeles Geriatrics Attitude (UCLA-GA) scale. In the data collection form, socio-demographic characteristics, the region the participants serve in (rural/urban) and information on working time, in both occupational and family medicine system, were recorded.

UCLA Geriatrics Attitude (UCLA-GA) Scale:

The scale, developed by Reuben, consists of fourteen questions and is used to assess attitudes towards the elderly. The Turkish validity and reliability of the scale was conducted by Şahin in 2011 (13). The UCLA-GA scale has four dimensions: social values, medical care, compassion and resources distribution. The total score is obtained by combining the four dimensions. The highest possible score is 70 and higher scores show a more positive attitude. The average scores of the individual questions can be interpreted as: 1 to 2 indicating negative scores, 3 indicating neutral scores and 4 to 5 indicating positive scores.

Statistical Analysis

The data obtained from the study were evaluated with the SPSS 15.0 program. In the descriptive statistics, student-t test for the comparison of two independent groups in terms of continuous data when normal distribution conditions were achieved (Mann-Whitney U-test when normal distribution conditions were not met), one-way analysis of variance for comparison of three or more groups in terms of continuous data (Kruskal-Wallis test if normal distribution conditions were not met) and Pearson's correlation test to compare two continuous data were applied.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (Local University, Faculty of Medicine Ethics Committee of Health Sciences + reference number: 20478486) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants expressed their consent by marking it on the consent form, which was electronically illuminated.

Informed consent

Informed consent was obtained from all individual participants included in the study.

RESULTS

A total of 401 family physicians, 216 of whom (53.9%) were women, participated in the study. The mean age of the participants was 41.19 ± 8.51 years (min: 26 years, max: 62 years). According to the study area, 68.6% of the participants were working in urban areas (Table 1).

The mean UCLA-GA total score of the participants was 41.79 ± 3.69 (min-max: 30-61) and the mean score for individual questions was 2.98 ± 2.63 (min-max: 2.29-3.86). On gender-wise evaluation of the mean total score and mean score of the individual questions, it was observed that female participants scored significantly higher ($p = 0.001$).

When the social values, medical care, compassion and resource distribution subscale scores of the scale were evaluated, respectively, female participants and the physicians under 40 years of age scored significantly higher in the UCLA-GA social values subscale ($p = 0.025$). As the mean year for the study was 6.5 years in the family medicine, the cut-off year was 6 years for the family medicine and the cut-off year was 15 years for the physician's working period as 16.3.

**Table 1.** General Information about the Participants.

Features	N (%)
Gender	
Female	216 (53.8)
Male	185(46.2)
Age (year)	
< 40	172 (42.9)
≥ 40	229 (57.1)
Professional year	
< 15	190 (47.4)
≥ 15	211 (52.6)
Working as a family physician (year)	
< 6	160 (39.9)
≥ 6	258 (60.1)
Working area	
Rural	85 (21.3)
Urban	275 (68.5)
Slums	41 (10.2)
Professional year (mean, sd)	16.31 ± 8.71
Working as a family physician (mean, sd)	6.50 ± 3.55
Age (mean, sd)	41.19 ± 8.51
UCLA-GA total score (mean, sd)	41.79 ± 3.69
UCLA-GA mean score (mean, sd)	2.98 ± 2.63

Physicians older than 40 years (total subscale mean score = 13.35, $p < 0.003$), physicians working since a duration of 15 years or more (total subscale mean score = 13.33, $p < 0.005$) and those who worked in the family medicine system for more than 6 years (total subscale mean score = 13.33, $p < 0.002$) reported more positive attitudes in medical care subscale (Table 2).

The UCLA-GA medical care subscale score raised with increased working time in family medicine ($r = 0.151$, $p = 0.002$) or with being a medical doctor ($r = 0.14$, $p = 0.005$) and growing age ($r = 0.15$, $p = 0.003$). There was no significant difference between the attitudes of the family physicians working in urban/rural areas or the

percentage of elderly population registered with a family physician.

The only variable affecting the total score of UCLA-GA scale and included in the determinants of UCLA-GA social values sub-scale score was found to be gender ($r^2 = 0.015$). In multivariate analysis, there was no determinant variable in the UCLA-GA medical care subscale score in the three-variable model. In the study, it was decided to keep the age variable in the model because autocorrelations were found to be high and meaningful (r values between 0.063 and 0.097, $p < 0.0001$) among the variables of age, occupational year and family physician who explained UCLA-GA medical care subscale score. This model is

Table 2. Comparison of UCLA scores according to sociodemographic characteristics.

	Social values	Medical care	Compassion	Resources distribution	UCLA-GA Total
Gender					
Female	5.45 ± 1.60	13.24 ± 2.27	12.44 ± 2.37	11.22 ± 1.80	42.36 ± 3.42
Male	5.07 ± 1.74	12.78 ± 2.67	12.34 ± 2.84	10.92 ± 2.13	41.14 ± 3.89
p	.025	.068	.072	.098	.001
Age (year)					
< 40	5.48 ± 1.59	12.60 ± 2.57	12.55 ± 2.63	11.05 ± 2.06	41.69 ± 3.81
≥ 40	5.12 ± 1.73	13.35 ± 2.35	12.28 ± 2.56	11.10 ± 1.89	41.87 ± 3.60
p	.036	.003	.306	.798	.638
Professional year					
< 15	5.45 ± 1.58	12.64 ± 2.55	12.55 ± 2.66	11.02 ± 2.03	41.67 ± 3.80
≥ 15	5.13 ± 1.74	13.33 ± 2.36	12.27 ± 2.54	11.13 ± 1.91	41.89 ± 3.60
p	.059	.005	.290	.559	.563
Working as a family physician (year)					
< 6	5.34 ± 1.67	12.48 ± 2.48	12.59 ± 2.64	11.06 ± 2.04	41.48 ± 3.90
≥ 6	5.24 ± 1.69	13.33 ± 2.41	12.29 ± 2.56	11.09 ± 1.92	41.96 ± 3.56
p	.575	.002	.263	.896	.213

Table 3. Multivariate analysis explaining the relationship between UCLA-GA sub-scales and socio-demographic characteristics.

	R ²	Coefficient (ß)	95% CI	p
UCLA-GA Social values	.015			
Constant			4.627 to 6.349	.000
Gender		.106	.024 to .689	.036
Age		-.049	-.029 to .010	.327
UCLA-GA Medical care	.021			
Constant				.000
Age		.089	-.091 to .142	.664
Professional year		.037	-.099 to .120	.852
Working as a family physician		.027	-.072 to .110	.685

CI: confidence interval

presented in the table because the strength of the model with age variable is higher.

DISCUSSION

Doctors who have different demographic and professional background features have different attitudes towards the elderly (7). Attitudes towards the elderly among healthcare professionals

are often neutral or positive (5,8,14). From this perspective, the cohort of this study, which evaluates the attitudes of family physicians actively working in elderly primary care services, shows a relatively positive attitude towards the elderly, since the mean score of UCLA-GA for all participants was 2.98 and 54.4% of the participants scored over the average, considering a score of 3 points per question as neutral in the attitude



towards the elderly. In two studies conducted in medical students in the UK and medical students, internal medicine residents and geriatric medicine fellows in the USA, the UCLA-GA average score was found to be 3.69 and 3.90, respectively (15,16).

A more positive attitude towards the elderly was found among female family physicians. Significantly better attitude of female gender in both UCLA-GA total score and social sub-dimension is supported by the literature (5,17). A study on ageism in a hospital in Australia found that women over 30 had more positive attitudes towards the elderly (5). Moreover, more positive attitudes of female students have been demonstrated in studies conducted in different departments such as Medicine, and Nursing (3,13). However, there are studies that do not show a significant relationship between gender and attitude towards the elderly (12,18).

In terms of effective and sustainable primary care, addressing attitudes towards the elderly among healthcare professionals is important (19). The effects of age, education level and working experience, together with gender, on attitude towards the elderly, were evaluated the most (20). In our study, it is seen that those who are ≥ 40 years of age, those with professional experience ≥ 15 years and those who work in the family medicine system ≥ 6 years have a significantly more positive attitude towards the elderly in the medical care sub-dimension. The study in Australia found that physicians with more than 10 years of professional experience and holding a senior position display more positive attitudes towards the elderly. Additionally, it was stated that the education level, working experience and knowledge about ageing affect their attitudes towards the elderly (1,5). These data coincide with the increase in chronological age and a more positive attitude in the medical care sub-dimension.

Recently, there have been studies that reveal the attitudes of young healthcare providers and

students in particular. According to the results of the research that examined the change between the education process and attitudes of physiotherapy students conducted by Hobbs et al., the attitude towards the elderly increased positively during the education period (21). In another study comprising medical students, it was shown that the attitudes of medical students are related to the knowledge and experience of the students, and education and training on this subject is very important in increasing the positive attitude (22). We also found that family physicians who are < 40 years old have more positive attitudes in the UCLA-GA social sub-dimension. In a survey conducted in recent years among younger family physicians in Turkey, physicians and family medicine residents who are ≤ 30 years old were significantly found to have more positive attitude towards ageing (23).

Previous researches have shown that knowledge about aging is an important factor affecting attitudes towards the elderly (8, 9). In fact, Lee and colleagues believed that personal life supports positive attitudes toward aging and that interaction with healthy elderly in geriatric rotations removes the pre-existing negative attitudes of doctors towards aging (24). It is recommended that a positive development of the attitude towards the elderly should be focused on pre-university education through a proactive method (25). In a recent study involving medical students in Australia, the following are forefront titles for improving attitudes towards the elderly: 1) working in research on ageing, 2) participation in didactic on successful ageing, 3) role modelling of mentors and programme staff who are closely interested in geriatrics, 4) geriatric clinical experience offering some personal exposures to older adults and 5) implementation of programmes by a centre focusing on healthy ageing. In addition, this study has revealed the efficiency of interventions with empathetic component in changing the attitudes towards the elderly, such as a recent review of interventions leading to a positive attitude change

among doctors and medical students towards older adults, mentoring, informal contact with older adults or an ageing simulation game (19).

This paper also has some limitations. The most important limitation is related to the sample group because it covers only the family physicians who have responded on the association's mailing lists. The return of sent e-mails can also be considered somewhat low; however, this may be due to workload and the lack of interest among doctors. Another limitation can be evaluated as the weak causal aspect in the study, which, in fact, can be evaluated in connection with the purpose of the study, because determinants on the dependent variable were kept to a limited number (age, study, education, etc.). Also, according to the multivariate analysis results, gender is the only variable that affects the UCLA total score, is among the determinants of the UCLA social sub-dimension and the percentage of explanation is 0.015%. The high autocorrelations of the three variables affecting the UCLA medical subfield score disrupted the multivariate model, and a more positive attitude in terms of medical care with increasing professional experience and age was observed in this study. On the other hand, it

is noteworthy that young family physicians have a more positive attitude for social dimension towards the elderly.

Consequently, considering the recent international studies, a wide range of systematic (education, field application, mentorship, use of artificial intelligence, e-learning, etc.) and detailed studies are needed to determine the needs of this increasing population. Thus, plans on improving the attitudes of family physicians from communication skills to practical applications can be suggested. This planning should be made not only for the sake of the sick elderly but also for the healthy elderly, because it should be remembered that each day in the primary care, different demands and requirements may be met in the medical field related to the healthy elderly.

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CASE REPORT

IMMUNOGLOBULIN G4-RELATED DISEASE PRESENTING AS URETERAL MALIGNANCY AND URETERAL STRICTURE TREATED WITH AZATHIOPRINE AFTER SURGERY IN A GERIATRIC PATIENT WITH A SINGLE FUNCTIONAL KIDNEY: A CASE REPORT

ABSTRACT

Immunoglobulin G4-related sclerosing ureteral disease is a rare benign disorder characterised by fibrosis and lymphoplasmacytic infiltration in the ureter. A 70-year-old man with a single functional kidney and left flank pain was diagnosed with IgG4-related ureteral disease that presented as a unilateral ureteral mass. Left hydronephrosis and a 25 × 23 × 26 mm left midureteral mass were found. No malignancy was found on ureteroscopy and urinary cytology did not reveal any neoplastic cells. A 2 cm midureteral stenosis was found in the left ureter on retrograde pyelography. It was not a ureteral stricture but was the result of periureteral inflammation and fibrosis caused by immunoglobulin G4-related sclerosing disease. Initial endoscopic ablation-obliteration therapy was unsuccessful, and after 6 weeks the patient was treated by robotic ureteroureterostomy. Most plasma cells in the excised ureteral segment were IgG4-positive. Serum IgG4 was 273 mg/dL (normal range: 85–120 mg/dL). The histology of the ureteral segment resembled retroperitoneal fibrosis and the histopathology of the stricture included IgG4-positive cells, fibrosis and ureteritis. The patient was treated with oral azathioprine for 6 months. No evidence of recurrence was seen on ureteroscopy or abdominopelvic computed tomography at the 3-month or 1-year follow-up.

Keywords: Robotics; Immunoglobulins; Ureter; Neoplasms.



INTRODUCTION

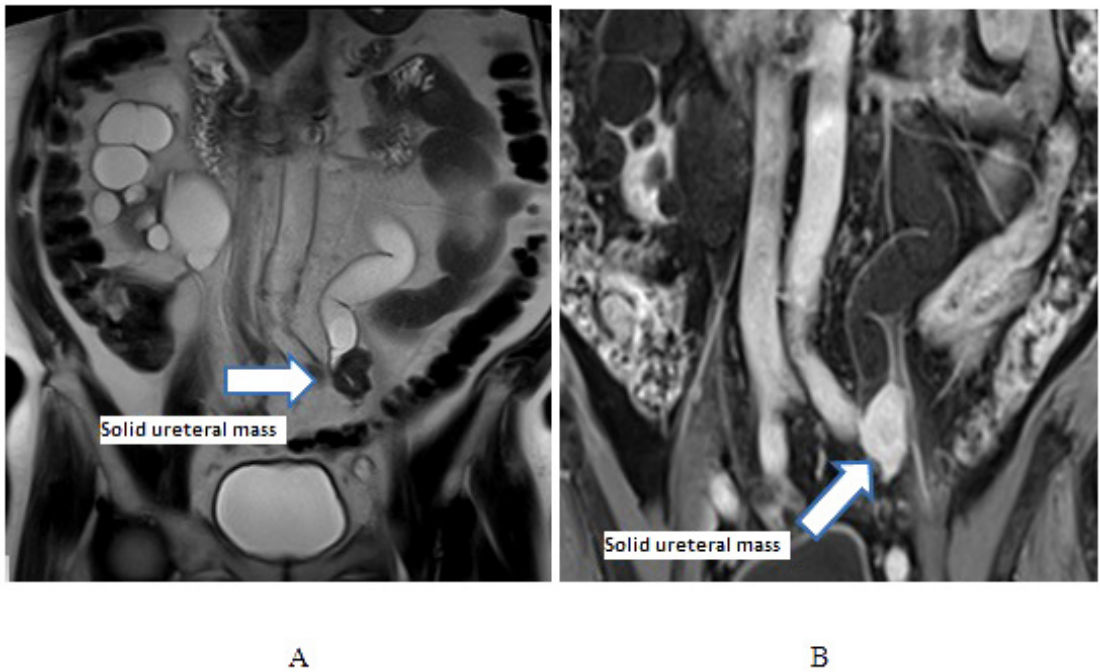
Ureteral stricture is an uncommon benign disorder that may cause acute renal failure if untreated. Most are iatrogenic, but they can also result from infection, endoscopic procedures, trauma, radiotherapy, pelvic surgery, retroperitoneal fibrosis, malignancy, or immunoglobulin G4-related ureteral disease (IgG4-RUD). IgG4-RUD is a rare condition characterised by fibrosis and lymphoplasmacytic infiltration of the ureter. Only 15 cases have been reported. (1). The most common ureteral manifestation of IgG4-RUD is ureteritis. Mass-forming lesions, segmental stenosis, extrinsic narrowing of the ureter, or ureteral strictures may also occur. The surgical management of ureteral strictures depends the location and length and include open, laparoscopic, or robotic ureteroureterostomy; ureteral reimplantation, or nephrectomy. Other endourological treatments include balloon

dilation, cold knife incision, ablation-obliteration therapy, and laser endoureterotomy (2). This IgG4-RUD patient presented with a ureteral mass-forming lesion that was treated by robot-assisted surgery.

CASE REPORT

A 70-year-old man presented with left flank pain. The patient had a single functioning kidney. The right kidney was dysfunctional because of urolithiasis and previous surgeries for stone disease. Ultrasonography findings were right grade 2 hydronephrosis, right atrophic kidney, left grade 4 hydronephrosis and a left midureteral mass suspicious for ureteral cancer. Magnetic resonance imaging (MRI) revealed a 25 × 23 × 26 mm left midureteral mass, left grade 4 hydronephrosis, right grade 3 hydronephrosis, and a atrophic right kidney (Fig. 1).

Figure 1. Solid mass in the middle-distal left ureter at the level of iliac bifurcation; the lesion was hypointense on T2-weighted images (A) and strongly enhanced on fat-suppressed, T1-weighted contrast-enhanced images (B) with grade 4 hydronephrosis.

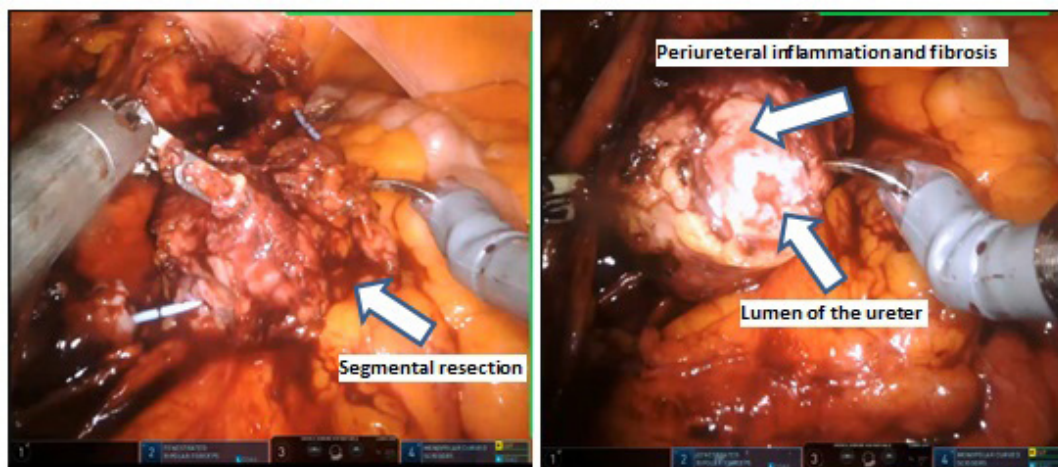


The MRI contrast agent did not affect the patient's renal function. T2-weighted MRI was used instead of computed tomography (CT) because it has been reported to be more useful for demonstrating dilated or obstructed collecting systems (3). The hydronephrosis in the right kidney was chronic and resulted from stone disease. The hydronephrosis in the left kidney was newly developed and caused by the ureteral mass. Renal function evaluated by diuretic renal scintigraphy using a standard protocol was 81% for the left and 19% for the right kidney. Treatment for hydronephrosis in the right atrophic kidney was not considered because it was asymptomatic. Retrograde pyelography (RPG) and diagnostic ureteroscopy (URS) were performed before nephroureterectomy of the mass in the left ureter because the patient had a single functioning kidney. A 2 cm left midureteral stricture was found. No malignant lesions were detected, but a mass causing extrinsic narrowing of the ureter was found. A biopsy revealed only nonspecific ureteritis and increased fibrosis; urinary cytology did not reveal any neoplastic cells. Endoscopic obliteration therapy was performed. A 6-Fr, 26-cm double-J stent was implanted and was

cystoscopically removed 6 weeks later. The mass was large for successful endoscopic obliteration, but that treatment was performed to avoid both unnecessary nephroureterectomy and permanent dialysis. A random interventional radiology-guided biopsy on day 3 after the procedure revealed fibrosis, abundant IgG4-positive cells and ureteritis that confirmed the diagnosis. When the catheter was removed 6 weeks after obliteration therapy, it was found that creatinine progression had occurred and the anteroposterior diameter of the renal pelvis had increased.

The patient was treated by robotic ureteroureterostomy for ureteral stricture caused by ureteral IgG4 sclerosing disease. The operative time was 193 minutes, the console time was 112 minutes, and the intraoperative blood loss was approximately 50 mL. Blood transfusion was not required. The drainage catheter was removed on the second postoperative day, and the double-J catheter was removed cystoscopically 6 weeks later. The patient was discharged on postoperative day 2. The histopathological findings of the urethral stricture included abundant IgG4-positive cells, fibrosis, and ureteritis (Figures 2 and 3).

Figure 2. Segmental resection of the ureter (A), ureteral stricture caused by periureteral inflammation and fibrosis (B).

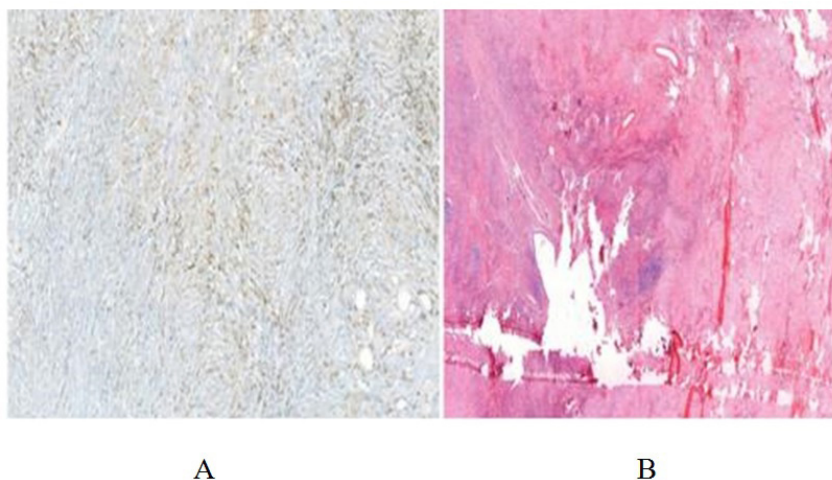


A

B



Figure 3. Microscopic scans of the immunoglobulin G4-related ureteral disease of the ureter. Aggregated IGG4-positive plasma cells (A), Overly increased fibrosis and prominent inflammatory cells (B).



The patient's blood IgG4 concentration was 273 mg/dL (normal range: 85–120 mg/dL) and he was treated with oral azathioprine for 6 months by the rheumatology department. At the 3-month follow-up, ultrasonography revealed grade 1 left hydronephrosis. The flank pain had subsided, and the creatinine had decreased from 2.15 to 1.35 mg/dL. No evidence of recurrence was seen on URS and abdominopelvic CT at 3 months and 1 year after discharge.

DISCUSSION

IgG4-RUD is a rare inflammatory disorder that can mimic mass-forming lesions. It is characterised by a lymphoplasmacytic infiltrate abundant in IgG4-positive plasma cells and increased fibrosis. Serum IgG4 may be elevated (4). Immunoglobulin G4-related disease (IgG4-RD) can affect any organ or system, including the pancreas, thyroid, salivary glands, or ureter (5). Although IgG4-RD of the urinary tract usually involves the urinary bladder, it can occur in the kidneys, prostate, or ureter (6). Radiological diagnosis of ureteral involvement may be challenging if malignancy-

mimicking lesions are present. In such cases, the presence of biochemical, clinical or pathological abnormalities in addition to the radiological evidence is helpful. The most common ureteral manifestation is ureteritis followed by mass-forming lesions, segmental stenosis or stricture and extraureteral lesions with secondary ureteral involvement. IgG4-RD of the ureter may rarely present as hydronephrosis arising in the ureter and lead to acute kidney injury with spontaneous remission (7). IgG4-RD of the ureter is diagnosed by pathological, radiological and ureterscopic evaluation and if urine cytology and ureterscopic biopsy find no evidence of malignancy, this kind of inflammatory lesion should be included in the differential diagnosis. Aggressive treatment, such as nephroureterectomy, should be avoided. An accurate diagnosis is important because anti-inflammatory therapy is indicated to prevent recurrent strictures, but no consensus exists as to whether steroids or other medical treatment should be given to patients after resecting the lesion. No specific treatments for IgG4-RD, especially IgG4-RUD, are widely recommended.

Treatment of IgG4-RD includes a watch-and-wait approach, glucocorticoids, rituximab, azathioprine and steroid-sparing immunomodulators. It has been reported that relapse may occur in 25% to 50% of patients after discontinuation of medical treatment (6). The most commonly used non-endoscopic surgery for the treatment of ureteral stricture is ureteroureterostomy, which can be performed with open, laparoscopic or robot-assisted procedures. Even though additional evidence is needed for validation, it is our experience that in geriatric patients, robotic surgery has advantages including less analgesia for postoperative pain, less bleeding and a shorter hospital stay compared with other approaches. Its most important disadvantage is a longer procedure time. To our knowledge, this is the first report of a robot-assisted ureteroureterostomy for IgG4-RUD in a geriatric patient.

In conclusion, IgG4-RUD may originate as hydronephrosis in the renal pelvis and ureter,

mimicking a ureteral tumour. Early diagnosis is important because most patients respond to immunosuppressive drugs. To avoid unnecessary nephroureterectomy, diagnostic URS and biopsy are recommended to rule out malignancy, and systemic medical treatment is recommended to prevent recurrence after surgery. Robotic ureteroureterostomy may be a suitable, feasible, effective, and minimally invasive alternative for the treatment of ureteral strictures due IgG4-RUD in cases in which endoscopic treatment has failed. Our experience with this patient adds to what is known about the radiological-pathological diagnosis and surgical-medical treatment outcomes of IgG4-RUD. Clinical trials are needed to achieve a better understanding of clinical manifestations, diagnosis and treatment options of patients with IgG4-RUD.

CONFLICT OF INTEREST

No conflict of interest.

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CASE REPORT

PATHOLOGICAL MANDIBULAR ANGLE FRACTURE: SPONTANEOUS HEALING IN A CASE OF OSTEOMYELITIS AFTER THIRD MOLAR EXTRACTION

ABSTRACT

Late pathological fractures of the mandible associated with the extraction of an impacted third molar and osteomyelitis of the jaw feature rarely in the scientific literature. Indeed, most information on the subject is to be found in the form of case reports. Fractures of this kind may occur in regions where the bone has weakened because of an underlying pathological process, which has developed slowly. Predisposing factors of this complication are believed to be multifactorial but, in the older age group, reduced bone elasticity, bone atrophy, risk of osteoporosis, and potential of tooth ankylosis can weaken the mandible, possibly increasing the rate of fractures. In this study, we report a case of chronic osteomyelitis with a mandibular angle fracture in an elderly male as a rare complication of an odontogenic cystic lesion associated with the extraction of a mandibular third molar. Spontaneous healing occurred with the use of an antibiotic therapy until the second surgical intervention. Attention is focused on the possible risk indicators and preventive measures.

Key Words: Fractures, Spontaneous; Tooth Extraction; Fracture Healing; Geriatric Dentistry.

INTRODUCTION

Surgical extraction of impacted mandibular third molars is generally a safe procedure in the oral surgery department but it can occasionally be accompanied by complications. The most severe and rare complication of impacted third molar extraction is mandibular fracture, which can occur during or after the surgical procedure, usually within the first four weeks after the extraction. The risk factors of this complication are believed to be multifactorial, and the presence of local bone lesions is a predisposing risk factor because of the weakening of the mandible (1-3).

Osteomyelitis is an infection and inflammation associated with bone structures and can occasionally lead to serious complications, such as pathological fractures. It can result from the direct inoculation of micro-organisms due to trauma or surgery. The slow progression of symptoms following the extraction of a third molar should be closely monitored, both clinically and radiographically, to prevent this complication (4).

In this study, we report the rare case of a mandibular angle fracture in a 69-year-old male, 18 weeks after the development of an odontogenic cystic lesion associated with the extraction of an impacted third molar. We go on to discuss possible risk indicators and the association between osteomyelitis of the jaw and pathological fracture after the extraction of an impacted third molar.

CLINICAL REPORT

A 69-year-old man was referred to the Oral and Maxillofacial Surgery department of Ege University for evaluation and treatment of an odontogenic cystic lesion associated with the impacted mandibular left third molar. The patient had no systemic complaints, and routine laboratory tests were normal. The clinical evaluation revealed an expanded swelling of the left mandibular body, with no associated cervical lymphadenopathies,

and chronic and uncontrolled periodontitis. In addition, panoramic radiography showed a well-defined radiolucent lesion surrounding the impacted third molar, with insufficient distance between the lesion and the angle of the mandible (Figure 1).

Based on clinical and radiological findings, the lesion was suspected to be a dentigerous cyst; therefore, surgical treatment for removal of the affected tooth and cystic lesion was planned. The patient was informed of the surgical protocol and a signed consent form was obtained. The surgery was performed under local anesthesia. The mandible was approached via the intra-oral access. The lesion was completely excised, and the impacted tooth was extracted (Figure 2). The surgically-removed enucleated material was sent for histopathologic examination, which confirmed the diagnosis of dentigerous cyst. The patient was scheduled for regular follow-ups.

After 18 postoperative weeks, the patient presented with an expanding swelling of the left mandibular body and complained of severe pain, trismus, and fever. On applying pressure to the operation site, slight seropurulent exudates were observed in the clinical examination. The post-extraction panoramic radiograph revealed the presence of a complete fracture zone without displacements in the left angle of the mandible (Figure 3). Cone-beam computed tomography (CBCT) revealed a fracture line in the left angle of the mandible where the surgery was performed (Figure 4). The pre-diagnosis was osteomyelitis of the mandible with a pathological fracture secondary to the surgical extraction of the left mandibular third molar. Based on the clinical case history, surgical treatment was planned, including sequestrectomy, curettage, and fixation of the fractured fragments under general anesthesia. Before the surgery, moxifloxacin (400 mg every 24 h for seven days) and metronidazole (500 mg every 8 h for seven days) were prescribed to the patient.



Figure 1. A well-defined radiolucent lesion surrounding the impacted third molar with insufficient distance between the lesion and the angle of the mandible.

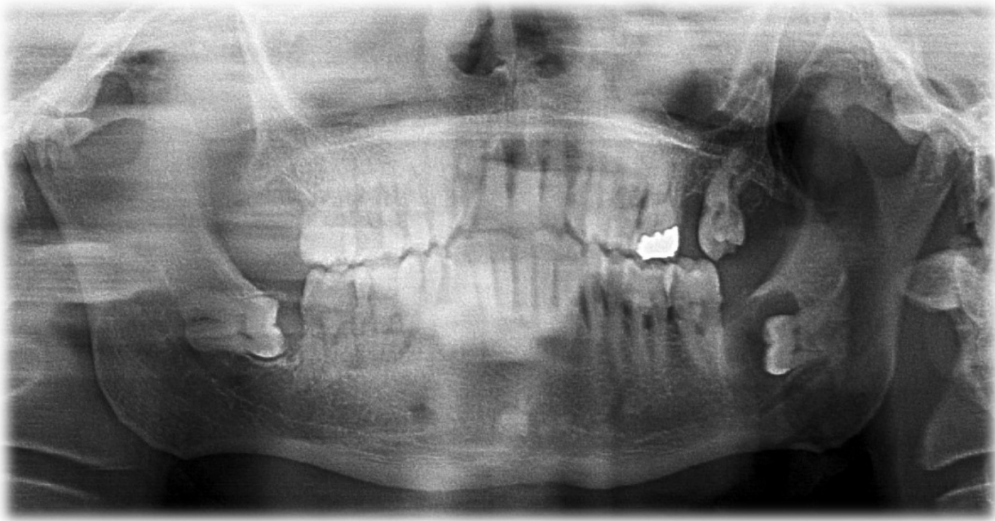


Figure 2. Post-operative panoramic image of the patient after excision of the odontogenic cystic lesion and extraction of the impacted tooth.



Figure 3. After 18 post-operative weeks, presence of a complete fracture zone without displacements in the left angle of the mandible.



After one postoperative month, on the operation day, the mandible was approached via the extra-oral access under general anesthesia; however, the fracture line was completely healed spontaneously, and the fracture was immobile (Figure 5). Before surgery no additional periodontal or dental infection or inflammation existed. The area was curated carefully, and the patient was scheduled for frequent routine follow-ups.

DISCUSSION

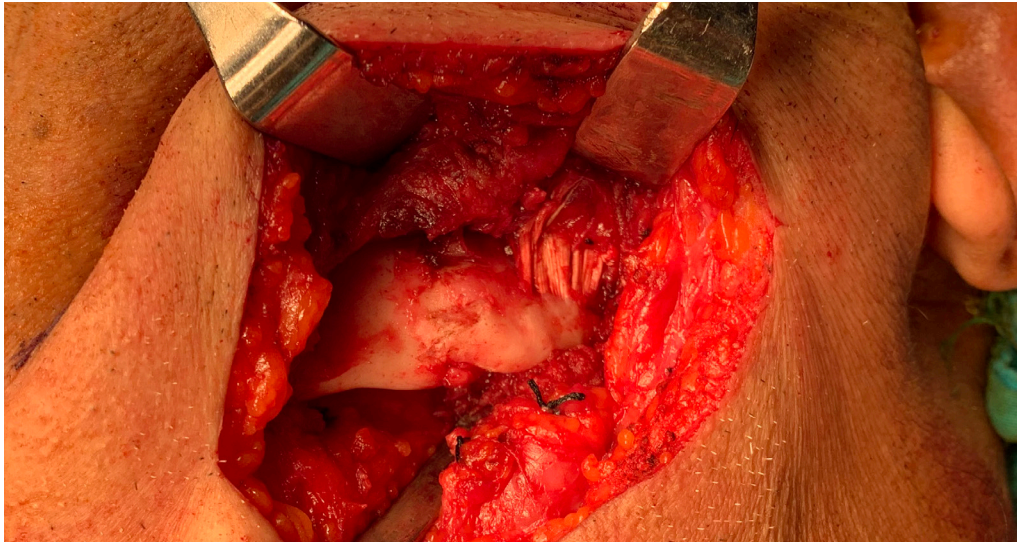
Mandibular angle fracture associated with the extraction of an impacted third molar is a rare complication and is considered multifactorial, with factors including: age, sex, degree of impaction, relative volume of the tooth in the jaw, pre-existing infections or bone lesions, failure to maintain a soft diet in the early postoperative period, and surgical technique. It may occur as an immediate

or a late complication, usually within the first four weeks after the extraction (3-5).

Deeply impacted third molars have a significant impact on risk due to the greater volume of bone which is required to be removed during the surgery. Pre-existing bone lesions, such as odontogenic cysts, may easily diminish the strength of the bone and predispose to fractures (5). These lesions are more frequently found in patients aged 40 years or older, and special care should be taken when the third molar is associated with pathological lesions in elderly patients (6). Pippi et al. recommended the use of a miniplate to avoid postoperative mandibular fractures if an odontogenic cystic lesion is associated with a deeply impacted tooth (7). In cases of predisposing factors for this complication, all preventive measures should be considered before and during the surgery, such as sectioning the tooth, using correct instrumentation, and avoiding uncontrolled excessive forces (7,8). The



Figure 5. Spontaneous healing of fracture zone.



case presented here involved a higher possibility of mandibular fractures due to the large volume of bone removal and weakening of the mandible. For this reason, the tooth was sectioned to minimize bone removal after excision of the cystic lesion. However, no lingual cortical involvement was found with the impacted tooth and the use of a miniplate was not required.

Weakening of the mandible due to a decrease in its bone elasticity through aging may also play a role in the occurrence of mandibular fractures (9). Moreover, in the older age group, reduced bone elasticity, bone atrophy, risk of osteoporosis, and potential for tooth ankylosis weaken the mandible, possibly increasing the rate of fractures (10). In addition, late fractures usually occur during the second or third postoperative week, resulting from a high level of biting forces during mastication, especially in men aged over 40 years with complete dentition (5). Also, the risk to men

is greater due to the increased possibility of trauma (8,10). In accordance with the findings of the previously-mentioned studies, the patient in this case was a 69-year-old male, with complete dentition, and a fully impacted third molar associated with an odontogenic cystic lesion. On the panoramic and CBCT scans obtained before surgery, the impaction was shown to be deep, with an insufficient distance from the apex of the socket to the inferior border of the mandible.

Surgical trauma, pulpal, and/or periodontal infections are predisposing factors for osteomyelitis. Pathological fractures due to a weakened bone are a serious complication of osteomyelitis (3). As the patient in this case was visually impaired, he was unable to maintain his oral hygiene at an adequate level postoperatively and he had localized periodontal infection at the surgical area. Therefore, after 18 postoperative weeks, it was found he had developed

osteomyelitis of the mandible with a pathological fracture secondary to the surgical extraction of the left mandibular third molar.

Bone healing can occur through a direct or indirect mechanism. Direct bone healing occurs under conditions of absolute stability, while indirect bone healing is the only natural method of fracture healing. Spontaneous bone healing can be regarded as indirect bone healing, which can sometimes occur with untreated jaw fractures (11). In this case, spontaneous healing occurred in the last month when the patient was receiving antibiotic therapy for osteomyelitis. During the second operation, we found natural and spontaneous healing of the fracture. Spontaneous healing may have occurred because of the patient's Complete dentition and his dental occlusion avoiding displacement produced by the masticatory muscles.

The case presented here has some limitations because the patient was not evaluated with

respect to bone mineral density (BMD) values, which are used to measure bone strength. Post menopausal women have a statistically significant risk of osteoporosis and elderly men, aged over 60, also have a high risk of developing the disease (12). Before surgical intervention, it is necessary in both men and women to measure oral bone variable indexes such as BMD, as it is a significant predictor of fracture especially in the risk group.

Although they are rare occurrences, mandibular fractures caused by extraction of a deeply impacted lower third molar, and corresponding preventive techniques, are frequently reported in the literature. To prevent this complication, or to manage it professionally when it does occur, clinical and radiological evaluations should be performed meticulously before surgery, especially in the case of an elderly population. Furthermore, it is important that patients in the risk group are followed up at regular intervals after the procedure.

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