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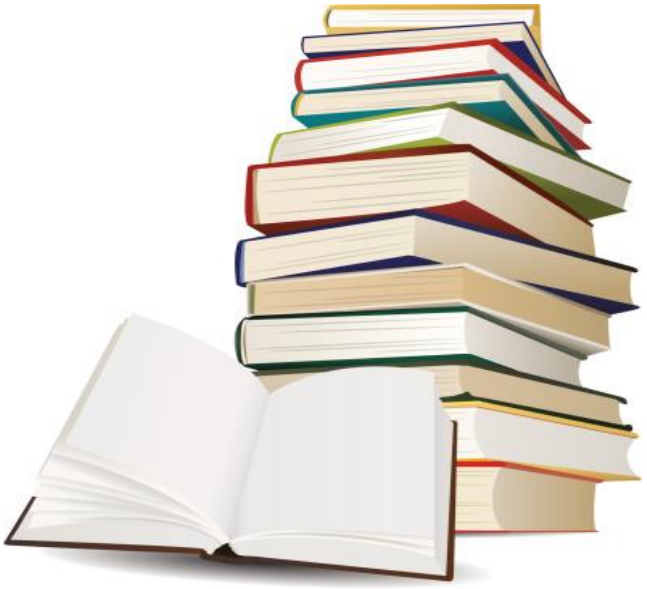
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From The Editor In Chief

The upcoming education activity of Turkish Geriatrics Society is the third course on scientific research in the field of geriatrics which will be held on the 21st and 22nd of April, 2017 in Ankara.

Trainers who are experienced in research methodology and scientific writing in geriatrics and gerontology will take part during this interactive course, aiming to support the young academicians and to increase the awareness about geriatric research.

The main subjects of this course are, research on geriatric population, evidence based medicine, types of research, basic principles of the design of scientific research, observational, cohort, cross sectional and case control studies, resources of frequent errors, experimental and clinical research, validation studies, ethical aspects of the research, the procedure of application to the ethical committees, publication ethics, how to publish a paper and how to evaluate a paper.

All details of this course are announced on the website of Turkish Geriatrics Society and the board of directors is honored to invite you to this scientific event.

As the members of the "board of directors" we are well aware of the fact that, reviewers of our journal always give valuable constructive criticism to the authors and help to improve the journal. Another new attempt of the journal for 2017 is that the wide list of "national advisory board" will be covered on the web based system and all the referees that have given support to the journal will be announced at the end of each year.

Prof. Yeşim GOKCE KUTSAL, M.D.

Editor in Chief

TURKISH JOURNAL OF GERIATRICS

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AGING IS AN ISSUE OF TURKEY

Recent data shows that aged population percentage has increased to 8.3% within the total number of the individuals (79 814 871) living in Turkey by December 2016 (1). Table 1 shows us the trend since 2010.

Table 1. Aged population frequency within the total population in Turkey (2010-2016) (1-7)

Year	Aged population frequency (%)
2016	8.3
2015	8.2
2014	8.0
2013	7.7
2012	7.5
2011	7.3
2010	7.2

On one hand, it is very promising that people live longer when compared to the previous decades. On the other hand, the question of "quality of life" becomes more valid as the people live longer lives. It is very crucial for a country to achieve to focus on both quantity and quality while talking on aging issues.

As the population ages, burden of diseases profile turns to noncommunicable diseases in Turkey. Hacettepe University, Institute of Population Studies recently published a national survey jointly conducted with the Ministry of Health, Turkey belonging to 2013. Due to the results of the survey, noncommunicable diseases frequency increased from 13% to 14.8% between 2000 and 2013 (8). World Health Organization (WHO) defines noncommunicable in four main types (cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes (9). Significant part of the diseases' frequencies is expected to increase as the population ages. Multimorbidities are also seen frequently among older people (10).

All these developments urged the international scientific people to prepare a global strategy and action plan on aging and health. Until 2020, all the member countries of the WHO should be organized in the aim of healthy aging. Age friendly environments, strong health systems for the aged people, sustainable long term care facilities are among the prior issues of the Global Strategy (11).

At this point, let's remember the recommended five priorities at the community level for the WHO European Region countries where Turkey is located. This guidance was enhanced in 2012. Prevention of falls, promotion of physical activity, vaccination of the older people, increase facilities on care (home, self, etc), increase geriatric and gerontological capacity concurrently (12).

Such international guidance will help all countries very much in deciding their ways and in localizing their services compatible with the international developments.

Aging is a good success, thus, if the countries are not prepared, success expectation might turn to "disaster".

Geriatrics and gerontology disciplines are good guides to enlighten the challenging and long way in this regard.

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RESEARCH

BIOMARKERS OF ALZHEIMER'S DISEASE AND VASCULAR DEMENTIA SIMULTANEOUSLY SAMPLED FROM SERUM AND CEREBROSPINAL FLUID

- Ömer KARADAŞ[1]
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- Akçay Övünç ÖZÖN[3]
- Bilgin ÖZTÜRK[4]
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Abstract

Introduction: Alzheimer's disease, which is a progressive disease accompanied by behavioral problems and decreased activities of daily living with early cognitive decline, and vascular dementia, which is related to cerebrovascular lesions with gradual, progressive cognitive decline, are common in the elderly. Currently, pathological examination is the gold standard in both Alzheimer's disease and vascular dementia and studies to elucidate the role of cytokines in their pathophysiology using cerebrospinal fluid and serum biological markers have been intensified. In this study, cerebrospinal fluid and serum biomarker levels from both Alzheimer's disease and vascular dementia patients were examined.

Materials and Method: Thirty patients diagnosed with Alzheimer's disease (Group 1) and vascular dementia (Group 2) were enrolled in this study. Serum interleukin-1β, tumor necrosis factor--α, and interleukin-6 levels as well as serum and cerebrospinal fluid protein carbonyl, glutathione and β-amyloid levels from Groups 1 and 2 (N=15 each) patients were compared.

Results: Serum interleukin-1β, tumor necrosis factor-α, and β-amyloid levels as well as serum and cerebrospinal fluid protein carbonyl and glutathione levels were not statistically different ($p>0.05$) between Group 1 and Group 2. Serum interlukin-6 levels and cerebrospinal fluid β-amyloid levels were significantly higher and lower, respectively, in Group 2 than in Group 1 ($p<0.05$).

Conclusion: In this study, serum interleukin-6 levels were higher, whereas cerebrospinal fluid β-amyloid levels were lower, in vascular dementia patients than in Alzheimer's disease patients.

Key Words: Alzheimer's disease; Dementia, Vascular; Cytokines; Biochemical markers

ARAŞTIRMA

ALZHEİMER HASTALIĞI VE VASKÜLER DEMANSTA EŞ ZAMANLI ALINAN SERUM VE BEYİN OMURİLİK SIVISINDA BİYOLOJİK BELİRTEÇLER

Öz

Giriş: Kognitif bozulmanın ön planda olduğu, davranışsal sorunların ve günlük yaşam aktivitelerindeki bozulmanın eşlik ettiği, ilerleyici bir hastalık olan Alzheimer hastalığı ve serebrovasküler faktörler ile ilişkili, basamaklı kognitif gerileme ile seyreden vasküler demans sıklıkla ileri yaş hastalığıdır. Günümüzde hem Alzheimer hastalığı hem de vasküler demans tanısında patolojik inceleme altın standart olmakla birlikte, beyin omurilik sıvısı ve serumdaki biyolojik belirteçler ile sitokinlerin patofizyolojideki rollerini ortaya çıkarmak için çalışmalar hız kazanmıştır. Bu çalışmada Alzheimer hastalığı ve vasküler demans hastalarının eş zamanlı alınan beyin omurilik sıvısı ve serumlarındaki biyolojik belirteç seviyeleri değerlendirilmiştir.

Gereç ve Yöntem: Çalışmaya Alzheimer hastalığı (Grup 1) ve vasküler demans (Grup 2) tanısı konulan 30 hasta alındı. Grup 1 (n=15) ve grup 2 (n=15) hastalarından eş zamanlı olarak serum ve beyin omurilik sıvısı alınarak serum interlökin-1β, tümör nekroz faktör-α, interlökin-6, serum ve beyin omurilik sıvısı protein karbonil, glutatyon, β-amiloid düzeyleri ölçülüp karşılaştırıldı.

Bulgular: Gruplar karşılaştırıldığında, serum interlökin-1β, tümör nekrozis faktör-α, β-amiloid, serum ve beyin omurilik sıvısı protein karbonil, glutatyon düzeyleri istatistiksel olarak farklı değildi ($p>0.05$). Birinci gruba kıyasla ikinci grupta serum interlökin-6 düzeylerindeki yükseklik ile beyin omurilik sıvısı β-amiloid düzeylerindeki düşüklük istatistiksel olarak anlamlıydı ($p<0.05$).

Sonuç: Bu çalışmada, Alzheimer ve vasküler demans hastalarından eş zamanlı alınan BOS ve serumlarındaki sitokinler değerlendirildiğinde vasküler demans hastalarında Alzheimer hastalarına göre serum interlökin-6 seviyelerinin daha yüksek olduğu ancak beyin omurilik sıvısı amiloid düzeylerinin ise daha düşük seviyede olduğu saptandı.

Anahtar Sözcükler: Alzheimer hastalığı; Vasküler demans; Sitokinler; Biyokimyasal belirteçler

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INTRODUCTION

Various types of dementia are characterized by impaired cognitive ability that adversely affects activities of daily living. Dementia prevalence increases with age, and the care and treatment of affected individuals are quite expensive. The most frequently observed type of this syndrome is Alzheimer's disease (AD). In AD, cerebral parenchymal lesions are observed apart from the loss of neurons and synapses. Molecular studies have shown that amyloid beta-associated amyloid plaques are important in AD pathogenesis (1,2). Patients experience organizational problems when learning information, and distortion in the semantic and episodic memory is evident (2).

Cerebrovascular factors play roles in vascular dementia (VaD), and VaD usually manifests at a much older age. Vascular lesions in the brain are known cause to VaD; however, the role of these lesions in the pathophysiology of VaD has not been fully elucidated. The size and number of lesions in the brain as well as whether subcortical white matter is affected or not is important in VaD pathogenesis. Changes in the cognitive profile occur at different rates in VaD patients, with slow mentation and deteriorations in goal setting and organizing being at the forefront. Memory performance and hint-assisted remembering is better in VaD than in AD, and there is less frequent forgetting in VaD. Previous studies have reported that neuropsychological assessments in both these dementia types are similar (2,3).

Pathological examination is the most definite method to accurately diagnose both AD and VaD dementia. Research on specific and efficacious treatment methods for dementia types is ongoing because treatment methods differ among common dementia types. The primary aim of treatment in dementia is early initiation so as to slow down the disease process and to make the treatment more effective. In addition to biochemical neurophysiological and cognitive tests, several approaches such as combinations of specific imaging and genetic profiling have been attempted. Moreover, new methods are currently being developed. Biomarkers in various body fluids may be related to the clinical manifestation and the pathology of dementia. Biomarkers that are not affected by comorbid factors and do not show any individual differences are expected to play important roles in prognosis assessments as well as early diagnosis and treatment planning (3,4).

Recent postmortem studies have focused on biomarkers for effective diagnoses, and studies on the pathophysiological mechanisms associated with these biomarkers have begun. These mechanisms offer promise in distinguishing AD and VaD, assessing prognosis, and developing effective treatment and prophylactic strategies. Amyloid gene syntehesizes amyloid precursor protein (AβPP) from a fragment of 40 to 42 aminoacids which are the major neuropathological hallmarks of AD and was choosen as neurological marker. The clinical studies have showed that oxygen and nitrogen free radicals induced protein, lipid and DNA oxidation which were leading to the cytotoxic effect. Impaired permeability of the blood-brain barrier and endothelial damage in small vessels in AD patients were reported implying that the presence of oxidative radicals or free radical increase in systemic circulation might affect the brain in AD. Protein carbonyl (PCO) and glutathion (GSH) was choosen as oxidative stress markers (2,5,6,7).

Inflammatory mechanisms have been strongly linked to the pathogenesis of both AD and VaD. Cytokines such as interleukin 1β (IL-1β), tumor necrosis factor α (TNF- α), and interleukin 6 (IL-6), which have been involved in the inflammatory process located close to amiloid plaques might be cytotoxic when chronically produced and might stimulate the production of β-amyloid peptides. Increased levels of TNF-a and IL-6 have been reported in the cerebrospinal fluid of patients with VaD which suggests a possible involvement of inflammatory mechanisms in the pathogenesis of cognitive impairment in patients with cerebrovascular disease (8). IL-1β, TNF-α and IL-6 were choosen as inflammatory markers.

The primary aim of this study was to compare biomarker levels measured in serum and cerebrospinal fluid (CSF) samples obtained simultaneously from patients with AD and VaD. The secondary aim was to define correlations within the groups.

MATERIALS AND METHOD

This prospective comparative clinical trial complies with the Declaration of Helsinki and was

approved by the Local Ethics Committee (August 2010, 984), and informed consent was obtained from all participants. A total of 30 patients diagnosed with AD and VaD were included in the study. Fifteen patients with Global Deterioration Scale (GDS) scores of 4–6 who were diagnosed with AD according to the diagnostic criteria of Communicative Disorders and Stroke and the Alzheimer's Disease and related Disorders Association (NINCDS-ADRDA) were included in the AD group (Group 1) (9). Fifteen patients with GDS scores of 4–6 and diagnosed with VaD according to the diagnostic criteria of Communicative Disorders and Stroke and the Association Internationale pour la Recherche et l'Enseignement en Neurosciences (NINCDS-AIREN) were included in the VaD group (Group 2) (10).

Clinical and demographic data of all patients was collected. General physical and neurological examinations were performed for each patient. Clinical evaluation and biochemical analyses were performed to exclude other pathologies. Brain magnetic resonance and brain computed tomography images of all patients were evaluated to exclude other pathologies and to support the diagnosis. Patients with a history of malignancies; those with inflammatory disease, uncontrolled hypertension (HT), uncontrolled diabetes mellitus (DM), chronic liver failure, chronic renal failure, congestive heart failure, hypophyseal and hypothalamic dysfunction, major psychiatric disorders; or those who took steroids, antibiotics, and nonsteroidal anti-inflammatory drugs in the last 10 days were excluded from the study.

The diagnosis of HT was based on antihypertensive drug use and three or more blood pressure measurements above 140/90 mmHg. The diagnosis of DM was based on the fact that at least two measurements of fasting glycemia were>126 mg/dl and that blood glycemia was>200 mg/dl 120 min after the oral glucose challenge test. Smokers were defined as those who smoked 10 cigarettes/day.

According to the inclusion and exclusion criteria, 15 men and 15 women were included in the study. Blood and CSF samples were obtained simulteanously from the patients between 8–10 a.m. after they were maintained on fasting since 10 p.m.. CSF was collected in 2.5 samples in the lateral decubitus position from the L4–L5 intervertebral disc space. Blood and CSF samples were then poured into regular biochemistry tubes and were centrifuged for 10 min at 1000 rpm before being placed in deep freezers (−80°C) after removing the precipitates from the bottom. All patients in the AD group were taking acetylcholinesterase inhibitor (AChEI), whereas none of the patients in the VaD group were taking AChEI or N-Methyl-D-aspartic acid (NMDA) receptor antagonist.

Serum levels of IL-1β, IL-6, and TNF-α were measured using commercially available sandwich enzyme-linked immunosorbent assay (ELISA) kits (AssayPro LCC, St. Charles, MO, USA). Results are provided in pg/mL. According to the manufacturer's guidelines, the coefficient of variation was 10.2%, 9.7%, and 10.5% for the assessments of IL-1β, IL-6, and TNF-α, respectively. Serum and CSF $A\beta_{1\text{-}40}$ levels were measured by ELISA (Invitrogen Corporation, CA, USA), as were serum and CSF protein carbonyl (PCO) levels (Northwest Life Science Specialties, LLC, WA, USA). Serum and CSF glutathione (GSH) assays were analyzed with the Modified Tietze method using the NWLSS Glutathione Assay kit (Northwest Life Science Specialties, LLC, WA, USA).

Statistical analysis was performed using SPSS software (version 15). The normal distribution of variables was examined with visual (histogram) and analytical (Kolmogorov–Smirnov) methods. Descriptive analyses for non-normally distributed variables are shown as median, minimum, and maximum levels. Serum and CSF GSH, PCO, and β-Amyloid, as well as serum TNF-α, IL-1β, and IL-6 levels were non-normally distributed; these parameters were compared between groups using the

Mann–Whitney U test. Differences were considered statistically significant when P values were<0.05. Correlation coefficients and statistical significance for intervariable correlations that were non-normally distributed were calculated using the Spearman's rank correlation coefficient. The type-1 error level of 5% was considered statistically significant.

RESULTS

Fifteen (8 males, 7 females) AD and 15 (7 males, 8 females) VaD patients were included in the study. No significant difference was detected between the groups in terms of age and gender. There was no significantly significant difference in comorbidities between the prevalence of DM and coronary heart disease (CHD) between the groups. HT was statistically higher in Group 2 (p<0.05). There was no significant difference between the groups in terms of smoking habits (Table 1).

There was no statistically significant difference between the groups regarding serum and CSF GSH median levels (p>0.05) or PCO levels (p>0.05). Although there were no differences in serum β-amyloid levels between the groups, CSF β-amyloid levels were lower in Group 2 (p<0.05). Although there were no significant differences in serum TNF-α and IL-1β levels between the groups (p>0.05), serum IL-6 levels were higher in Group 2 (p<0.05; Table 2).

DISCUSSION

According to the findings obtained in this study, serum IL-1β, TNF-α, and β-amyloid levels as well as serum and CSF PCO and GSH levels were not statistically different between the AD and VaD groups. Compared to the AD group, VaD group had significantly higher serum IL-6 levels and significantly lower CSF β-amyloid levels. HT was statistically higher in the VaD group. These statistical significant findings are important because they show a pathological association when evaluated in terms of sensitivity and specificity.

Clinically apparent impairment in memory functions in AD indicates severe loss of neurons in the entorhinal cortex. Hence, attempts to detect these pathophysiological changes early to develop treatments to prevent this progressive process are underway. Studies have shown that many biomarkers, such as IL-1β, IL-6, IL-10, TNF-α, Aβ1-42 and Aβ1-40 are related to pathological processes (5,6). In recent studies, the search for specific biomarkers associated with pathological processes in dementia patients has been accelerated. Whether these markers are the cause or the consequence of disease is crucial in understanding the pathophysiology and in developing new treatment strategies. Some of the biomarkers identified show an association with the dementia type rather than with etiologies. Therefore, these biomarkers may be important indicators of sensitivity and specificity in support of diagnosis and treatment planning.

Table 1. General characteristic of Alzheimer's Disease (Group 1) and vascular dementia (Group 2) patients

Parameter	Group 1	Group 2	p
n (Women/Men)	15 (7/8)	15 (8/7)	0.71
Age	70.20±6.25	71.26±6.45	0.72
HT (n)	6	12	0.025[a]
DM (n)	2	6	0.099
Smoking (n)	6	7	0.71
CHD (n)	3	5	0.40

[a]p<0.05 N,Number; HT, Hypertension; DM, Diabetes Mellitus; CHD, Coronary Heart Disease

Table 2. Biomarker levels for Alzheimer's Disease (Group 1) and vascular dementia (Group 2) patients

		Group 1	Group 2	[a]p
Serum GSH level (µmol/L)	**Mean±sd**	15.99±6.00	15.68±5.75	0.7089
	Min-Max	5.25–26.25	5.25–28.60	
	Median	18.20	15.00	
	95% CI	12.67–19.31	12.50–18.86	
CSF GSH level (µmol/L)	**Mean±sd**	12.23±7.47	12.67±7.16	0.6936
	Min-Max	4.59-36.75	5.25–34.12	
	Median	10.46	10.50	
	95% CI	8.09–16.37	8.70–16.63	
Serum PCO level (nmol/mg)	**Mean±sd**	2.29±0.82	1.80±0.81	0.0969
	Min-Max	0.68–3.64	0.45–3.18	
	Median	2.18	1.59	
	95% CI	1.83–2.75	1.35–2.25	
CSF PCO level (nmol/mg)	**Mean±sd**	9.13±4.09	7.78±2.72	0.4124
	Min-Max	2.15–15.90	3.32–10.50	
	Median	8.75	8.89	
	95% CI	6.86–11.40	6.28–9.29	
Serum Amyloid level (pg/ml)	**Mean±sd**	3.98±2.72	5.30±3.85	0.4427
	Min-Max	0.50–10.64	0.57–11.93	
	Median	3.78	3.57	
	95% CI	2.47–5.48	3.16–7.43	
CSF Amyloid level (pg/ml)	**Mean±sd**	391.23±56.45	334.27±43.85	0.0062
	Min-Max	295.0–475.0	239.0–399.0	
	Median	395.0	340.0	
	95% CI	360.0–422.5	310.0–358.6	
Serum TNF-α level (pg/ml)	**Mean±sd**	32.17±11.52	27.50±11.78	0.1607
	Min-Max	8.62–54.40	12.63–57.62	
	Median	30.45	26.90	
	95% CI	25.79–38.55	20.97–34.02	
Serum IL-1β level (pg/ml)	**Mean±sd**	15.05±5.24	11.84±4.65	0.0975
	Min-Max	5.89–25.96	6.67–21.33	
	Median	15.40	10.96	
	95% CI	12.15–17.95	9.26–14.42	
Serum IL-6 level (pg/ml)	**Mean±sd**	28.48±9.11	38.96±9.19	0.0153
	Min-Max	13.90–43.00	25.60–57.56	
	Median	27.90	35.90	
	95% CI	23.43–33.52	33.87–44.05	

[a]Mann–Whitney U Test; GSH, Glutathione; PCO, Protein carbonyl; CSF, Cerebrospinal fluid

With high lipid content and oxygen capacity brain is more prone to oxidative stress. Serum and CSF PCO and GSH levels as oxidative stress markers were found similar both in AD and VaD. According to our results these oxidative stress markers are not crucial for differentation of both diseases. Serum TNF-α and IL-1β as inflammatory mediators, produced in both brain and systemic, were found similar in AD and VaD groups. Therefore these mediators have no an important role in the pathophysiology of AD and VaD.

Zuliani et al. measured plasma levels of IL-6, TNF-α, IL-1β, and IL-10 in four groups of patients: a late-onset Alzheimer's disease group (LOAD, 60 subjects), a vascular dementia group (VaD, 80 subjects), a cerebrovascular disease without dementia group (CDND, 40 subjects), and a control group (C, 42 subjects). Compared to the C group, the LOAD, VaD, and CDND groups had high IL-1β levels. TNF-α levels were higher in the VaD and LOAD groups than in the C group; furthermore, TNF-α and IL-6 levels were higher in the VaD group than in the LOAD group. Logistic regression analysis indicated that higher IL-6 levels increased VaD risk compared to LOAD risk (8). In our study, serum IL-6 levels were higher in the VaD group.

Angelopoulos et al. found elevated serum IL-1β, IL-6, and IL-10 levels in dementia patients. There was no statistically significant correlation between interleukin levels in AD and VaD patients. However, there was a significant correlation between IL-6 and TNF-α levels and age. IL-1β and IL-6 showed a positive correlation with HT (11). In our study, HT prevalence was higher in the VaD group than in the AD group, and IL-6 levels were similarly high. Yasutake et al. examined serum BDNF, TNF-α, and IL-1β levels in 60 AD, 60 VaD, and 33 healthy control participants. Serum BDNF levels were found to be significantly lower in the AD group than in the VaD and control groups. There was no correlation between TNF-α and IL-1β levels or BDNF levels in the dementia groups, and there were no differences in TNF-α and IL-1β levels between the groups (12). In our study, there was no difference between the AD and VaD groups in terms of TNF-α and IL-1β levels.

Vascular infarcts and presence of neuroinflammation associated with increased IL-6 levels in different types of dementia was well known (13). Helmy et al. evaluated IL-6 levels, C-reactive protein levels, and serum protein electrophoresis results in 10 AD, 10 VaD, and 20 non-demented control participants. Serum IL-6 and C-reactive protein levels were significantly higher in both the dementia groups than in the control group. There was no statistically significant difference between the AD and VaD groups in terms of IL-6 levels. The serum IL-6 cutoff level at which statistical significance was observed was 14.25 pg/mL. It has been concluded that serum IL-6 levels may be used to differentiate dementia from the normal aging-related changes (14). In our study, serum IL-6 levels were higher in the VaD group. These differences may be because of differences in the number of patients, their treatment status, and the presence of comorbidities, such as HT, DM, and CHD.

In the study by Janelidze et al., different types of dementia biomarkers in CSF were studied. When CSF β-amyloid levels were examined in the AD and VaD groups, levels in the VaD group were lower than those in the AD group (15), consistent with the findings of the present study. Acetylcholinesterase inhibitor usage in the AD group, no AChEI or NMDA receptor antagonist usage in the VaD group, and many possible confounding factors, such as accompanying HT, DM, or CHD, may have influenced this result. In many studies, β-amyloid levels were lower in the AD groups than in the control groups, whereas IL-6 levels were higher in the VaD groups than the control groups. Therefore, the lack of a control group is the most important limitation of the present study. The second limitation is the limited number of patients.

In conclusion, serum IL-6 and CSF β-amyloid levels showed significant differences between VaD and AD patients, suggesting that this distinction may be important in the pathophysiological process. There is a need for randomized, double-blind, placebo-controlled, and long-term follow-up studies in which patients are assessed for comorbid factors to accurately demonstrate the efficacy and potency of these biomarkers in determining AD and VaD.

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RESEARCH

NEUTROPHIL-TO-LYMPHOCYTE RATIO AS A PREDICTOR OF SEVERE CORONARY ARTERY DISEASE AND LEFT VENTRICULAR SYSTOLIC DYSFUNCTION OF ANY DEGREE IN GERIATRIC PATIENTS PRESENTING TO EMERGENCY DEPARTMENT WITH ACUTE CORONARY SYNDROME

Abstract

Introduction: We examined the role of the neutrophil-to-lymphocyte ratio (NLR) for predicting severe coronary artery disease and left ventricular systolic dysfunction of any degree in geriatric patients presenting to emergency department with non-ST-elevation acute coronary syndrome.

Materials and Method: We retrospectively reviewed data for patients aged ≥65 years with non-ST-elevation acute coronary syndrome who underwent coronary angiography between April 2011 and January 2016. Patients were divided into Group 1 (101 patients; severe [>50%] lesions in one or more epicardial artery or branch) and Group 2 (65 patients; no severe lesions). The key clinical parameters, including NLR were compared among the groups and the power of NLR as a predictor of severe coronary artery disease and left ventricular systolic dysfunction of any degree was determined.

Results: Group 1 included more patients who were male, older, or smoked; these had higher troponin I, mass CK-MB, NLR, but a lower left-ventricular ejection fraction. NLR was an independent predictor of severe coronary disease and left ventricular systolic dysfunction of any degree with good sensitivity and moderate specificity.

Conclusion: Neutrophil-to-lymphocyte ratio is a simple, rapid, and cheap parameter that can predict severe coronary artery disease and left ventricular systolic dysfunction of any degree in geriatric patients with non-ST-elevation acute coronary syndrome.

Anahtar Sözcükler: Akut koroner sendrom; Yaşlı; Nötrofil; lenfosit

ARAŞTIRMA

AKUT KORONER SENDROMLA ACİL SERVİSE BAŞVURAN GERİATRİK HASTALARDA CİDDİ KORONER ARTER HASTALIĞININ VE HERHANGİ BİR DERECEDE SOL VENTRİKÜL SİSTOLİK DİSFONKSİYONUNUN ÖNGÖRDÜRÜCÜSÜ OLARAK NÖTROFİL LENFOSİT ORANI

Öz

Giriş: Bu çalışmada, akut koroner sendrom ile acil servise başvuran geriatrik hastalarda nötrofil/lenfosit oranının (NLR) ciddi koroner arter hastalığını ve herhangi bir derecede sol ventrikül sistolik disfonksiyonunu göstermedeki rolü araştırılmıştır.

Gereç ve Yöntem: Nisan 2011 ile Ocak 2016 tarihleri arasında ST elevasyonsuz akut koroner sendrom ile acil servise başvuran ve koroner anjiyografi uygulanan 65 yaş ve üzeri hastaların verileri retrospektif olarak incelendi. Hastalar Grup 1 (bir ya da daha fazla epikardiyal koroner arter ya da dalında ciddi [≥50%] lezyonları olan 101 hasta) ve Grup 2 (ciddi lezyonları olmayan 65 hasta) olarak ikiye ayrıldı. NLR dahil anahtar klinik parametreler gruplar arasında karşılaştırıldı ve NLR'nin ciddi koroner arter hastalığı ve herhangi bir derecede sol ventrikül sistolik disfonksiyonunu öngördürücü gücü hesaplandı.

Bulgular: Grup 1'de daha fazla erkek, daha yaşlı hasta, daha yüksek sigara içme sıklığı, daha yüksek troponin I, kütle CK-MB ve NLR düzeyleri ve daha düşük sol ventrikül ejeksiyon fraksiyonu saptandı. NLR hem ciddi koroner arter hastalığını hem de herhangi bir derecede sol ventrikül sistolik disfonksiyonunu iyi bir duyarlılık ve ortalama özgüllükle öngörebiliyordu.

Sonuç: Basit, hızlı ve ucuz bir parametre olan NLR, ST elevasyonsuz akut koroner sendromla acil servise başvuran geriatrik hastalarda ciddi koroner arter hastalığını ve herhangi bir derecede sol ventrikül sistolik disfonksiyonunu öngörebilir.

Key Words: Key Words: Acute coronary syndrome; Aged; Neutrophils; lymphocytes

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INTRODUCTION

Acute coronary syndromes (ACS) in geriatric patients are a common emergency department presentation (1). Geriatric patients with ACS may present with atypical symptoms, non-specific electrocardiographic changes (ECG) and non-cardiac troponin elevations (1-3). They are also more sensitive to the side effects of interventional procedures, particularly stroke and bleeding (1). Therefore, it is vital in this population to correctly predict coronary artery disease severity and myocardial dysfunction to eliminate diagnostic uncertainty, avoid unnecessary procedures, and prevent inappropriate discharges from the emergency department.

It is known that inflammatory mechanisms occur in ACSs, so various studies have been conducted to determine the role of inflammatory markers in coronary artery thrombosis, both as a diagnostic and prognostic tool (4,5). Neutrophil-to-lymphocyte ratio (NLR), an inflammatory parameter calculated from routinely studied complete blood counts, has been reported to reflect the severity of obstructive coronary artery lesions (6,7) as well as left ventricular dysfunction (8,9) or prognosis in ACSs (10,11). However, there is little information about its role in predicting CAD severity and left ventricular dysfunction in geriatric patients with ACS. Therefore, we explored the predictive role of NLR for angiographical single- or multi-vessel severe coronary artery disease (CAD) and echocardiographic left ventricular systolic dysfunction of any degree in geriatric patients free of a history of CAD presenting to an emergency department with ACS.

MATERIALS AND METHOD

This study was approved by Baskent University Institutional Review Board (Project No: KA16/177; Date: 05.05.2016) and supported by Baskent University Research Fund. This was a retrospective review of the medical records of geriatric patients who presented with ACS to the Emergency Department of Başkent University Ankara Hospital and underwent invasive coronary angiography between April 2011 and January 2016. The medical records of our patients were accessed via the hospital's data automation system.

The study population consisted of geriatric patients (>65 years old) without known CAD presenting to our emergency department with chest pain or angina equivalents (dyspnea, sweating, altered consciousness, syncope, embolic events, acute heart failure, or hypotension) within 3 hours of symptom onset. All patients underwent ECG testing, biochemistry and blood count analysis, plain chest X-ray, and standard transthoracic echocardiography (performed by experienced senior residents or expert cardiologists). The troponin I levels were measured at the emergency department admission and 3-6 hours later, depending on the assay used (i.e regular vs high-sensitive troponin I assays). Echocardiographic data including the left-ventricular ejection fraction (LVEF), any segmental wall motion abnormalities, and left ventricular systolic dysfunction of any degree (LVEF<52% for men and 54% for women) were recorded. All patients were hospitalized by the cardiology department and examined with invasive coronary angiography on the basis of clinical presentation, ischemic ECG findings, or elevated troponin I measurements, alone or in combination. Therefore, patients both with unstable angina pectoris (resting chest pain without troponin I elevation) and non-ST elevation myocardial infarction (NSTEMI) (resting chest pain with troponin I elevation) who underwent coronary angiography were included in the study. NSTEMI was diagnosed on the basis of a rise and/or fall in the troponin I levels in an appropriate clinical setting with or without typical ECG findings.

Patients with severe coronary artery stenoses (>50%) in one or more major epicardial coronary artery or branch, necessitating intervention, were assigned to Group 1. Those patients with non-significant lesions (normal coronary arteries, minimal plaque burden or coronary arterial irregularities, stenoses<50%, with no thrombus burden in single or multiple coronary arteries) were assigned to Group 2. We excluded the following patients from the study: those with known significant CAD and prior revascularization; those with ST elevation >20 minutes in two consecutive ECG leads or persistent



left bundle branch block; those with atrial fibrillation or supraventricular tachyarrhythmias with rapid ventricular response or ventricular tachycardia, idioventricular rhythm, advanced (second or third degree) atrioventricular block, asystole, profound bradycardia (<40 beats per minute), or respiratory or circulatory arrest; sepsis or septic shock; those using non-steroidal antiinflammatory drugs, immunomodulators, immunosuppressants, or steroids; those with connective tissue disorders, inflammatory or rheumatological disorders, active cancer, or hematological malignancies, particularly lymphoproliferative disorders or a recent history of chemotherapy or radiotherapy; and those with known lymphopenia, lymphocytosis, neutropenia, neutrophilia, or leukocytosis.

We studied and compared the following parameters between the groups: demographic properties; ischemic changes on admission ECG (segmentary wall motion abnormalities, numerical value of LVEF, and the presence of left ventricular systolic dysfunction of any degree (LVEF<52% for men and 54% for women) on echocardiography performed at the emergency department or coronary care unit, biochemical and complete blood count parameters, cardiac biomarkers, and NLR. The following were considered to indicate ischemic changes on ECG: ST depression (especially horizontal or downsloping in character); transient (defined as<20 minutes) ST elevation; T-wave inversion or flattening presumed to be new; pseudonormalization of T waves; QT prolongation presumed to be secondary to ischemia; new onset pathological Q waves or U waves; and new onset poor anterior precordial R wave progression.

Statistical analysis

The normality of continuous variables was tested with the Kolmogorov–Smirnov test, and all normally and non-normally distributed variables were then expressed as mean±standard deviation or as median (range), respectively. When the variables were normally distributed, they were compared between the groups using the Student's *t* test; when not, they were compared using the Mann–Whitney *U* test. Categorical variables were compared using the chi-squared test.

Variables that were significantly correlated with severe CAD and left ventricular systolic dysfunction of any degree were determined using univariate analysis, which was followed by a logistic regression analysis to identify the independent significant predictors of both parameters. Receiver operating characteristic (ROC) curves were then drawn to examine the power of NLR to predict severe CAD and left ventricular systolic dysfunction of any degree. The significance level was set to $p<0.05$ for all statistical analyses.

RESULTS

The study population comprised 166 patients aged 73.7±6.6 years, of whom 97 (58.4%) were men and 69 (41.6%) were women. Groups 1 and 2 included 101 and 65 patients, respectively. The overall in-hospital mortality rate was 3.01% (n=5), with all deaths occurring in Group 1.

By coronary angiography, severe single- and multi-vessel CAD was identified in 30 (29.7%) and 71 patients (70.3%), respectively, in Group 1. Of those with severe multi-vessel CAD, 34 (47.9%) underwent coronary artery bypass graft surgery; percutaneous coronary intervention was performed to the circumflex artery in 17 (23.9%), to the left anterior descending artery in three (4.2%), and to the right coronary artery in seven (9.9%) (or their major branches in each case), or to two separate major epicardial vessels in two cases. Eight (11.3%) patients with multi-vessel disease had unfavorable lesional/clinical/myocardial characteristics and did not undergo any percutaneous or surgical intervention. Among those with significant single-vessel disease, percutaneous intervention was to the left anterior descending artery in 11 (36.7%), to the circumflex artery in three (10%), and to the right coronary artery in 10 (33.3%) (Or their major branches in each case). Six (20%) patients with significant single-vessel disease were unsuitable for percutaneous or surgical intervention because of unfavorable characteristics.

Group 1 included significantly older patients, more men, and more current or past smokers. Other demographic and clinical variables were similar between the groups (Table 1). Although there were

similar rates of ischemic changes on admission ECG in both groups, Group 1 had a significantly higher rate of segmental wall motion abnormalities, significantly reduced LVEF on echocardiography; however, the rate of left-ventricular hypertrophy was also similar (Table 2).

Table 1. Comparison of characteristics by severity of CAD

Characteristics	Group 1 (n, %)	Group 2 (n, %)	P
Age (years)	74 (65–91)	71 (65–87)	<0.05*
Sex (male)	51 (50.5%)	19 (28.2%)	<0.05**
Typical angina pectoris on admission	89 (88.1%)	51 (78.5%)	0.12
Diabetes mellitus	35 (34.6%)	18 (27.7%)	0.39
Hypertension	81 (80.1%)	54 (83.1%)	0.68
Hyperlipidemia	50 (49.5%)	34 (52.3%)	0.75
Family history for CAD	29 (28.7%)	16 (24.6%)	0.59
Chronic renal disease	18 (17.8%)	5 (7.7%)	0.16
Current or past smoking history	51 (50.5%)	20 (30.3%)	<0.05**
Current smoking history	22 (21.8%)	8 (12.3%)	0.15

*Student's t test, ** Chi-squared test. Group 1=severe; Group 2=non-severe. CAD: coronary artery disease.

Table 2. Comparison of electrocardiographic, echocardiographic, and laboratory findings by severity of CAD

Parameter	Group 1 n (%) or n (range)	Group 2 n (%) or n (range)	P
Signs of acute ischemia on ECG	57 (56.4%)	24 (36.9%)	0.16
LVEF (%)	46 (23–63)	58 (34–63)	<0.001*
s	55 (54.5%)	14 (%21.5)	<0.001**
Echocardiographic segmentary wall motion abnormalities	69 (68.3%)	10 (15.4%)	<0.001**
Echocardiographic left-ventricular hypertrophy	63 (62.4%)	31 (47.7%)	0.13
Mass CK-MB	1.53 (0–181.31)	0.95 (0–17.92)	<0.05*
Troponin I	0.16 (0–67.8)	0.006 (0–2.38)	<0.001*
Neutrophil	3.03 (0.90–24.59)	2.31(0.52–17.56)	<0.05*
Lymphocyte	2.00 (0.62–5.21)	2.33 (0.67–5.59)	<0.05*
NLR	3.03 (0.90–24.59)	2.32 (0.53–17.57)	<0.01*

*Mann–Whitney *U* test, **Chi-squared test. Group 1=severe; Group 2=non-severe. CAD: coronary artery disease. ECG: Electrocardiography, LVEF: left-ventricular ejection fraction.

Comparison of the biochemical and hematological parameters indicated that Group 1 had a significantly higher median blood urea nitrogen, creatinine, mass CK-MB, troponin I, neutrophil count, lymphocyte count, and NLR levels (Table 2). However, levels of other parameters were similar to those in Group

2. Univariate analysis then revealed that NLR was significantly correlated to severe CAD and the presence of left ventricular systolic dysfunction of any degree, and a multivariate logistic regression analysis confirmed that NLR was a significant independent predictor of both parameters (Table 3). A low in-hospital mortality rate prevented any statistical analysis of the relationship between NLR and mortality.

Table 3. Multivariate logistic regression analyses showing the significant independent predictors of severe single- or multi-vessel CAD and left ventricular systolic dysfunction of any degree

	Predicted parameter	
Predictor parameter HR (95% CI)	**Severe CAD**	**Left ventricular systolic dysfunction of any degree**
NLR	1.25 (1.05–1.48)*	1.22 (1.06–1.40)*
Male sex	2.40 (1.09–5.27)*	2.27 (1.11–4.59)*
Typical angina pectoris on admission	3.59 (1.33–9.70)*	–
Age	–	1.08 (1.03–1.14)*

*p<0.05. NLR: neutrophil-to-lymphocyte count, CAD: coronary artery disease, HR: hazard ratio, CI: confidence interval

The ROC curve drawn to determine the power of NLR to predict severe CAD showed an area under the curve of 0.638 (95% confidence interval 0.55–0.72). At a cut-off level of 1.815, it could predict severe CAD with a sensitivity of 80.2%, specificity of 40%, positive predictive value of 67.5%, and negative predictive value of 56.5% (Figure 1). As for the ROC curve drawn to determine the power of NLR to predict left ventricular systolic dysfunction of any degree, the area under the curve was 0.696 (confidence interval 0.61–0.78). At a cut-off level of 2.419, this could predict left ventricular systolic dysfunction of any degree with a sensitivity of 76.9%, specificity of 57.1%, positive predictive value of 69.5%, and negative predictive value of 50.7% (Figure 2).

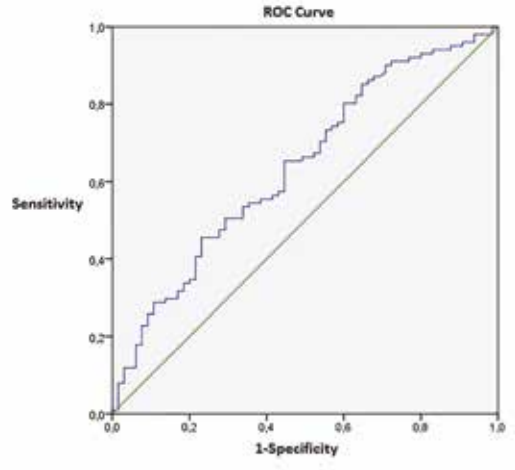


Figure 1. Receiver Operating Characteristic Curve for Neutrophil-to-Lymphocyte Ratio to Predict Severe Single- or Multi-Vessel Coronary Artery Disease

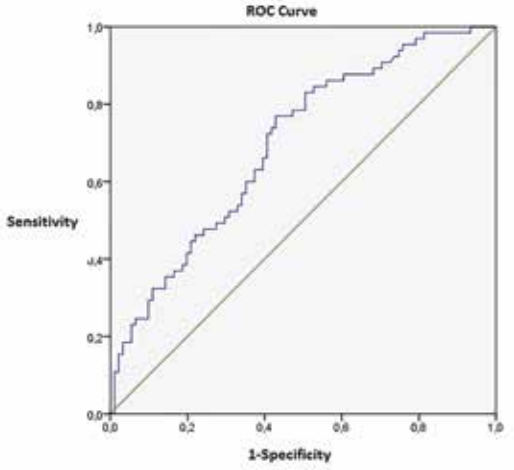


Figure 2. Receiver Operating Characteristic Curve for Neutrophil-to-Lymphocyte Ratio to Predict Left Ventricular Systolic Dysfunction of any Degree

DISCUSSION

In the geriatric population, ACSs are characterized by atypical presentations and non-specific or unreliable ECG and cardiac biomarker findings (1,2). These factors may collectively cause excess hospitalizations and coronary angiography procedures, and when coupled by a high comorbidity burden and increased fragility of this population, they increase the risk of hemorrhage, contrast nephropathy, allergic reactions, infections, and mortality. The alternative is also possible, with the high rate of non-specific signs, symptoms, ECG changes, and troponin I elevations potentially reducing the perceived reliability of these parameters among clinicians, leading to premature or inappropriate discharge from the emergency department without admission or intervention. Therefore, sensitive, specific, and cheap markers are still needed that can be used to predict severe CAD or myocardial injury requiring intervention.

ACSs are characterized by an increased leukocyte count in the early phase (12). ACSs, particularly when myocardial injury occurs, cause neutrophilia in the peripheral blood, and by means of substances released by activated neutrophils, lead to atherosclerotic plaque rupture and further myocardial injury (13-15). In addition, highly inflammatory conditions like ACSs may give rise to relative lymphopenia that is driven by lymphocyte apoptosis and that eventually leads to proinflammatory cytokine release, which further exacerbates the inflammation and myocyte damage (16). It is also known that inflammation is closely related to severity of stable and unstable CAD (17,18). Therefore, leukocytosis, neutrophilia, relative lymphopenia, and increased NLR may be useful for guiding clinicians in the assessment of inflammatory burden, and thus CAD severity and myocardial injury in the ACS setting. Supporting this idea, NLR was found by previous studies to be linked to CAD severity in myocardial infarction (6,7). It was also reported to be an independent predictor of left-ventricular dysfunction (8) and all-cause mortality in ACSs (10,11). In this study, we showed that NLR level was significantly higher in geriatric patients with severe CAD on invasive coronary angiography compared with those without such lesions. We also revealed that NLR could independently predict severe single- or multi-vessel CAD requiring intervention, and could also predict left ventricular systolic dysfunction of any degree. An elevated NLR level in ACS could either be an indicator of the inflammatory milieu causing plaque rupture (i.e., *the cause*) or be a reflection of inflammatory events activated in response to plaque rupture, intravascular thrombosis, or myocardial injury (i.e., *the effect*), or both. A higher NLR in this setting likely indicates a higher grade of inflammation, which underlies a more severe CAD and a higher rate of myocardial dysfunction (19,20). Although both type I (primary plaque rupture or erosion) and type II (myocardial oxygen supply–demand mismatch) myocardial injury may occur in ACS, the higher NLR in those with severe CAD suggests a greater plaque burden and that type I MI is more plausible in our patient population. Nevertheless, in at least some patients, increased NLR levels may have developed also from myocardial injury due to type I or Type II MIs with accompanying inflammatory response with neutrophilia and relative lymphopenia. This is the first study to examine the role of NLR for determining CAD severity in the geriatric ACS setting. Although a similar ACS study also showed that NLR was independently correlated to the SYNTAX score, a surrogate marker of CAD severity and extent, the mean age of the study participants was 62.0±12.7 years, which was younger than in our study (mean age 73.7±6.6 years) (21). Similarly, in a study in non-ST elevation myocardial infarction that correlated SYNTAX score for CAD extent to NLR, the mean age of the study population was 63.8±12 years, which was considerably lower than that in our population (22).

Inflamamatory markers such as NLR may perform better than troponins for predicting both CAD burden and myocardial dysfunction as a result of an intense inflammatory state in these conditions (19,20). In support of this hypothesis, our study revealed that troponin I, unlike NLR, was not an independent predictor of neither severe CAD nor myocardial dysfunction. This may have stemmed from the fact that not all severe coronary lesions on



coronary angiography are unstable, but rather they are incidentally detected and thus may not cause troponin elevation, limiting the association between troponin I level and severe CAD. Although the group with severe CAD had a significantly greater troponin I level, this difference may not necessarily indicate widespread CAD since a partial or complete obstruction of a relatively small coronary artery and, sometimes, the injury of a relatively small myocardial territory may produce substantial troponin I release. There was also no significant difference between the two groups with regard to the rate of ischemic changes on ECG despite the difference in CAD burden, possibly because of a greater prevalence of secondary ST-T changes due to non-coronary causes (eg. left ventricular hypertrophy) in this age group, obscuring any significant difference in ischemic ECG changes between the study groups, non-coronary ischemia producing ischemic ST-T changes despite normal or only minimally diseased coronary arteries, and normal or minimally abnormal ECG in some patients with acute coronary syndrome, irrespective of having severe CAD, which was reported to occur in upto 6% of cases (23). Hence, as a result of the inherent limitations of the clinical presentation, ECG findings, and troponin I levels, NLR offers a promise to predict severe CAD and left ventricular dysfunction that necessitate intervention, both saving available resources and avoding unnecessary complications in geriatric populations.

NLR may increase in some inflammatory conditions and risk factors, such as smoking (24). This may also be considered to have occurred to some degree in our study; however, as stated in the methods section, we excluded major inflammatory conditions such as connective tissue disorders and rheumatologic disorders, conditions characterized by neutrophilia, steroid use, active infection or cancer, sepsis, and septic shock. Although cigarette smoking may induce inflammation and increase NLR, the ratio of current smoking was similar in both groups. Therefore, it is unlikely that elevated NLR levels resulted from neither active smoking nor other inflammatory conditions, and they likely reflected severe CAD and myocardial injury.

Our results do not imply that a low NLR level can be used to determine geriatric patients without significant coronary lesions or LV dysfunction in whom ACS treatment can be deferred. ACS is a clinical diagnosis where neither biomarkers nor angiography and echocardiography can be used alone to make treatment decisions. Therefore, neither NLR nor any other biomarker alone should guide clinicians for the treatment of ACS. Rather, as stated above, NLR can be used to pick up patients with a more severe CAD or LV dysfunction that justify coronary intervention.

Study limitations

Our study has some limitations. First, it was a retrospective study with the limitations inherent to this design. Second, the results of both regular troponin I and high-sensitive troponin I assays were used. Third, coronary artery lesions<50% were considered insignificant, even though it is already known that some ACSs originate from such lesions. However, because our aim was to identify those lesions necessitating coronary intervention, not those patients in need of ACS treatment, we consider it appropriate that such lesions were considered insignificant. Fourth, this study did not provide any information as to which conditions may have caused secondary ACS/MI in patients without severe CAD; but, it should be noted that this was beyond the scope of this research. Fifth, we could not provide any meaningful comparison for in-hospital mortality because of the low mortality rate.

In conclusion, we showed that NLR, a test that can be performed rapidly and without added cost in all emergency departments, could predict severe angiographic CAD and left ventricular systolic dysfunction of any degree in geriatric patients with ACS in this study. Therefore, NLR shows promise for identifying geriatric patients likely to have a more extensive disease and require intervention. Further studies are needed to confirm our findings, particularly in terms of addressing the limitations.

Conflict of Interest

The authors declare no conflict of interest.

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RESEARCH

PREDICTORS OF MORTALITY IN OCTOGENERIANS WHO UNDERWENT CORONARY ARTERY BYPASS GRAFTING AFTER AN ACUTE CORONARY SYNDROME

Abstract

Introduction: Coronary artery bypass grafting is increasingly being performed on patients with advanced age. We aimed to investigate the outcomes of early coronary artery bypass grafting in octogenerians within the first month of an acute coronary syndrome.

Materials and Method: This study enrolled 94 octogenerian patients who underwent early coronary artery bypass grafting after acute coronary syndrome between March 2005 and May 2015. The pre-operative and post-operative variables were assesed retrospectively.

Results: Mean age of the patients was 81.8±2.39 years; 53 patients (56.3%) were men and 41 (43.7%) were women. In-hospital mortality rate was 14.8% (14 patients). The factors related with mortality were pre-operative chronic obstructive pulmonary disease (p=0.009); elevated creatinine levels (p=0.004); decreased left ventricular ejection fraction (p=0.045) and use intra-aortic ballon pump support (p<0.001), as well as prolonged post-operative intensive care unit stay (p=0.010). The independent predictors of mortality were pre-operative elevated creatinine level and chronic obstructive pulmonary disease.

Conclusion: Although the mortality rate of coronary artery bypass grafting in octogenerians was higher than that of a younger population, it can be reduced if pre-operative kidney dysfunction and chronic obstructive pulmonary disease are treated with appropriate medications.

Key Words: Aged; Coronary artery bypass; Octogenerians; Mortality

ARAŞTIRMA

OKTOGENERYANLARDA AKUT KORONER SENDROM SONRASI YAPILAN KORONER ARTER BAYPAS CERRAHİSİ MORTALİTE PREDİKTÖR ANALİZİ

Öz

Giriş: Koroner arter baypas greftleme (CABG) operasyonları, ileri yaş grubu hasta grubunda gittikçe artan sıklıkta yapılmaktadır. Bu çalışmada akut koroner sendrom sonrası CABG uygulanan 80 yaş ve üstü hasta grubunda mortalite prediktörlerinin analiz edilmesi amaçlanmıştır.

Gereç ve Yöntem: Kliniğimizde Mart 2005 ile Mayıs 2015 tarihleri arasında CABG uygulanan 94 hasta çalışmaya dahil edildi. Hastaların preoperatif ve postoperatif verileri retrospektif olarak incelendi.

Bulgular: Hastaların ortalama yaşı 81.8±2.39 idi. Elli üç (% 56.3) hasta erkek, 41 (%43,7) hasta ise kadındı. Hastane içi mortalite % 14.8 (14 hasta) olarak gerçekleşti. Preoperatif Kronik Obstruktif Akciğer Hastalığı (KOAH) olanlarda (p=0.009), kreatinin yüksekliği olanlarda (p=0.004), düşük sol ventrikül ejeksiyon fraksiyonu olanlarda (p=0.045), yoğun bakım kalış süreleri uzun olanlarda (p= 0.010) ve İntraaortik Balon Pompası (İABP) ihtiyacı olanlarda (p=0.000) mortalite daha yüksek bulundu. Ayrıca, preoperatif yüksek kreatinin değerleri ve KOAH varlığı postoperatif mortalite için bağımsız prediktörler olarak bulunmuştur.

Sonuç: Oktogeneryanlarda CABG sonrası mortalite gençlere oranla daha yüksek bulunmasına rağmen preoperatif dönemde böbrek fonksiyon bozukluğu ve KOAH'ın uygun medikasyonlarla tedavi edilmesi ile mortalite oranları daha da düşürülebilir.

Anahtar Sözcükler: Yaşlı; Koroner arter baypas; Oktogeneryanlar; Mortalite

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INTRODUCTION

Coronary artery bypass grafting (CABG) is usually avoided in the elderly population because of the increased morbidity and mortality in this age group. The main factors influencing this decision of avoiding CABG are low life expectancy and intolerance to cardiopulmonary bypass (CPB), which is an important component of the operation. Furthermore, most of these patients have multiple comorbidities, such as diabetes mellitus, renal failure and neurologic disorders (1). Compared with younger patients, older patients may be overwhelmed by the detrimential effects of surgery and post-operative intensive care unit (ICU) stay. Despite this fact, the most appropriate clinical management for this subset of patients has never been determined and is left mainly to the physicians' clinical discretion. In this study, we aimed to investigate the main factors affecting mortality and morbidity of octogenerian patients who underwent early CABG within the first month after an event of acute coronary syndrome.

MATERIALS AND METHODS

The local ethics committee approval was obtained for this study.

Patient profile

Ninety-four octogenerian patients who underwent CABG within 30 days after an event of acute coronary syndrome between March 2005 and May 2015 were retrospectively enrolled. Patients who needed additional surgical procedures other than coronary bypass were excluded. The following variables were recorded: 1) pre-operative data, including age, gender, diabetes mellitus, left ventricular ejection fraction (LVEF), hypertension, chronic obstructive pulmonary disease (COPD; defined as FEV1/FVC<70% and/or FVC<80% and FEV1/FVC>70%), hyperlipidaemia, obesity, heredity, active smoking, elevated creatinine level (>1.3 mg/dl), carotid artery stenosis, history of cerebrovascular disease and emergent surgery; 2) peri-operative data, including off-pump or on-pump revascularisation, cross clamp time, CPB time, number of revascularised vessels, need for inotropic support and intra-aortic ballon pump (IABP) support; and 3) post-operative data, including mortality, duration of ICU stay and duration of hospital stay.

Surgical technique

All patients were operated via median sternotomy incision. In all patients, the left internal mammary artery was anastamosed with the left anterior descending artery, whereas the great saphenous vein was anastamosed with the rest of the coronary vessels. There were 84 (89.3%) patients who were operated under CPB with mild hypothermia (32 °C). Cardiac arrest was achieved by antegrade cardioplegia. All patients were operated with single cross clamp technique. Off-pump CABG was used for 10 (10.6%) patients. Patients were divided into group 1 (survivors) and group 2 (non-survivors).

Statistical analysis

Statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA). Comparisons of categorical variables were analysed by the $\chi 2$ test. The Fisher exact test was used if the expected frequency in a contingency table was<5. Independent samples t-test was used to assess differences in continuous variables between groups 1 and 2. Variables associated with post-operative mortality at a P value of<0.05 in the univariate analysis were included in the multivariate logistic regression analysis to determine the independent predictors of mortality after CABG.

RESULTS

The mean age of the patients was 81.8±2.39 years; 53 patients (56.3%) were men and 41 (43.7%) patients were women. The CABG utilised a single vessel in 8 (8.5%) patients, two vessels in 20 (21.2%) patients, three vessels in 41 (43.6%) patients, four vessels in 19 (20.2%) patients and five vessels in 6 (6.3%) patients. The rest of the pre-operative demographic data are

listed in Table 1. Operative and post-operative data are shown in Table 2.In-hospital mortality was observed in 14 (14.8%) patients because of ventilator-associated pneumonia related with prolonged intubation (n=5), renal insufficiency (n=5) and low cardiac output syndrome (n=4).

Table 1. Pre-operative demographic data of the study population

Characteristics	value
Age (years±sd)	81.8 ±2.39
Gender (male) n(%)	53 (56.3%)
Diabetes mellitus n(%)	40 (42.5%)
COPD n(%)	50 (53.1%)
Hyperlipidemia n(%)	44 (46.8%)
Obesity n(%)	16 (17%)
Heredity n(%)	11 (11.7%)
Active smoking n(%)	52 (55.3%)
Elevated creatinine (≥1.3 mg/dl) n(%)	16 (17%)
Carotid artery stenosis n(%)	12 (12.7%)
LVEF (%)	43.5±10.1
Emergent surgery n(%)	7 (7.4%)
Cerebrovascular disease n(%)	8 (8.5%)

COPD: chronic obstructive pulmonary disease, LVEF: left ventricular ejection fraction

Table 2. Operative and post-operative data of the study population

CABG × 1	8 (8.5%)
CABG × 2	20 (21.2%)
CABG × 3	41 (43.6%)
CABG × 4	19 (20.2%)
CABG × 5	6 (6.3%)
Number of bypass vessels	2.9±1
On-pump (n)	84 (89.3%)
Off-pump (n)	10 (10.6%)
CPB time (n=84) (minutes)	102.8±41.1
Cross clamp time (n=84) (minutes)	73.6±33
ICU stay (days)	6.9±9.7
Inotropic support	85 (94.2%)
IABP support	30 (31.9%)
Hospital stay (days)	12.6±9.7

Data are presented as n (%) or mean±sd.
CABG: coronary artery bypass grafting, CPB: cardiopulmonary bypass, IABP: intra-aortic baloon pump, ICU: intensive care unit

Analyses of pre-operative data revealed statistically significant differences between the two groups in terms of COPD (p=0.009), low LVEF (p=0.045) and elevated creatinine levels (p=0.004) in the pre-operative period. No differences were detected between the groups in terms of number of vessels anastomosed, total CPB time and cross clamp time. Compared with group 1, group 2 had significantly longer duration of ICU stay (p=0.010) and more need of IABP support (p<0.001) (Table 3).

DISCUSSION

The mortality rate of CABG has been reported to be higher in octogenerians than in younger populations (2). In particular, post-operative 30-day mortality rates after elective CABG in various age groups were 0.5% for patients younger than 50 years, 0.7% for patients 50–59 years old, 1.3% for patients 60–69 years old, 2.9% for patients 70–79 years old and 5.3% for octogenerians (3). In this



Table 3. Survivors vs. Non-survivors

Pre-operative characteristics	Survivors		Non-survivors		p
	Mean	n (%)	Mean	n (%)	
Age, years	81.77±2.17		82.21±3.46		0.515[t]
Male sex		46(57.5%)		7(50%)	0.602[*]
Diabetes mellitus		31(38.75%)		9(64.28%)	0.075[*]
Hypertension		48 (60%)		9(64.28%)	0.762[*]
COPD		38(47.5%)		12(85.71%)	0.009[i]
Hyperlipidemia		34(42.5%)		10(71.42%)	0.079[i]
Obesity		13(16.25%)		2(21.42%)	0.634[*]
Family history		9(11.25%)		2(14.28%)	0.744[*]
Active smoking		45(56.25%)		7(50%)	0.664[*]
Creatinine level	1.1±0.35		1.4±0.42		0.004[t]
Carotid artery stenosis		9(11.25%)		3(21.42%)	0.379[i]
Pre-operative LVEF %	44.47±10.45		38.57±6.62		0.045[t]
Emergent surgery		6(7.5%)		1(7.14%)	1.000[i]
Pre-operative CVA		7(8.75%)		1(7.14%)	1.000[i]
Operative characteristics					
Number of vessels bypassed	2.95±0.96		2.92±1.26		0.942[t]
CPB time (n=84)	100.63±37.1		116.25±59.9		0.225[t]
On-pump CABG		72(90%)		12(85.71%)	0.641[i]
Off-pump CABG		8(10%)		2(14.28%)	
Cross clamp time (n=84)	72.26±30.44		81.83±46.72		0.357[t]
Post-operative characteristics					
ICU stay, days	5.8±8.02		13.07±15.42		0.010[t]
Inotropic support		71(88.75%)		14(100%)	0.347[i]
IABP support		18(22.5%)		12(85.71%)	0.000[i]
Hospital stay, days	12.1±8.16		15.50±16.13		0.231[t]

Data are presented as n (%) or mean±SD.

[*]: $\chi 2$ test

[i]: Fisher exact test

[t]: Independent samples t test

CABG: coronary artery bypass grafting, COPD: chronic obstructive pulmonary disease, CPB: cardiopulmonary bypass, CVA: cerebro vascular attack, IABP: intra-aortic baloon pump, ICU: intensive care unit, LVEF: left ventricule ejection fraction.

study on early CABG for octogenerians, the in-hospital mortality rate was 14.8%. The presence of COPD, low LVEF and elevated creatinine level in the pre-operative period were found as predictors of mortality. We considered that the high mortality rate of our study population might have been related with the performance of early CABG after an acute coronary syndrome.

Since the 1980's, the number of cardiac surgical procedures performed on octogenerians had been increasing. An increase in the number of elderly population in Western countries was reported to cause the increase in the number of these patients that are suitable for surgical procedures (4). In addition, the superiority of revascularisation over optimal medical treatment has been shown in patients 75 years or older (5,6). As a result of the recent improvements in surgical techniques, myocardial preservation, extracorporeal perfusion techniques and post-operative care, octogenerians can now undergo operations more safely (7,8). Off-pump CABG is known to be less invasive and has lower mortality and post-operative complication rates than on-pump CABG (9). However, a multi-centre study on 1993 elderly patients showed no difference between on-pump and off-pump CABG patients (10). Similarly, we did not find any statistically significant difference in mortality between off-pump and on-pump CABG patients.

Ozen et al stated that prolonged CBP was an independent risk factor for post-operative mortality in 101 octogenerian patients who underwent CABG and additional procedures (11). In addition, they found that post-operative mortality was associated with emergent surgery, but not with pre-operative variables. On the contrary, our results revealed that post-operative mortality was independently predicted by the presence of elevated creatinine level and COPD in the pre-operative period, but was not related with the duration of CPB. The difference between this present study and that by Ozen et al might be related with the prolonged CPB time due to additional surgical procedures performed on the latter's study population. On the other hand, these two studies had similar results on prolonged ICU stay in the mortality group or non-survivors Ozen et al. found that ICU stay time was longer in the mortality group. Similarly ICU stay time was longer in the non survivors in our study (13.07±15.42 days). Scandroglio et al reported that the mortality rate among 260 octogenerian patients who underwent major cardiac surgical procedures (CABG, mitral valve surgery, aortic valve surgery and ascending aorta surgery) was higher when surgery was unplanned (14%) compared to when surgery was planned (3.8%) (12). In addition, similar to our study, their results showed that pre-operative COPD was an independent risk factor for predicting post-operative mortality. Studies by Peterson et al, Likosky et al and Alexander et al showed that mortality rates after CABG in octogenerians were ranged from 7.7% to 11.5% (13-15). The mortality rate of our study population was higher than the mortality rates of these three large-scale studies. An acute coronary syndrome event preceding CABG might account for this relatively higher mortality rate in our study.

The relatively small number of patients and the single-centre, retrospective design were the limitations of our study. Nevertheless, in this study population that comprised octogenerians, mortality rate from CABG after an acute coronary event was acceptable. This post-operative mortality risk can be further decreased by appropriate pre-operative treatment of underlying COPD and renal insufficiency such as breathing exercizes and avoiding from nephrotoxic agents.



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RESEARCH

PREVALENCE OF SKIN DISEASES AMONG ELDERLY RESIDING IN NURSING HOMES IN MUGLA

Abstract

Introduction: Birth rates are not only declining worldwide but people are also living longer. Despite the growing elderly population, there are limited numbers of studies on this population residing in nursing homes. We aimed to determine the prevalence of skin diseases in elderly residing in nursing homes in Southwest Anatolia, and to contribute to the development of preventive healthcare for these diseases.

Materials and Method: We conducted a cross-sectional trial in two nursing homes located in the central province of Mugla. A questionnaire, including questions on sociodemographic characteristics, diagnosis of any dermatological diseases, and clinical history, was administered to the elderly patients.

Results: Of the 105 elderly patients, 64 (61.0%) were males and 41 (39.0%) were females. Lentigo was identified as the most common skin disease (90.5%). Xerosis (78.1%), senile angioma (61.0%), and tinea unguium (59.0%) was followed lentigo respectively. Five (4.8%) elderly patients had decubitus ulcers. A significant difference was detected in the occurrence of tinea pedis, and decubitus ulcers (p=0.032 and p=0.000, respectively) in these patients compared with ambulatory patients.

Conclusion: This study is thought to be among the pioneer researches evaluating the prevalence of skin diseases in the elderly patients residing in nursing homes in Southwest Anatolia. The information obtained should contribute to epidemiological data to determine the prevalence of skin diseases observed in the elderly population in nursing homes in this area. This knowledge may lead to the improvement of measures for preventing skin diseases in these patients.

Key Words: Aged; Skin diseases; Nursing homes; Preventive medicine; Lentigo

ARAŞTIRMA

MUĞLA'DA HUZUREVLERİNDE İKAMET EDEN YAŞLILARDA DERİ HASTALIKLARININ PREVALANSI

Öz

Giriş: Tüm dünyada doğum hızları azalmakta, insanlar daha uzun yaşamakta ve yaşlı nüfus giderek artış göstermektedir. Artan yaşlı nüfusa rağmen huzurevlerinde yapılan çalışmalar sınırlıdır. Çalışmamız ile Güneybatı Anadolu'da huzurevlerinde görülen deri hastalıklarının prevalansını belirlemek ve bu hastalıklara yönelik koruyucu sağlık hizmetlerinin geliştirilmesine katkı sağlamak amaçlanmıştır.

Gereç ve Yöntem: Muğla il merkezinde bulunan kamuya ait iki huzurevinde, kesitsel nitelikte bir çalışma yapıldı. Tüm yaşlılara sosyodemografik, dermatolojik hastalıkların tanısı, özgeçmişleri ile ilgili değişkenleri içeren bir form uygulandı.

Bulgular: Çalışmaya katılan yaşlıların 64'ü (%61.0) erkekti, 41'i (%39.0) kadındı. Yaşlılarda en sık %90.5 ile lentigo görüldü. Bunu sırasıyla kserozis (%78.1), senil anjiom (%61.0), tinea unguium (%59.0) izledi. Yaşlıların 5'inde (%4.8) dekübit ülseri gözlendi. Yatağa bağımlı hastalarda yatağa bağımlı olmayan hastalara göre tinea pedis ve dekubit ülserinde anlamlı farklılık saptandı (sırasıyla p=0.032, p=0.000).

Sonuç: Araştırmanın Güneybatı Anadolu'da huzurevlerinde ikamet eden yaşlılardaki deri hastalıklarının prevalansını değerlendiren öncü çalışmalar olduğu düşünülmektedir. Bu çalışma ile bu bölgede huzurevindeki yaşlı nüfusta gözlenen deri hastalıklarının sıklığının saptanması ile epidemiyolojik verilere katkıda bulunulması ve bu hastalıklara yönelik koruyucu önlemlerin geliştirilmesi önerilmiştir.

Anahtar Sözcükler: Yaşlı; Deri hastalıkları; Huzurevleri; Koruyucu tıp; Lentigo

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INTRODUCTION

Birth rates are not only declining worldwide but people are also living longer. According to the World Health Organization, the elderly population is expected to increase from 11% to 22% between the years 2000 and 2050. Furthermore, the population of people over the age of 60 years is expected to increase from 605 million to 2 billion (1). The elderly Turkish population was 6,192,962 in 2014 and represented 8% of the total population (2).

Because both systemic and skin diseases are more prevalent in the elderly, these patients represent a special group in dermatology (3). Despite the growing elderly population, there are limited numbers of studies on this population, particularly on those residing in nursing homes. Currently, majority of the studies conducted on elderly patients residing in nursing homes in Turkey are usually related to socio-demographic characteristics and quality of life (4-6). Studies conducted on the prevalence of skin diseases in elderly patients residing in nursing homes are scarce (7-11), and mostly related to the frequency of dermatophyte infections (12, 13).

Mugla is a province in the southwest of Turkey situated between 36° 17'–37° 33' N latitude and 27° 13'–29° 46' E longitude (14). The aims of this study were to determine the prevalence of skin diseases in elderly patients residing in nursing homes in Southwest Anatolia and to contribute to the development of preventive healthcare for these diseases.

MATERIALS AND METHOD

This was a cross-sectional trial, conducted in two nursing homes located in the central province of Mugla. One hundred thirteen elderly were residing in nursing homes. One of them was transferred to another nursing home in different province, and another one did not want to participate in the study. Six of the elderly were not accessible because of their permissions. Therefore, 105 of the elderly were enrolled into the study. A questionnaire, including questions on sociodemographic characteristics, diagnosis of any dermatological diseases, and clinical history, was administered to the elderly patients. This form was developed using available relevant literature. The form was completed during face-to-face interviews between the clinical staff and elderly patients. The medical and nursing staff assisted us in completing the questionnaires for elderly patients with psychiatric and neurological disorders. Two dermatology specialists visited the nursing homes to examine the elderly patients. Skin diseases were diagnosed and classified. No invasive procedures were used on the elderly patients.

The study was performed over 1 month. The elderly patients were examined with the naked eye in a well-lit environment. Permission was obtained from the relevant government agencies. The ethics committee approval was obtained for this study.

Evaluation of data

SPSS for Windows 20 statistical program was used to create the database and for statistical analysis. The Pearson Chi-square and Fisher's Exact Test were used to assess statistical significance. $p<0.05$ was the accepted limit for significance.

RESULTS

Details of the elderly patients enrolled in the study are summarized in Table 1. Of the 105 elderly patients, 64 (61.0%) were male and 41 (39.0%) were female. Twenty-two (21.0%) were literate and 21 (20.0%) were illiterate. Of them, 48 (45.7%) had completed first-secondary education, 10 (9.5%) had completed high school, and only 4 (3.8%) had completed college/university. Eighteen (17.1%) elderly patients were married and 87 (82.9%) were unmarried (Table 1).

Table 1. Socio-demographic characteristics of elderly staying in nursing homes

Characteristics	n	%
Gender		
Female	41	39.0
Male	64	61.0
Age (year)		
60-79	54	51.4
≥80	51	48.6
Education status		
Illiterate	21	20.0
First-secondary education	48	45.7
High school	10	9.5
College	4	3.8
Literate	22	21.0
Marital status		
Marriage	18	17.1
Not marriage	87	82.9
Child status		
Not have child	25	23.8
Have child	80	76.2
Smoking habits		
Smoke	22	21.0
Not smoke	83	79.0
Alcohol consumption		
Use	4	3.8
Not use	101	96.2
Duration of residencies		
<2 years	51	48.6
≥ 2 years	54	51.4
Fee payment status		
Pay	61	58.1
Not pay	44	41.9

Evaluation of the residential history of the participants showed that 51 (48.6%) had stayed in nursing homes for less than 2 years, whereas 54 (51.4%) had stayed for≥2 years. Sixty-one (58.1%) elderly patients were paying residential fees. With respect to children, 80 (76.2%) elderly patients had at least one child. Results from questions concerning the details of their habits were as follows: 22 (21.0%) elderly patients smoked and 83 (79.0%) did not smoke and 4 (3.8%) consumed alcohol and 101 (96.2%) did not consume alcohol (Table 1).

The results of examinations for skin diseases are summarized in Table 2. Examinations for skin diseases produced the following results: 45 (42.9%) elderly patients had tinea pedis, 2 (1.9%) had tinea manuum, 62 (59.0%) had tinea unguium, 17 (16.2%) had atopic dermatitis, 4 (3.8%) had contact dermatitis, 3 (2.9%) had lichen simplex chronicus, 42 (40%) had seborrheic dermatitis, 10 (9.5%) had stasis dermatitis, 82 (78.1%) had xerosis, 20 (19.0%) had pruritus, 60 (57.1%) had seborrheic keratosis, 45 (42.9%) had actinic keratoses, 2 (1.9%) had basal cell carcinoma, 17 (16.2%) had nail disorders [onikogrifoz in 8 (7.6%), 1 (1.0%), nail pliers, and nail dystrophy in 8 (7.6%)], 18 (17.1%) had callus, 5 (4.8%) had decubitus ulcer, 28 (26.7%) had senile purpura, 3 (2.9%) had vitiligo, 95 (90.5%) had lentigo, 1 (1.0%) had miliary, 56 (53.3%) had dermatoheliosis, 6 (5.7%) had poikiloderma, 64 (61.0%) had senile angioma, 41 (39.0%) had fibroepithelial polyps, 1 (1.0%) had corn cutaneum, 10 (9.5%) had acne rosacea, 8 (7.6%) had senile comedones, 2 (1.9%) had lipoma, 2 (1.9%) had sebaceous hyperplasia, 1 (1.0%) had mily, and 1 (1.0%) had macular amyloidosis (Table 2).

With respect to systemic diseases, 59 (56.2%) elderly patients suffered from hypertension, 16 (15.2%) had diabetes mellitus, 16 (15.2%) had suffered a stroke, 14 (13.3%) had lung disease, 11 (10.5%) had coronary artery disease, 9 (8.6%) had dementia, 6 (5.7%) had Alzheimer's disease, 4 (3.8%) had some deafness, 3 (2.9%) had Parkinson's disease, and 5 (4.8%) had other diseases. Among the 105 participants, 26 (24.8%) had a previous history of skin diseases. Of these, 14 (13.5%) had atopic dermatitis, 8 (7.7%) had rosacea, 2 (1.9%) had vitiligo, and 1 (1.0%) had basal cell carcinoma, and 1 (1.0%) had seborrheic dermatitis of the elderly.

Table 2. Skin diseases in nursing homes

Diagnosis	n=105	%
Fungal infections		
Tinea unguium	62	59.0
Tinea pedis	45	42.9
Tinea manuum	2	1.9
Dermatitis		
Atopic dermatitis	17	16.2
Contact dermatitis	4	3.8
Lichen simplex chronicus	3	2.9
Seborrheic dermatitis	42	40.0
Stasis dermatitis	10	9.5
Xerosis	82	78.1
Pruritus	20	19.0
Skin tumors		
Skin tags	41	39.0
Seborrheic keratosis	60	57.1
Actinic keratosis	45	42.9
Basal cell carsinoma	2	1.9
Nail disorders	17	16.2
Disorders due to physical factors		
Callus	18	17.1
Pressure sores	5	4.8
Skin changes due to ultraviolet radiation		
Senile purpura	28	26.7
Dermatoheliosis	56	53.3
Civatte poikiloderma	6	5.7
Senile comedone	8	7.6
Pigmentary disorders		
Vitiligo	3	2.9
Lentigo	95	90.5
Others		
Miliaria	1	1.0
Senile angioma	64	61.0
Corn cutaneum	1	1.0
Acne rosacea	10	9.5
Lipom	2	1.9
Sebase hyperplasia	2	1.9
Milium	1	1.0
Macular amiloidosis	1	1.0

Twenty-two (21.0%) elderly patients were bed-ridden. A significant difference was detected in the occurrence of tinea pedis and decubitus ulcers (p=0.032 and p=0.000, respectively) in these patients compared with ambulatory patients.

No significant differences were detected in the occurrence of xerosis and tinea unguium (p>0.05) between these two sets of patients.

Tinea unguium was observed in 17 (41.5%) female and 45 (70.3%) male patients, whereas 28 (68.3%) female and 28 (43.8%) male patients had dermatoheliosis. Forty-one (100%) female and 54 (84.4%) male patients had lentigo.

The prevalences of tinea unguium, dermatoheliosis, and lentigo were higher in males (p=0.004, p=0.017, and p=0.006 respectively).

In terms of age, there was significant differences between the early (60- 79 years old) and advanced geriatric (≥80 years) age groups in the prevalences of seborrheic keratosis, senile purpura, dermatoheliosis (p=0.010, p=0.000, and p=0.031 respectively).

There was no significant correlation between the observed diseases and the alcohol consumption and smoking habits, educational status, and the duration of residencies.

DISCUSSION

Aging is a physiological process during which many changes occur in the structure and function of the skin. Thinning of the skin, increased dryness and roughness, appearance of wrinkles, decreased skin elasticity, and increased incidence of benign or malignant formations are considered to be part of the natural aging process. The cell renewal rate also decreases in older skin (15).

Lentigo was identified as the most common skin disease in our study, with almost 90.5% of the elderly patients suffering from it. This is in contrast to a previous study that reported the frequency of lentigo to be only 0.8% in elderly patients residing in nursing homes (9). A reason for the high frequency of lentigo in the current study is that majority of the elderly population had type 2 skin colour. Their livelihood were tobacco during youth and also their swimming habits because of the province's situation.

Xerosis (78.1%) was the second most common skin disease in our study. According to the literature, the frequency of xerosis ranges from 1.5% to 58.3% (7,9,11,16) (Table 3). The frequency of xerosis was higher in the elderly patients residing in nursing home in our study than in those reported previously. Possible explanations for this difference could be linked to the bathroom habits of the elderly patients and the prevailing climatic conditions.

Table 3. Comparison of skin diseases in nursing homes in USA, Southern Taiwan, Central Japan, Hong Kong, Australia and Turkey

Authors	Country	Fungal infections (n/%)	Dermatitis (n/%)	Xerosis (n/%)	Pressure sores (n/%)	Skin cancers (n/%)	Lentigo (n/%)
Norman[16]	USA	151/9.7	569/36.6	772/49.6	-/-	353/22.7	-/-
Smith et al.[7]	Southern Taiwan	245/61.6	29/7.3	232/58.3	7/1.8	1/0.3	-/-
Smith et al.[11]	Central Japan	6/4.4	2/1.5	2/1.5	1/0.7	-/-	-/-
Chan[9]	Hong Kong	42/16.4	51/19.7	47/18.3	8/3.1	2/0.8	2/0.8
Smith et al.[10]	Australia	87/24.2	32/8.9	106/29.5	-/-	14/4.9	-/-
Kilic et al[13]	Turkey	217/49.7	33/11	136/45.3	3/0.7	-/-	-/-
Our study	Turkey	72/68.5	60/57.1	82/78.1	5/4.8	2/1.9	95/90.5



Senile angioma 64 (61.0%) was the third most common skin disease that was observed in the elderly patients in our study. The frequency of senile angioma was 20.3% in Kiliç et al.'s study conducted in Turkey and 47.2% in Tseng's study conducted in Southern Taiwan (8,13).

The frequency of tinea pedis found in the present study was similar to that reported in other studies (7,8). The main difference was the more frequent occurrence of tinea unguium in males in our study than that reported in a study conducted in Australia. The frequency of tinea pedis was 42.9% and was similar to that reported in a study conducted in Taiwan (7,8). It was, however, higher that results from studies conducted in Hong Kong (9), Australia (10), and Japan (11).

There was also a significant difference in the occurrence of tinea pedis between bedridden and non-bedridden patients (p=0.032). This was in agreement with the results of the study conducted by Smith et al. who detected an 18-fold increased risk of tinea unguium in the elderly population (10).

Seborrheic keratosis (57.1%) was the fifth most common skin disease in our study. According to the literature the frequency of seborrheic keratosis ranges from 0.7% to 99.4% (8,9,11,13).

Pruritus was identified in approximately one quarter of the elderly patients (19.0%) in our study; a frequency that was higher than the results of a study conducted in Taiwan. The frequency of pruritus was higher in the elderly patients residing in nursing home in our study than a study performed in Turkey (13).

The frequency of contact dermatitis was 3.8% in our study, a result similar to that of a study performed in Hong Kong (9).

Pressure ulcers was observed 4.8% in our study. Here a significant difference was observed in the occurrence of decubitus ulcers between the bedridden and non-bedridden elderly patients (p=0.000). Twenty-two (21.0%) elderly patients were bedridden, of which approximately 25% suffered from decubitus ulcers. Our results contrast with the frequencies of 1.8% and 0.7% observed in studies conducted in Taiwan and Japan, respectively (7,11).

Basal cell carcinoma was observed in only two elderly (1.9%) patients, and its frequency was lower than that reported in a study conducted in Australia (10). The risk of basal cell carcinoma is increasing in the Mugla province where exposure to strong sunlight occurs during a large part of the year.

This study is only the second study to evaluate the prevalence of skin diseases in the elderly patients residing in nursing homes in Turkey. It is the first study evaluating the prevalence of skin diseases in the elderly patients residing in nursing homes in Southwest Anatolia. The information obtained should contribute to epidemiological data to determine the prevalence of skin diseases observed in the elderly population in nursing homes in this area. This knowledge may lead to the improvement of measures for preventing skin diseases in these patients.

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RESEARCH

VALIDITY AND RELIABILITY OF THE "PERCEPTIONS OF RESTRAINT USE QUESTIONNAIRE" FOR USE IN TURKEY

Abstract

Introduction: The purpose of this study was to test the reliability and validity of the Perceptions of Restraint Use Questionnaire, which assesses nurses' perceptions about the use of physical restraints when caring for older patients.

Materials and Method: Ninety-five nurses working in a university hospital in Adıyaman were involved in this methodological study. Questionnaire translation, content validity, internal consistency, and total item score correlation were conducted for validity and reliability purposes.

Results: Six instructors assessed the Questionnaire for the validity analysis. After the pilot study, final revisions were made based on the instructors' suggestions. The Questionnaire item total score correlation reliability coefficients were found to range between r=0.26 and 0.81. The Questionnaire internal consistency analysis revealed a Cronbach's alpha reliability coefficient of α=0.93. An analysis of test-retest time invariance revealed no differences between the two test administrations (p>0.05).

Conclusion: The Turkish version of the Questionnaire was found to have acceptable psychometric features and was adequately adapted to the cultural context of this country. It could be a useful tool for the assessment of situations when nurses feel the use of physical restraints is necessary.

Key Words: Physical Restraint; Aged; Nurse; Reliability and validity

ARAŞTIRMA

TESPİT KULLANIMI ALGI ANKETİ"NİN TÜRKİYE'DE KULLANIMI İÇİN GEÇERLİK VE GÜVENİRLİĞİ

Öz

Amaç: Bu çalışmanın amacı hemşirelerin yaşlı hastalarda fiziksel tespit kullanımı konusundaki algılarını ölçen Tespit Kullanımı Algı Anketi'nin (PRUQ-T) geçerlilik ve güvenirliğini test etmektir.

Gereç Yöntem: Metodolojik türde yapılan çalışmaya Adıyaman'da bulunan bir üniversite hastanesinin servislerinde çalışan 95 hemşire alındı. Ölçeğin geçerliğine ilişkin çeviri ve kapsam geçerliği çalışmaları yapılırken güvenirliğine yönelik iç tutarlık ve madde toplam puan korelasyonlarına yapıldı.

Bulgular: Ölçeğin geçerliğini değerlendirmede altı öğretim üyesinin görüşü alındı ve öneriler doğrultusunda hazırlanan ölçeğe pilot uygulama sonrası son şekli verildi. Ölçeğin maddelerinin madde toplam puan korelasyon güvenirlik katsayıları r=0.26 - 0.81 arasında saptandı. Ölçeğin iç tutarlık analizinde Cronbach alfa güvenirlik katsayısı α=0.93 olarak bulundu. Ölçeğin zamana göre değişmezliği test-tekrar test analizi ile incelendiğinde her iki uygulama arasında fark olmadığı saptandı (p>0.05).

Sonuç: Tespit Kullanımı Algı Anketi'nin Türkçe formunun psikometrik özelliklerinin iyi düzeyde olduğu ve bu ülkenin kültürel durumuna uygun olduğu saptanmıştır. Hemşirelerin fiziksel tespit kullanımını en gerekli bulduğu durumları değerlendirebilmeleri açısından faydalı bir araç olduğu düşünülmektedir.

Anahtar Sözcükler: Fiziksel tespit; Yaşlı; Hemşire; Geçerlik ve güvenirlik

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INTRODUCTION

One of the main nurse care responsibilities is to prevent patients and relatives from harming themselves and others (1). Therefore, nurses may need to use physical restraints to protect patients and other people. Restraint practice refers to the use of physical, mechanical or chemical agents to limit movements in one part of the body to prevent patients harming themselves or others (2–6).

Patient restraints can be either physical or chemical. Physical restraints are defined as the limiting or prevention of patient movement using physical or mechanical devices on the body, or the use of bodily force for a short time by a health professional (7–9). Chemical restraints are defined as bringing freedom of action and behavior under control, using chemical means, in patients who are not receiving treatment for any mental disease symptoms (10,11).

As restraints limit movement, their use inevitably hinders the patients' autonomy-with the aim of preventing them from harming themselves or others. Besides the existing physiopathological problems, a majority of elderly people in nursing homes experience various changes in their cognitive levels and behavior, tend to adjust poorly to the care and treatment processes, and may harm themselves (1). Research has found that 80% of older patients in intensive care units have experienced various degrees of cognitive and behavioral agitation, and have harmed themselves by pulling out endotracheal tubes, tracheostomy tubes or removing dressings (12,13). In these cases, limiting movement through the use of restraints may become part of their care. Nurses are primarily responsible for patient care and safety; therefore, it is important to identify their perceptions about restraint use to raise awareness about this issue.

The main purpose of this study was to test the reliability and validity of the Perceptions of Restraint Use Questionnaire (PRUQ) in Turkish.

MATERIALS and METHOD

Study design and Subjects

This study was methodological in nature. It was conducted on nurses working in a university hospital in Adıyaman. Ninety-five nurses working in eight service areas were involved in the study, of which 78.9% were female. The average age was 30.62±6.34 (min 19, max 47), and average time working in their respective service areas was 3.08±3.27 years.

Study Sample

The study sample was made up of nurses working in the Internal Diseases, Reanimation, Palliative Care, Neurology, and Chest Diseases service areas of the Internal Diseases, Surgery, and Cardiology intensive care units at a university hospital in Adıyaman. The number of items in the questionnaire determined that five to ten times more participants should be involved. For this study, the participant number targeted was six times more than the number of items in the questionnaire (102 nurses). However, the study was completed by 95 nurses, all of whom had volunteered to participate. Thirty nurses were contacted for the test-retest.

Data Collection Tools

Data were collected using a PRUQ.

Personal Identification Form

The participants were asked seven questions about their demographic details and the services they worked in.

Perceptions of Restraint Use Questionnaire:

The "Perceptions of Restraint Use Questionnaire" was developed by Lois Evans and Neville Strumpf in 1993 and has 17 of the most-cited reasons for using restraints. These were assessed using a Likert scale, ranging from 1 (not important) to 5 (very important). To calculate the average (mean) score for the questionnaire, the value of each answer was summated (ranging from 17 to 85 points) and divided by 17. Higher values indicated that the situation described was considered an important justification for using physical restraints, and vice versa. No cut-off value has been indicated in any related literature (14,15).

Data Collection

Data collection forms, which were completed during available time, were administered to the nurses at the workplace. A test-retest was conducted on 30 nurses after a two-week interval. Form completion took about 15 minutes.



Table 1. PRUQ Expert Review Evaluations

Perceptions of Restraint Use Questionnaire	Mean	sd	Min	Max
1- Protecting an older person from:	3.50	0.55	3.00	4.00
a- Falling out of bed?	3.50	0.55	3.00	4.00
b- Falling out of a chair?	2.83	0.98	2.00	4.00
c- Unsafe ambulation?	3.00	0.89	2.00	4.00
2- Preventing an older person from wandering?	3.17	0.75	2.00	4.00
3- Preventing an older person from taking things from others?	3.83	0.41	3.00	4.00
4- Preventing an older person from getting into dangerous places or supplies?	3.33	0.82	2.00	4.00
5- Keeping a confused older person from bothering others?	3.83	0.41	3.00	4.00
6- Preventing an older person from:	3.83	0.41	3.00	4.00
a- Pulling out a catheter?	3.83	0.41	3.00	4.00
b- Pulling out a feeding tube?	3.83	0.41	3.00	4.00
c- Pulling out an IV?	3.83	0.41	3.00	4.00
d- Breaking open sutures?	3.33	0.82	2.00	4.00
e- Removing a dressing?	3.50	0.55	3.00	4.00
7- Providing quiet time or rest for an overactive older person?	3.17	1.33	1.00	4.00
8- Providing for safety when judgment is impaired?	4.00	0.00	4.00	4.00
9- Substituting for staff observation?	3.83	0.41	3.00	4.00

Data Analysis

Statistical analyses were performed using the SPSS 16 programming package. A content validity index based on expert reviews was utilized to assess the content validity of the questionnaire. Pearson's correlation analysis was used for item analysis, and internal consistency was tested using Cronbach's alpha reliability coefficient. The time invariance of the scale was tested using a t-test for dependent groups.

Ethical Considerations

Permission to use the PRUQ for Turkish validity and reliability purposes was obtained from Lois Evans and Neville Strumpf, its developer. Written permission was obtained from the Ethics Committee of the hospital at which the study was conducted (protocol no. 2016/3-19), and verbal informed consent was received from the participants after the purpose of the study was fully explained.

RESULTS

Validity Results

Analysis of Language Equivalence

The English version of the PRUQ was translated into Turkish by two project-unrelated individuals who were fluent in both Turkish and English. The questionnaire that had been translated into Turkish was reviewed by the researchers and a revised Turkish text was developed. This text was then back-translated into English by a Turkish instructor who taught English in the Department of Foreign Languages; she was informed about the study but was not given the original questionnaire. The original text and the back-translated form were compared, and any changes in meaning were evaluated, after which final revisions were made.

The Turkish questionnaire was sent to six instructors to be reviewed for appropriateness to Turkish culture, language equivalence, and content validity.

After revisions were made in line with their suggestions, the questionnaire was piloted with 10 nurses not involved in the study.

Analysis of Content Validity

The Content Validity Index (CVI) was used in the expert review evaluations (16–18). Accordingly, the instructors were asked to evaluate the items as 1=not appropriate, 2=somewhat appropriate (the item and the statement should be revised), 3=appropriate (minor changes needed), and 4=very appropriate. The CVI score was determined by dividing the number of experts who gave 3–4 points by the total number of experts altogether. Of all the questionnaire items, 88.5% were given 3–4 points. Table 1 shows the PRUQ Expert Review Evaluations.

Reliability Results

Item Analysis

The PRUQ Turkish adaptation included an evaluation of the item-total score correlations for reliability. As there were no items with item correlations below 0.20, the correlation reliability coefficients (Pearson's Product-Moment Correlation Coefficient) were between r=0.26 and 0.81. The relationship between the item scores and total scale scores was found to be positive and statistically significant (Table 2).

Table 2. PRUQ total score item correlations (n=120)

Perceptions of Restraint Use Questionnaire	r	p
1- Protecting an older person from:		
a- Falling out of bed?	0.74	0.001
b- Falling out of a chair?	0.81	0.001
c- Unsafe ambulation?	0.66	0.001
2- Preventing an older person from wandering?	0.26	0.011
3- Preventing an older person from taking things from others?	0.39	0.001
4- Preventing an older person from getting into dangerous places or supplies?	0.60	0.001
5- Keeping a confused older person from bothering others?	0.38	0.001
6- Preventing an older person from:		
a- Pulling out a catheter?	0.70	0.001
b- Pulling out a feeding tube?	0.70	0.001
c- Pulling out an IV?	0.56	0.001
d- Breaking open sutures?	0.61	0.001
e- Removing a dressing?	0.55	0.001
7- Providing quiet time or rest for an overactive older person?	0.42	0.001
8- Providing for safety when judgment is impaired?	0.65	0.001
9- Substituting for staff observation?	0.41	0.001
10- Protecting staff or other patients from physical abusiveness/combativeness?	0.58	0.001
11- Managing agitation?	0.46	0.001



PRUQ Internal Consistency Reliability Coefficient

The PRUQ internal consistency was evaluated using Cronbach's Alpha, which is an appropriate measure for Likert-type scales. Total item scale correlations were evaluated when all items were analyzed. The PRUQ total item correlations were found to range from 0.26 to 0.81; no items were excluded from the questionnaire. The Cronbach's Alpha Reliability Coefficient value analysis for the Questionnaire was 0.93. From this, the Turkish form of the 17 to item PRUQ was developed.

Comparison of Test-Retest Mean Scores for the PRUQ and the Correlations

Test-retest reliability is the power of an instrument to demonstrate consistent results from one administration to another, and to show time invariance. Correlations obtained from two questionnaire administrations are calculated to determine the test-retest reliability, which results in a retest reliability coefficient. Pearson's Product-Moment Correlation Coefficient and a t-test on dependent groups were used for the PRUQ test-retest measurements, which was administered to 30 people over a two-week interval (Table 3).

Table 3. Comparison of Test-Retest Mean Scores For The Questionnaire And Correlations (n=30)

Questionnaire	First Adminst. Mean±SD	Second Adminst. Mean ±S D	t	p	r	p
PRUQ	4.77±0.42	4.72±0.29	0.472	0.64	0.94	< 0.00

The PRUQ time invariance reliability analysis included a comparison of the mean scores obtained from the test-retest and a dependent group t-test; no statistically significant difference was found between the mean scores (see Table 3). The relationship between the scores obtained from the first and second administrations of the questionnaire was analyzed using Pearson's Correlation Analysis. The reliability coefficient between the two measurement scores over the two-week interval was found to display a very strong and statistically significant relationship, with an r=0.94 reliability coefficient (Table 3).

DISCUSSION

The PRUQ is used to assess the physical restraint use perceptions of nurses who provide care to older patients. This study tested the reliability and validity of the PRUQ, and it was found that the Turkish version of PRUQ had exceptional psychometric features.

As intercultural questionnaire adaptations require permission from the owners of the questionnaire, written permission was obtained through e-mail for this study. Furthermore, the translation of a questionnaire to another language may change its nature (18). To minimize these differences, questionnaire items should be examined carefully. Necessary transformations are made with a view to giving meaning to the target language, and the questionnaire standardized in line with the norms of the participants. Back-translation is the most commonly used method to enhance cultural equivalence in an original questionnaire in the target language (18). Back-translation was performed in this study with a view to enhancing cultural equivalence.

Content validity is used to evaluate whether the questionnaire and each item in it measures the correct concepts. This method requires a group of experts which can range from 3 to 20 (18–20). In line with the related literature, this study sought advice from six experts in the field. Scores obtained from the expert reviews (1 to 4) were evaluated using the CVI. Eighty-eight point five percent of the questionnaire items received 3–4 points, indicating that there was a consensus between the experts, so the questionnaire was deemed to be culturally appropriate.

Item total score analysis, which gives information about the reliability of each item, is one of the methods used to assess internal consistency in terms of the reliability of the questionnaire adaptation. If the items in a scale are equally-weighted and independent, high correlation coefficients are expected between each item and the total score. Although there is no standard cut-off point that indicates sufficient reliability, it has been reported to be over 0.50 by Karasar (20), over 0.30 by Öner (21), and over 0.25 by Akgül and Çevik (22) and Gözüm and Aksayan (17).

Item total score correlations for the PRUQ reliability in this study showed that the correlation reliability coefficient (Pearson's Product-Moment Correlation Coefficient) was between r=0.26 and 0.81 and the relationship between the item scores and the total scale scores were found to be positive and statistically significant. This result indicated that all items contributed to the questionnaire's total score, had good distinguishing features, and were reliable (14-15).

Each item on a scale needs to have a consistent internal reliability. The most appropriate method to assess this is Cronbach's alpha reliability coefficient, which has been frequently used to assess the internal consistency of Likert-type scales (18–20). The higher the alpha coefficient of the scale is, the more consistent the items in the scale are with each other; i.e., it is assumed the items predict components of the same feature (16, 17). The alpha coefficient, which is calculated by averaging the coefficients that result from all variances to the general variances and which ranges from 0 to 1, examines whether the questions in the scale have the integrity to explain a homogenous structure (16). A Cronbach's alpha coefficient between 0.60 and 0.80 indicates a very reliable scale and a Cronbach's alpha coefficient between 0.80 and 1.00 (23) is considered highly reliable.

The Cronbach's alpha reliability coefficient for the Turkish PRUQ was 0.93, indicating that the questionnaire items in this study were internally consistent and clearly tested physical restraint use perceptions; therefore, it was found to be a reliable scale. Although the number of studies that have used this scale has been quite limited, the Cronbach's Alpha value in the Spanish adaptation of the scale by Farina-Lopez et al., (2016) was 0.94, and 0.908 in a study that assessed nurses' Perceptions of Restraint Use (2014) (24,25).

Test-retest reliability is the power of one instrument to display consistent results and time invariance from one measurement to another. Test-retest reliability is identified by calculating the correlations with the scores obtained from two administrations of an instrument or test. As test scores generally change and are equally spaced, reliability is usually found using Pearson's Product–Moment Correlation Coefficient which has values that range between (r) "0" and "1." Effectiveness of the statement increases with an increase in correlation (r) and, conversely, decreases with a decrease in correlation. A correlation coefficient that is high enough indicates that the measurements obtained from the two administrations are stable, and that there has been little change within the time that the quality was measured (16-17,21).

The PRUQ reliability analysis included the administration of the questionnaire to 30 participants at a two-week interval to assess the time invariance. The mean scores obtained from the test-retest were compared with a dependent group's t-test and no statistically significant differences were identified between the mean scores ($p>0.05$). The relationship between the scores obtained through the Pearson's Correlation Analysis of the first and second administration of the PRUQ found that the reliability coefficient between the two measures was r=0.94, indicating a positive, very strong and statistically significant relationship between the scores from the two administrations. The statistical significance of the test-retest scale correlation supported the reliability of the scale over time in terms of consistency.

Conducting the study at a single small university hospital was a limitation. Nursing staff at a single, particular hospital setting may not represent all nursing staff in the Turkey.

In conclusion; given that the Turkish adaptation of the PRUQ has 17 items and is easy, comprehensible, and brief, it is considered to be a reliable and valid tool for assessing nurses' perceptions about the use



of physical restraints on older patients. It is recommended that the questionnaire be further tested, in terms of its validity and reliability, with other health professionals providing care to older patients.

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Declaration of Interest Statement

The authors have indicated no financial conflicts of interest about this research. This was not an industry supported study.

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RESEARCH

RELATIONSHIP BETWEEN KINESIOPHOBIA, QUADRICEPS MUSCLE STRENGTH AND QUALITY OF LIFE IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Abstract

Introduction: The aim of this study was to investigate the relationship between kinesiophobia, quadriceps muscle strength and quality of life in patients with knee osteoarthritis.

Materials and Method: We included 145 patients (age, 55.9±8 years) diagnosed with osteoarthritis of the knee in this study. Kinesiophobia, pain intensity, quadriceps muscle strength, disability and quality of life were evaluated using Tampa Scale for Kinesiophobia, visual analogue scale, hand-held dynamometer, Lysholm scale and short form-36, respectively.

Results: There was a significant relationship between pain at rest (p= .028), pain during activity (p=.015), disability (p=.019), vitality (p=.03) and social function (p=.036) of short form-36 and quadriceps muscle strength in females. No significant relationship was found between the test variables and quadriceps muscle strength (p> .05) in males. There was a significant relationship between pain during activity (p=.021), quadriceps muscle strength (p=.017), vitality (p=.026) and social function (p=.007) parameters of quality of life and kinesiophobia in females. There was a significant association between quadriceps muscle strength and kinesiophobia (p=.001) in males.

Conclusion: Quadriceps muscle weakness was associated with increased pain intensity and disability and reduced quality of life in females but not in males with osteoarthritis. Additionally, kinesiophobia was associated with higher pain intensity during activity, quadriceps muscle weakness and poorer quality of life in females. In males, level of kinesiophobia was associated with quadriceps muscle weakness.

Key Words: Osteoarthritis; Quadriceps muscle; Muscle weakness; Disability; Quality of life

ARAŞTIRMA

DİZ OSTEOARTRİTLİ HASTALARDA KİNEZYOFOBİ, KUADRİSEPS KAS KUVVETİ VE YAŞAM KALİTESİ ARASINDAKİ İLİŞKİ

Öz

Giriş: Bu çalışmanın amacı, diz osteoartritli hastalarda kinezyofobi, kuadriseps kas kuvveti ve yaşam kalitesi arasındaki ilişkiyi araştırmaktır.

Gereç ve Yöntem: Çalışmaya 145 diz osteoartritli hasta (age, 55.9±8 years) dahil edilmiştir. Kinezyofobi, ağrı şiddeti, kuadriseps kas kuvveti, özürlülük ve yaşam kalitesi sırasıyla Tampa Kinezyofobi Ölçeği, Vizüel Analog Skala, el dinamometresi, Lysholm Skala ve Kısa Form-36 ile değerlendirilmiştir.

Bulgular: Bayanlarda, istirahatte ağrı (p= .028), aktivite sırasında ağrı (p=.015), özürlülük (p=.019), Kısa Form-36'nın canlılık (p=.03), sosyal fonksiyon (p=.036) parametreleri ve kuadriseps kas kuvveti arasında anlamlı ilişki tespit edilmiştir. Erkeklerde, kuadriseps kas kuvveti ve diğer değişkenler arasında anlamlı bir ilişki bulunmamıştır (p> .05). Bayanlarda, aktivite sırasında ağrı (p=.021), kuadriseps kas kuvveti (p=.017), Kısa Form-36'nın canlılık (p=.026), sosyal fonksiyon (p=.007) parametreleri ve kinezyofobi arasında anlamlı ilişki bulunmuştur. Erkeklerde ise kuadriseps kas kuvveti ve kinezyofobi arasında anlamlı bir ilişki saptanmıştır (p=.001).

Sonuç: Kuadriseps kas zayıflığı, osteoartritli bayanlarda ağrı şiddeti ve özürlülüğü arttıran, yaşam kalitesini azaltan bir faktördür, fakat erkeklerde böyle bir sonuç bulunmamıştır. Aynı zamanda, bayanlarda kinezyofobi, aktivite sırasında ağrı şiddeti, kuadriseps kas zayıflığı ve daha düşük yaşam kalitesi ile ilişkili bulunmuştur. Erkeklerde ise kinezyofobi düzeyi kuadriseps kas zayıflığı ile ilişkili bulunmuştur.

Anahtar Sözcükler: Osteoartrit; Kuadriseps Kası Kas Zayıflığı; Yeti yitimi; Yaşam kalitesi

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INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease that affects the cartilage and many of its surrounding tissues (1). It is one of the major causes of lower extremity disability among older adults (2) and most often occurs in the knee, hip, hand, spine and foot. In the Framingham Study, the prevalence of radiographic knee OA was 19.2% among individuals aged above 45 years (1). Knee OA is characterized by pain and limitations in the ability to perform activities of daily living, such as stair climbing, walking and housework (3). Steultjens et al. (4) reported that knee muscle strength was associated with disability and avoidance of activity in patients with knee OA. The quadriceps muscle assists in shock absorption in the knee joint during gait, and knee extensor muscle weakness leads to abnormal joint loading in patients with knee OA (5).

In recent decades, the fear-avoidance model has been put forward to explain the association between chronic pain and disability. This new theory describes the role of emotional, cognitive and behavioural factors in the management of chronic pain and disability. According to the fear-avoidance model, psychological factors such as pain catastrophizing and kinesiophobia can be the risk factors for persistent pain and disability (6). Kinesiophobia is defined as 'an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury' (7, 8). Several studies have reported the negative effects of kinesiophobia on disability and activities of daily living in individuals with OA. Somers et al. (9) reported that the severity of OA was associated with psychological disability and walking performance. Scopaz et al. (10) documented that anxiety and fear-avoidance beliefs correlated with self-reported physical function in patients with knee OA. Low-level physical activity can lead to muscle weakness when the patients avoid physical activity due to pain. Impairment of quadriceps femoris muscle performance can reduce the stabilization ability of the knee joint and contribute to injuries of the intraarticular structures. This may increase disability and decrease quality of life in patients with knee OA. Therefore, the aim of this study was to investigate the relationship between kinesiophobia, muscle strength and quality of life in patients with knee OA.

MATERIALS AND METHOD

Participants

We included 145 patients (age, 55.9±8 years; body mass index (BMI), 30.8±5 kg/m^2) diagnosed with OA of the knee in this study. Inclusion criteria were age between 40 and 75 years and unilateral or bilateral knee OA diagnosed according to the clinical criteria of the American College of Rheumatology (11). Exclusion criteria were the presence of rheumatoid arthritis or other systemic inflammatory arthropathies, knee and hip surgery within the last 12 months or a history of knee and hip arthroplastic surgery, history of stroke and neuromuscular diseases and intraarticular corticosteroid injections into either knee within the previous 3 months. All the participants underwent radiographic examination of both knees using an anteroposterior and lateral view with weight-bearing positioning. Radiographs were scored for OA by the same experienced radiologist (I.Z.). The Kellgren–Lawrence score (range, 1–4) was used to assess radiographic severity, with higher scores indicating greater radiographic severity of knee OA (12). This study was approved by the Ethics Committee of the Ankara Numune Training and Research Hospital, and the participants gave informed, written consent. They were evaluated via the following measures:

Pain Intensity

Pain intensity in the knees was measured using the visual analogue scale (VAS). Patients were asked to place a mark along a 100 mm line to best describe the severity of pain experienced by them at rest and during activity in the past week.

Quadriceps Muscle Strength

Quadriceps muscle strength was evaluated by the 'Make test' method using a hand-held dynamometer (JTECH Medical Industries, Salt Lake City, UT, USA). The participants were instructed to sit on an examination table with their test hip and knee in 90° and 60° flexion, respectively, stabilizing themselves by holding onto the sides of the table. The participant were asked to perform 5-s isometric maximum voluntary contraction against the dynamometer held in the examiner's hand (13). Scores were recorded in kilograms.



Kinesiophobia

Participants' kinesiophobia levels were measured using the Tampa Scale for Kinesiophobia (TSK). TSK is a self-report measure that assesses the fear of (re)injury due to movement in musculoskeletal diseases (7,8). It comprises 17 items that are scored on a 4-point scale from 'strongly agree' to 'strongly disagree'.

Lysholm Scale

The Lysholm knee scoring scale was originally developed to determine the functional status of patients with ligament injuries of the knee and has been widely used to evaluate disability in other knee pathologies. This scale comprises eight domains (limp, support, locking sensation, instability, pain, climbing stairs, swelling and squatting) with closed-answer alternatives. The final sum (i.e., score) is rated from 0 (severe impairment) to 100 points (no limitation) (14).

Quality of Life

The short form-36 (SF-36) is a widely-used measure of quality of life and comprises 36 items evaluating physical functioning, physical role functioning, emotional role functioning, social role functioning, general health, mental health, bodily pain and vitality (15).

Table 1. Characteristics of the study population

Variables	Males (n=31) Mean±sd	Females (n=114) Mean±sd	p value
Age (years)	55.87±8.93	55.92±7.79	.977
Body mass index (kg/m^2)	28.52±3.69	31.47±5.24	.004**
Kellgren-Lawrence score (Right knee)	1.64±0.70	1.95±0.97	.051
Kellgren-Lawrence score (Left knee)	1.67±0.74	1.94±0.97	.102
Pain at rest (VAS)	2±1.93	2.5±2.61	.235
Pain during activity (VAS)	7.22±1.92	8.06±1.60	.032*
Disability (Lysholm)	60.09±16.21	47.06±18.68	.000**
Quadriceps muscle strength (Right limb) (kg)	15.80±3.15	14.78±3.00	.113
Quadriceps muscle strength (Left limb) (kg)	15.39±2.73	14.39±2.75	.079
Kinesiophobia (TSK)	26.29±8.23	26.61±7.83	.845
SF-36 Physical Function	54.19±22.21	34.54±20.66	.000**
SF-36 Role Physical	29.03±38.78	13.02±29.46	.014*
SF-36 Bodily pain	44.70±19.19	33.00±19.86	.004**
SF-36 General health	60.96±18.55	44.96±17.73	.000**
SF-36 Vitality	47.41±20.07	36.45±21.97	.011*
SF-36 Social function	58.46±21.25	46.68±24.99	.011*
SF-36 Role emotional	49.56±47.76	24.50±39.15	.003*
SF-36 Mental health	66.19±19.01	57.32±18.68	.025*

Abbreviations: VAS Visual Analogue Scale, TSK Tampa Scale for Kinesiophobia
* *P< 0.05.*

*** P< 0.01.*

Statistical Analyses

Data were analysed using SPSS (Version 16.0, SPSS Inc., Chicago, IL). Descriptive statistics (mean±SD) were calculated for all variables. Normality of outcome variables was analysed using the Kolmogorov–Smirnov test. Relationships between study parameters were assessed using Pearson's correlation coefficient and Spearman rank correlation coefficient for parametric and non-parametric data, respectively. Statistical significance was established at p<.05.

RESULTS

Characteristics of the study population are presented in Table 1. There were significant differences in BMI, pain during activity, disability and all parameters of SF-36 between males and females (p< .05; Table 1). Correlational analyses revealed that there were significant relationships between pain at rest (p=.028), pain during activity (p=.015), disability (p=.019), vitality (p=.03) and social function (p=.036) of SF-36 and right quadriceps muscle strength in females. However, no significant relationship was found between radiographic severity of disease and quadriceps muscle strength in females (p> .05). In males, no relationship was found between radiographic severity of disease, pain intensity, disability, SF-36 parameters and quadriceps muscle strength (p> .05; Table 2). In addition, there were significant relationships between pain during activity (p=.021), quadriceps muscle strength (p=.017), vitality (p=.026) and social function (p=.007) parameters of SF-36 and kinesiophobia in females with OA. There was significant association between quadriceps muscle strength and kinesiophobia (p=.001) in males. No significant relationship was found between radiographic severity of disease and kinesiophobia in either gender (p> .05; Table 3).

Table 2. Correlation between quadriceps muscle strength and other variables

Variables	Quadriceps muscle strength (Right limb)		Quadriceps muscle strength (Left limb)	
	Males (n=31)	Females (n=114)	Males (n=31)	Females (n=114)
Kellgren-Lawrence score (Right knee)	.368	.091		
Kellgren-Lawrence score (Left knee)			.174	.156
Pain at rest (VAS)	.553	.028*	.713	.028*
Pain during activity (VAS)	.095	.015*	.074	.003**
Disability (Lysholm)	.538	.019*	.479	.001**
SF-36 Physical Function	.116	.068	.053	.164
SF-36 Role Physical	.520	.563	.251	.894
SF-36 Bodily pain	.680	.055	.981	.103
SF-36 General health	.361	.346	.563	.221
SF-36 Vitality	.819	.030*	.672	.024*
SF-36 Social function	.204	.036*	.586	.066
SF-36 Role emotional	.531	.306	.616	.963
SF-36 Mental health	.367	.668	.145	.949

Abbreviations: VAS Visual Analogue Scale, TSK Tampa Scale for Kinesiophobia

* P< 0.05.

** P< 0.01.

Table 3. Correlation between kinesiophobia and other variables

Variables	Kinesiophobia (TSK)	
	Males (n=31)	Females (n=114)
Kellgren-Lawrence score (Right knee)	.859	.749
Kellgren-Lawrence score (Left knee)	.662	.945
Body mass index (kg/m^2)	.282	.448
Pain at rest (VAS)	.191	.862
Pain during activity (VAS)	.414	.021*
Quadriceps muscle strength (Right limb)	.001**	.017*
Quadriceps muscle strength (Left limb)	.013*	.034*
Disability (Lysholm)	.862	.091
SF-36 Physical Function	.390	.095
SF-36 Role Physical	.733	.226
SF-36 Bodily pain	.984	.118
SF-36 General health	.360	.163
SF-36 Vitality	.211	.026*
SF-36 Social function	.128	.007**
SF-36 Role emotional	.513	.516
SF-36 Mental health	.568	.241

Abbreviations: VAS Visual Analogue Scale, TSK Tampa Scale for Kinesiophobia

* P< 0.05.

** P< 0.01.

DISCUSSION

The results of the present study showed that quadriceps weakness was associated with increased pain intensity and disability and reduced quality of life in females but not in males with OA. However, there was no significant difference in quadriceps muscle strength between females and males with OA. The patients assessed in this study were predominantly females (78%). Similar to our results, Steultjens et al. (4) observed a relationship between physical disability and muscle strength in patients (90% female) with knee OA. They reported that muscle strength of knee flexion and extension was a predisposing factor in the relationship between avoidance of activity and physical disability. Quadriceps muscle is the primary dynamic stabilizer of the knee joint. Quadriceps muscle weakness leads to instability of the knee, which may contribute to knee pain (16). Muraki et al. (16) found that the threshold of muscle strength for knee pain in females was similar to or higher than that in males. Hootman et al. (17) suggested that pain-related disuse atrophy could cause compression of joint surfaces during weight-bearing activity, leading to cartilage damage. Quadriceps muscle dysfunction may

contribute to abnormal knee kinematics during gait as well as impaired proprioception (16,18). Furthermore, quadriceps weakness may lead to reduced shock absorption ability at the knee joint, specifically at heel strike during normal gait, and may increase the progression of joint damage (19). Berger et al. (20) observed cartilage thickness for the vastus medialis and lateralis muscles using magnetic resonance imaging. They reported that distal vastus medialis volume was the primary predictor of the morphological features of cartilage in patients with symptomatic and radiographic knee OA.

The present study also found that kinesiophobia is associated with higher pain intensity during activity, quadriceps muscle weakness and poorer quality of life in females. In males, kinesiophobia only was significantly associated with quadriceps muscle weakness. Although the female OA patients in this study had higher pain intensity during activity than males, kinesiophobia scores did not significantly differ between females and males with OA. A possible explanation is that the females in this sample had a significantly higher BMI than the males. This could, therefore, lead to increased contact stress on the knee joint in females. In addition, females with OA have been found to experience more pain than males due to neural and psychosocial factors and are more likely to report reductions in daily living activities and quality of life (21). Finally, female patients lose the protective effect of oestrogen after menopause, leading to increased disease severity (22).

Kinesiophobia level reported in the previous studies on this subject was generally higher than that in our participants, and participants in these studies were predominantly female, similar to our study population. Domenech et al. (23) documented that kinesiophobia was moderately and significantly correlated with pain intensity and disability in patients with anterior knee pain. Hart et al. (24) reported that participants with OA had lower knee confidence and higher kinesiophobia than those without knee OA after anterior cruciate ligament reconstruction. In patients with OA, poorer knee confidence was associated with higher kinesiophobia and worse patient-reported and performance-based functional impairments. Somers et al. (9) reported that disease severity was correlated with psychological disability and walking speed in obese OA patients. However, severity of disease (as assessed using the Kellgren–Lawrence score) was not associated with kinesiophobia, similar to our findings. They showed that pain-related fear increased psychological disability and decreased walking speed. Scopaz et al. (10) suggested that both anxiety and fear-avoidance beliefs were related to self-reported physical function in patients with knee OA. They reported that higher anxiety and higher fear avoidance beliefs limited activities of daily living in patients with knee OA. Heuts et al. (25) suggested that the level of pain and pain-related fear were negatively associated with daily functioning in patients with OA. In individuals with OA, maintaining adequate daily activity is critical in managing disease-associated pain and disability, but patients with kinesiophobia may be hesitant to engage in physical activity.

A limitation of the present study is the lack of a control group without OA. However, our patients' average age was 55.9±8 years (range, 40–75 years), and in clinical practice, it is difficult to find patients within this age group without knee OA, especially radiographically.

In conclusion, the findings of this study indicated that quadriceps weakness was associated with increased pain intensity and disability and reduced quality of life in females with OA, but not in males. Furthermore, kinesiophobia was associated with higher pain intensity during activity, quadriceps muscle weakness and poorer quality of life in females. In males, kinesiophobia only was associated with quadriceps muscle weakness.

Individuals with OA may avoid physical activity due to pain during activity. The clinicians should question OA patients regarding symptoms of kinesiophobia that lead to psychological disability and develop strategies to overcome pain-related fear



of movement. Low-level physical activity may lead to decreased quadriceps muscle strength. Quadriceps muscle weakness can reduce stabilization of the knee joint and contribute to knee injuries. Quadriceps muscle strength can be improved through resistance training designed according to age, physical capacity and severity of disease among individuals with OA.

Conflict of interest None.

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RESEARCH

FUNCTIONAL PROFILES OF THE FEET AND ITS RELATION TO THE BALANCE IN ELDERLY PEOPLE

Abstract

Introduction: The aim of this study was to investigate functional profiles of the feet and its relation to the balance in asymptomatic elderly people.

Materials and Method: We assessed 114 asymptomatic elderly subjects (34 men and 80 women) with a mean age of 67.2±3.4 years (range 65–80 years) using computerized baropodometric and analysis in standing and walking conditions. Load on the forefoot, rearfoot and total foot, support surface of the foot, foot angle, mean and maximum pressures exerted on the ground, cadence, gait velocity and step width parameters were assessed with baropodometric analysis. To evaluate balance, stabilometric analysis was performed and center of pressure excursions were measured.

Results: The baropodometric analysis revealed a significantly greater support surface and total load in the static condition and larger foot angle in the dynamic condition for the right foot than for the left one among women. However, there was no asymmetry between the right and left feet among men. Gait velocity was higher in men than in women; when standing, the foot angle and total load of the left foot was greater in men than in women. Center of pressure excursions were significantly greater in women compared to the men in anterior–posterior and in medio-lateral direction.

Conclusion: The results suggest that compared with elderly men, elderly women are more likely to develop functional left–right foot asymmetries in static and balance disturbances in dynamic conditions. These conditions should be considered as possible causes for increased risk of fall in elderly women.

Key Words: Aged; Foot; Gait; Posture

ARAŞTIRMA

YAŞLILARDA FONKSİYONEL AYAK PROFİLİ VE DENGE İLE İLİŞKİSİ

Öz

Giriş: Bu çalışmanın amacı asemptomatik yaşlı bireylerde ayağın fonksiyonel profili ve denge ile ilişkisini araştırmaktı.

Gereç ve Yöntem: Bu çalışmada, yaş ortalaması 67.2±3.4 yıl (65 ile 80 yaş arası) olan 114 asemptomatik yaşlı birey (34 erkek, 80 kadın), bilgisayarlı baropodometrik analiz yöntemi ile ayakta duruş ve yürüme değerlendirildi. Değerlendirilen parametreler ön ayak, arka ayak ve tüm ayak üzerindeki yük, destek yüzeyi, ayak açısı, yere aktarılan ortalama ve maksimum basınçlar, kadans, yürüyüş hızı ve adım genişliğiydi. Dengeyi ölçmek için ise stabilometrik analiz yapıldı ve basınç merkezi ekskürsiyonları ölçüldü.

Bulgular: Baropodometrik analizler kadınlarda, sol ayak ile karşılaştırıldığında sağ ayakta artmış destek yüzeyi ve yük varlığını gösterdi. Erkeklerde sağ ve sol ayak arasında herhangi bir parametrede asimetri saptanmadı. Yürüme hızı erkeklerde kadınlardan daha fazlaydı. Ayakta duruşta sol ayağın ayak açısı ve üzerine binen yük, erkeklerde kadınlardan daha fazlaydı. Antero-posterior ve medio-lateral yönde basınç merkezi ekskürsiyonları kadınlarda, erkeklere göre daha fazlaydı.

Sonuç: Çalışmanın sonuçları kadınların, statik durumda yapılan ölçümlerde sağ ve sol ayak arasında fonksiyonel asimetri, dinamik durumlarda ise denge bozukluğu geliştirmeye ve yatkın olduğunu gösterdi. Bu sonuçların, yaşlı ve kadın bireylerde düşme riskini artırabileceği açısından dikkate alınması önerilmektedir.

Anahtar Sözcükler: Yaşlılık; Ayak; Yürüyüş; Postür; Denge

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INTRODUCTION

The foot constitutes a support surface that has sufficient flexibility for maintaining a stable upright stance and for effective weight transfer during gait (1). The feet play an important role in maintaining the postural balance during static and dynamic conditions by providing information to the central nervous system. External information provided by the feet relates to gravitational and reaction forces from the supporting surface; furthermore, information related to internal constraints such as proprioceptive signals and position sensing is provided by joint receptors and plantar mechanoreceptors (2).

Maintenance of body posture and symmetrical distribution of plantar loading primarily depends on proper biomechanics of the foot. Biomechanical variations in the lower extremities and in foot shape, biomechanics, and function are associated with functional overload and may predispose to risk factors that cause pain, dysfunction, accidents, and falls in elderly people (3).

With aging, alterations in joint mobility, biomechanics, and proprioception and muscle atrophy have been shown to occur in the foot. These changes affect foot functions and alter the plantar pressure distribution, which results in altered gait patterns in elderly people (4).

Computerized baropodometry analysis is a commonly used method for detecting functional alterations in feet that may be associated with possible risk factors, such as loading asymmetries, discrepancy in feet contact area, and excessive increase in plantar pressure. Therefore, this is an important method for understanding foot-related postural adaptation and asymmetries (5). The aim of this study was to investigate the functional profiles of the feet using baropodometric method in elderly asymptomatic people.

MATERIALS AND METHOD

Subjects

The study was approved by the Non-interventional Clinical Research Ethics Board of Hacettepe University GO 16/221 on May 24, 2016. The patients were sequentially enrolled from the Orthotic and Biomechanics Unit, Physiotherapy and Rehabilitation department of the Hacettepe University. The subjects were recruited in Ankara through public announcements, meetings and personal contacts. All the participants were informed about the study and signed the informed consent forms prior to participation.

We included 114 asymptomatic elderly volunteers (34 men and 80 women) with an average age of 67.2±3.4 years (range 65–80 years). The inclusion criteria were age 65 and above; being right-footed (i.e., having right lower extremity dominance), as defined by the Waterloo Footedness Questionnaire-Revised (WFQ-R) (6); and independent ambulation without an assistive device. Exclusion criteria were presence of any of the following conditions or characteristics: cognitive impairment; foot-related problems or pain 3 months prior to the visit; history of traumatic injury to or surgery of the lower extremity; previous neurological, musculoskeletal, rheumatic, or orthopedic disease; or diabetes or neuropathies diagnosed by a physician.

Examination procedure

The general characteristics evaluated for the subjects included their age, sex, body weight, height, and body mass index (BMI). Subjects were classified into four BMI categories according to World Health Organization categories as underweight, (BMI<18.5 kg/m^2), normal weight (18.5<BMI<25.0 kg/m^2), overweight (25≤BMI<30.0 kg/m^2) and obese (BMI ≥30 kg/m^2) (7). All examination procedures were performed by the first author.

For assessment of electronic baropodometric and stabilometric variables, a barosensitive force platform (Diasu Company, Rome, Italy; 120 cm long and 40 cm wide; 4024 sensors; frequency, 300 MHz) was used. The measuring system comprised the platform placed on the floor and connected to a computer running the manufacturer's software. The assessments were performed for static and dynamic conditions (standing upright and walking across the platform, respectively) of the subjects. No instructions were given to the subjects as to how to step onto the device; this



allowed them to assume their habitual standing posture and walking characteristics.

Foot type was determined by obtaining arch index values using foot print analyses taken while the subject stood on the force plate platform. Foot type was classified based on the arch index as follows: arch indices≥0.260 were considered low-arched; arch indices between 0.210 and 0.260 were considered normal; and arch indices≤0.210 were considered high-arched as introduced by Cavanagh and Rodgers (8).

For the static condition, the subjects were requested to stand barefoot on the force plate platform with their arms resting down alongside the trunk and to maintain this position for 1 min while looking directly straightforward with their eyes open. The following data were collected for each foot: percentages of the load on the forefoot and rearfoot, support surface of the foot, total load on the foot, and foot angle.

For the dynamic condition, the subjects were requested to walk barefoot across the platform. During walking, the support surface of the foot, total load on the foot, foot angle, mean and maximum pressures exerted on the ground, cadence, gait velocity, and step width were assessed.

For stabilometric recordings, center of pressure (COP) excursions in antero-posterior and medio-lateral direction during walking were measured. The distance from center of gravity of the foot to the center of gravity of the body (CGF-CGB distance) was recorded.

Statistical analysis

The Kolmogorov–Smirnov and Levene's tests were used to confirm the normal distribution of data and homogeneity of variances, respectively. Statistical comparisons were made using Student's t-test, considering p values<0.05 as significant. Data are expressed as means and standard deviations (SDs) (and 95% confidence interval). Analyses were performed using SPSS for Windows version 11.0 (SPSS Inc., Chicago, IL).

RESULTS

Initially, 162 elderly people were assessed for eligibility. Of them, 12 refused to participate and 36 were excluded from the study for not meeting the inclusion criteria, with diabetes, degenerative joint disease, balance problems, and pain cited as the main reasons. Thus, we included 114 asymptomatic elderly volunteers who agreed to participate in the study and underwent the computerized baropodometric analysis.

Demographic and clinical characteristics of the subjects according to the gender are presented in Table 1. Age, height, and body weight were significantly higher in men than in women (p<0.05). The BMI difference between these two groups was not statistically significant (p>0.05).

Of the 228 feet included in this study, 41 (18.0%) were classified as low-arched, 90 (39.5%) were classified as normal, and 97 (42.5%) were classified as high-arched. No significant difference in foot type was found between men and women (p>0.05). (Table 2).

Table 1. Demographic and clinical characteristics of the subjects (n=114)

Characteristic	Men (n=34) Mean±sd	Women (n=80) Mean±sd	p
Age (years)	68.3±4.1	66.8±3.0	0.032*
Height (cm)	171.8±8.7	159.4±5.9	0.000**
Weight (25)	85.0±14.2	76.5±12.1	0.002*
Body mass index (kg/m^2)	28.7±3.9	30.1±5.0	0.160
BMI classification n (%)			
Obese	13 (38.2)	41 (51.7)	
Overweight	18 (52.9)	26 (32.5)	0.112
Normal weight	3 (8.8)	13 (16.3)	

* p<0.05, ** p<0.001
Group values are expressed as mean±Standard Deviation or n (%).

Table 2. Foot type of the subjects

Foot type	Men (n= 34)		Women (n=80)		p
	Right n (%)	Left n (%)	Right n (%)	Left n (%)	
Low-arched	5 (14.7)	7 (20.6)	12 (15.0)	17 (21.3)	
Normal	14 (41.2)	10 (29.4)	38 (47.5)	28 (35.0)	0.788
High-arched	15 (44.1)	17 (50.0)	30 (37.5)	35 (43.8)	

A comparison of the baropodometric analysis results between men and women showed significant differences in some parameters (Table 3). The total load on and foot angle of the left foot were greater in men than in women while standing; furthermore, gait velocity was higher in men ($p<0.05$).

For all baropodometric parameters, no differences between right and left lower extremities were found for men ($p>0.05$). In women, the support surface of and total load on the right foot were significantly greater than those for the left foot while standing; furthermore, the foot angle of the right foot was greater than that of the left one during walking ($p<0.05$) (Table 3).

The results obtained stabilometric recordings revealed statistically significant differences between men and women. Center of pressure excursions were significantly greater in women compared to the men in anterior–posterior and in medio-lateral direction ($p<0.05$). CGF-CGB distance was greater in men than women ($p<0.05$) (Table 3).

DISCUSSION

This study demonstrated that the functional profile of the feet of people aged 65 and above differed between men and women. Women showed asymmetry between the right and left feet in loading and support surface area while standing and in foot angle during walking. This is consistent with previous studies reporting that women tend to exhibit plantar pressure asymmetries between the dominant and non-dominant sides of lower extremities during walking (9). Furthermore women had a slower preferred walking speed and greater COP excursions in antero-posterior and medio-lateral direction than men. These alterations in functional profile of the feet and postural balance might reflect a movement strategy intended to enhance stability and adaptability in elderly women (10).

Several factors, including foot structure, gait velocity, and body weight, have been shown to influence plantar pressure in elderly people (11). Load distribution has been shown to be uniform and equally distributed between the right and left support surfaces, and under normal conditions, 40% and 60% of the load should burden the forefoot and rearfoot, respectively. However, it has been found that compared with younger people, elderly people are more likely to show a decline in the magnitude of load and pressure under the heel, lateral foot, and hallux (12). In the present study, foot type distribution, comprising of high, normal and low foot type, showed similarity among men and women. Women were mostly obese and men were mostly overweight, but the differences in BMI between groups were not statistically different. Analysis during the static condition revealed that the support surface and total load were greater for the right foot than for the left one in women, but there was no asymmetry between the feet in men. In both men and women, the load distribution between the forefoot and rearfoot was normal in this study, in contrast to the results of a study by Scott et al. (12).



Table 3. Comparison of Static and Dynamic Baropodometric Values Among the Two Gender and Between the Right and the Left Foot

	Men (n= 34)		Women (n=80)		p	
	Right foot	**Left side**	**Right foot**	**Left foot**	**Right foot**	**Left foot**
Static measurements						
Load % forefoot	40.44±13.95	41.41±11.76	39.59±14.00	39.27±13.52	0.770	0.424
	(p=0.462)		(p=0.722)			
Load % rearfoot	59.56±13.95	68.60±11.77	60.41±14.00	60.71±13.52	0.770	0.432
	(p=0.472)		(p=0.741)			
Support surface (cm^2)	108.08±32.50	107.23±29.21	105.43±29.03	101.18±27.66	0.669	0.296
	(p=0.739)		(p=0.016)[a]			
Total load (kgf)	40.30±10.41	42.55±12.48	39.01±9.12	36.61±9.01	0.511	0.005[b]
	(p=0.221)		(p=0.040)[a]			
Foot angle (°)	10.93±5.43	12.50±6.37	10.20±5.33	10.12±5.13	0.509	0.039[b]
	(p=0.193)		(p=0.906)			
Dynamic measurements						
Support surface (cm^2)	110.95±35.34	108.84±33.38	103.05±31.77	103.41±32.54	0.243	0.421
	(p=0.595)		(p=0.884)			
Total load (kgf)	49.32±8.76	50.67±8.75	49.51±8.49	50.62±8.50	0.917	0.976
	(p =0.655)		(p=0.561)			
Foot angle (°)	14.54±4.45	13.59±5.19	14.39±5.34	12.55±5.92	0.893	0.375
	(p=0.325)		(p=0.023)[a]			
P_{mean} (kgf/cm^2)	833.16±469.33	999.54±1003.95	814.05±361.11	859.90±602.91	0.815	0.363
	(p=0.367)		(p=0.347)			
P_{max} (kgf/cm^2)	1282.97±539.35	1372.30±519.95	1244.86±569.61	1351.92±783.08	0.741	0.895
	(p=0.369)		(p=0.119)			
Cadance (step/min)	44.32±11.93	43.71±13.51	42.02±12.26	41.71±13.57	0.427	0.536
	(p=0.813)		(p=0.896)			
Step width (cm)	10.20±4.24	10.12±3.82	10.18±4.13	10.05±4.47	0.987	0.943
	(p=0.716)		(p=0.545)			
	Men (n= 34)		Women (n=80)		p	
Gait velocity (m/s)	61.13±20.39	51.63± 19.01			0.046[b]	
CGF- CGB distance	15.29±7.63	19.74±10.51				0.015[b]
COP ant-post (mm)	403.97±133.14	477.66±44.81			p<0.001[b]	
COP med-lat (mm)	253.90±86.89	310.10±61.19			0.001[b]	

Load % forefoot, Percentage of load on the forefoot; Load % rearfoot, Percentage of load on the rearfoot; Pmean, mean pressure; Pmax, maximum pressure; CGF-CGB distance, distance from center of gravity of the foot to the center of gravity of the body; COP ant-post, center of pressure excursion in the antero-posterior plane; COP med-lat; center of pressure excursion in the medio-lateral plane.

a significance value among the two sides of the lower extremity, p<0.05.

b significance value among the two gender, p<0.05

All values are expressed as mean±Standard Deviation.

The present study also showed that the total load on the left foot was greater in men than in women in the static condition. Preliminary baropodometric surveys have suggested that a significant increase in the contact area and plantar pressure predisposes to lower limb complications, such as pain and discomfort, and negatively affects walking and activities of daily living (13). According to the present study results, it appears that elderly women tend to overload the dominant lower extremity; this might lead to pressure-related foot problems on the dominant side in women. Kernozek and Lamott found a greater support surface and lesser contact time in the elderly than in young adults in both sides (4).

The specific positioning of the feet is known to influence postural responses and balance control in the subject's preferred standing position and during walking. The foot angle is defined as the angle between the direction of progression of the subject and a reference line on the sole of each foot (14). In the present study, during the assessment in the static condition, the foot angle of the left foot was found to be greater in men than in the women. During gait, the foot plays an important role in shock absorption in the heel-contact phase, adapting to irregular surfaces in the mid-stance phase and contributing to momentum generation for forward propulsion in the pushing-off phase (15). During walking, the foot angle of the right foot was greater than that of the left one in women, whereas this asymmetry was not observed in while standing. Changing the position of the foot at contact may affect all other joints and create a modifying effect on the moment around the lower extremity during gait. These asymmetries in foot angle between the feet may have been influenced by alterations in balance control.

Gait velocity provides valuable information about physical performance and is a predictor of functional dependence as well as future disability and mortality in elderly people. A decrease in gait velocity has been associated with decreased gait performance and increased risk of falls in elderly people (16). In the present study, preferred gait velocity was slower in women than in men and may be related to the foot angle asymmetry between the two sides in women. We propose that a decrease in walking velocity places elderly women at a greater risk of falls. During normal walking, the foot is the only part of the body that is in direct contact with the ground. Thus, any factor that alters normal foot function during ambulation may impair postural stability and balance, thereby increasing the risk of falls (17). A study found that concerns related to falls are greater in women than in men and this fear of falling results in a decreased mobility in elderly women (18). Kirkwood et al. suggested increasing the step length in elderly women with the aim of slowing the decline in gait velocity, thereby reducing the risk of falls (19).

Voluntary movements result in internal perturbations of balance and equilibrium. Proper control of the center of gravity motion and its coordination with COP are considered important to maintain the dynamic stability of the body and resultant kinetic demands at the joint of the supporting limb when walking (20). Postural stability decreases with age and causes the increase in risk of falls in elderly population (21). Although the groups kept similar ratio of foot type distribution and had no significant difference in BMI, women subjects displayed greater COP excursions in antero-posterior and medio-lateral direction and had greater distance between CGF and CGB than men, as stabilometric parameters, in this study. It has been demonstrated that an increase in the amplitude of the COP displacement represents an increase in the foot tilt strategy mechanism (generating a stabilizing moment force of the body in order to counteract body tilt) for balance control (22). Greater COP excursions in women could be interpreted as increase in foot tilt strategy to overcome the balance challenge of walking. Previous research has found excessive medio-lateral linear momentum during gait in elderly with gait instability from bilateral vestibular hypofunction (23). A compensatory adjustment for great CGB-CGF distance for women may show difficulty to maintain the line of progression within the base of support to avoid imbalance. Therefore we propose that elderly women adopt strategies to maintain dynamic stability and balance. The modulating mechanism for balance control is complex, possibly affecting the COP displacement (24). Interpretations of these findings may not generalize the effect of foot structure on bal-



ance control, but also consider the relation between functional profile of the feet and balance control during walking for elderly adults. Further studies are needed to clarify the relationship between postural control and foot structure.

In the present study, although men's body weight was significantly greater than that of women's and both genders had a similar support surface, there was no difference between the two genders in the mean and maximum pressures applied to the ground during walking. This may indicate that, despite their lower body weight, women tend to apply foot pressures to the ground similar to those applied by men. This can result in pressure-related foot complaints in women in the long term. Mickle et al. found that high plantar pressures during gait contribute to a risk of falls in community-dwelling elderly people (17). Kim et al. found unequal balance between the dominant and non-dominant feet, as well as increases in the support surface, particularly on the medial and posterior aspects of the plantar surface of the dominant side of older women during walking. They reported these findings as an indication of a high risk of falls in elderly women (9). In the present study, we observed similar findings in elderly women for the static condition, but they accommodated these alterations while walking. There are several reasons that might explain the change in pressure patterns in elderly people: temporospatial gait parameters, such as gait velocity, cadence, and step length; demographic characteristics, such as height and body weight; and altered foot biomechanics, such as foot posture, a limited range of motion, and foot deformities (11).

Limitations

There are several limitations and challenges to developing this research. One limitation of this study is the difference in mean age between the elderly men and women population. Another limitation is that the elderly population of this study mostly consisted of obese and overweight people. It appears that there is need for a continuing study investigating whether the influence of body weight on functional profile of the feet. Separate analyses by age groups and BMI in both genders would provide an opportunity to compare outcome measures between elderly people with similar ages. Moreover, there was the lack of data collection about the foot deformities of the subjects. Larger studies that include adults of different ages are needed to assess the exact relationship between the plantar pressure distribution, foot type, and postural balance and the underlying mechanism responsible for asymmetry between functional profiles of the feet in elderly women.

In conclusion, multiple alterations in foot biomechanics can affect the functional profile of the foot and may require clinical attention even in asymptomatic elderly people. This study revealed an unequal weight distribution between the lower extremities in elderly women. Furthermore, decrease in preferred gait velocity and increase in COP excursion during walking may indicate altered balance control elderly women. These should be considered as possible causes of fall during walking in elderly women. There is need for further investigation to clarify the relationship between postural control and foot structure in elderly people.

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RESEARCH

HEALTH SCIENCES STUDENTS' AGEING ANXIETY AND ATTITUDES TOWARDS OLDER PEOPLE

Abstract

Introduction: The aim of this study was to determine ageing anxiety and attitudes towards the elderly in students studying in the Faculty of Health Sciences at Adnan Menderes University in Turkey.

Materials and Method: This cross-sectional study carried out during 2016 and included 236 students enrolled at the university. Of these students, 146 were from the nursing department, 54 from the midwifery department and 36 from the nutrition and dietetics department. The students completed a questionnaire on demographic features, University of California, Los Angeles Geriatrics Attitudes Scale (14 items) and Anxiety about Aging Scale (20 items).

Results: Most of the participants were female nursing students. Approximately one-fifth of the students reported that their families shared their home with older relatives. Approximately half of the students reported that they participated in activities for older people. Mean scores for University of California, Los Angeles Geriatrics Attitudes Scale and Anxiety about Aging Scale were 48.22±5.44 and 66.38±8.75, respectively. First-year students, studying nutrition and dietetics and those not participating in nursing home activities had significantly lower scores on the University of California, Los Angeles Geriatrics Attitudes Scale. Students staying with older relatives had significantly higher scores on the Anxiety about Aging Scale.

Conclusion: Although health sciences students who will provide care for older people in the future had positive attitudes towards them, they also had high ageing anxiety. Undergraduate education should, therefore, be restructured to create positive communication between students and older people.

Key Words: Ageing; Anxiety; Attitude; Students

ARAŞTIRMA

SAĞLIK BİLİMLERİ ÖĞRENCİLERİNİN YAŞLANMA ENDİŞESİ VE YAŞLILARA YÖNELİK TUTUMU

Öz

Giriş: Çalışmanın amacı Adnan Menderes Üniversitesi Sağlık bilimleri Fakültesi'nde öğrenim gören öğrencilerinin yaşlılara yönelik tutumlarının ve yaşlanma endişelerinin belirlenmesidir.

Gereç ve Yöntem: Bu kesitsel çalışma 2016 yılında yürütülmüştür ve Adnan Menderes Universitesinde öğrenim gören 146 hemşirelik, 54 ebelik ve 36 diyetisyenlik olmak üzere toplam 236 öğrenci çalışmaya katılmıştır. Öğrenciler özbildirimle demografik özelliklere ilişkin bir anketi, 14 maddelik yaşlı tutum ölçeği ve 20 maddelik yaşlanma endişesi ölçeğini doldurmuşlardır.

Bulgular: Katılımcıların çoğunluğu kız ve hemşirelik öğrencileridir. Yaklaşık 1/5'i kendi ailelerinin yaşlılarla aynı evi paylaştığını yaklaşık yarısı da yaşlılarla ilgili aktivitelere katıldığını belirtmiştir. Öğrencilerin UCLA yaşlı tutum ve yaşlanma endişesi ölçeklerinden aldıkları ortalama puan sırasıyla 48.22±5.44 ve 66.38±8.75 olarak saptanmıştır. Yaşlı tutum ölçeğinden diyetisyenlik, 1. sınıf öğrencileri ve huzurevinde aktiviteye katılmayan öğrenciler istatistiksel anlamlı düşük puan almışlardır. Yaşlanma endişesi ölçeğinden, evlerinde yaşlı yakını ile yaşayanlar istatistiksel anlamlı yüksek puan almışlardır.

Sonuç: Gelecekte yaşlılara da hizmet sunacak olan sağlık bilimleri öğrencilerinin yaşlılara tutumu olumlu olsa da ageing anksiyeteleri yüksek bulunmuştur. Mezuniyet öncesi eğitimde yaşlılarla olumlu iletişim oluşturacak bir yapılandırma önemlidir.

Anahtar Sözcükler: Yaşlanma; Endişe; Tutum; Öğrenciler

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INTRODUCTION

The increasing number of elder people will cause instabilities in health and welfare systems furthermore the general approach towards aging and old people will be effected negatively (1). Industrialisation and modernisation have changed not only family structures but also work lives and lifestyles, and individuals in younger generations now have less frequent contact with those in older generations that might counter-act negative beliefs, attitudes and stereotypes. Age-segregated socialisation has led to misunderstandings between generations (2), and these miscommunications have fostered the emergence of misunderstanding and misconceptions, negative attitudes towards ageing and older people and ageing anxiety. Lasher and Faulkender (3) defined ageing anxiety as a combination of concerns and predictions about losses due to the ageing process. Ageing-related diseases, functional and cognitive losses and physical changes are the factors underlying ageing anxiety (4,5). Furthermore, exposure to negative attitudes towards older people may cause anxious feelings about one's own ageing process (6).

Negative attitudes towards older people, pejorative stereotypes and development of ageing anxiety can discourage healthcare workers from working with or offering high-quality healthcare and social services to older people (4,7). However, effective two-way communication helps older people in confiding with the healthcare staff. Therefore, attitudes towards older people are a critical part of their healthcare (8). Older people comprise a special population for healthcare services, and it is crucial that the healthcare staff prepare for a demographic evolution in society.

Difficulty in understanding and having empathy for older people and lack of awareness about age-specific health problems in prospective healthcare workers have negative effects on their attitudes towards older people. Therefore, identifying ageing anxiety and attitudes towards older people in health sciences students is critical for preventing the development of negative attitudes. The aim of this study was to determine the level of ageing anxiety and attitudes towards older people in students studying in the Faculty of Health Sciences at Adnan Menderes University in Aydin, Turkey.

MATERIALS AND METHOD

Study Design and Sample Selection

This descriptive study was conducted at Adnan Menderes University during 2016. The study covers a total of 310 students attending an elective course entitled "health promotion" in the Faculty of Health Sciences and 236 students (76%) participated to the study. Among these students, 146 (81%) were studying nursing, 54 (83%) were studying midwifery and 36 (55.4%) were studying nutrition and dietetics.

Instruments

Data about demographics were collected using a self-report questionnaire that included questions about personal characteristics (age, sex, family living place, presence of older family members, living with older people and interest in working with older people). The University of California, Los Angeles Geriatrics Attitudes (UCLA-GA) Scale was used to evaluate the students' attitudes towards older people. The multidimensional UCLA-GA Scale, a five-point Likert scale composed of 14 items, is among the most commonly used tools to evaluate attitudes towards older people. Its subscales are social values, medical care, affection and allocation of resources. The mean total score for the scale is based on the subscale scores. The highest possible score is 70, and high scores indicate positive attitudes (9,10). The Anxiety about Aging Scale was used to evaluate ageing anxiety. This five-point Likert scale has four subscales and 20 items (3,11-12). Its subscales include fear of older people, psychological concerns about ageing, anxiety about physical appearance and fear of losses associated with ageing. Higher scores indicate higher levels of anxiety and increased negative attitudes towards ageing.

Ethical Considerations

Ethical approval was obtained, and written permission was received from the departments in which the study was conducted. All participating students gave informed consent.



Statistical Analysis

Data were analysed using Statistical Package Program for Social Sciences 18.5 for Windows (SPSS Inc., Chicago, IL). A p value of<0.05 was considered statistically significant. Results are expressed as means±standard deviation. In addition, the *t* test and analysis of variance and linear regression analysis were used to determine relationships between scores on the scales and sociodemographic features.

RESULTS

Demographic features of the students are listed in Table 1. Most of the participants were female nursing students. The amount of time students had lived in urban or rural areas before the study was nearly similar. The mothers of most of the students were primary school graduates or literate only, whereas their fathers had higher education levels. A large percentage of the students had an older relative, and approximately one-fifth of the students indicated that their families shared their home with an older relative. Approximately half of the students participated in activities for older people and nursing home practicums.

The mean scores (range) of the students were 48.22±5.44 (32–65) for the UCLA-GA Scale and 66.38±8.75 (33–92) for the Anxiety about Aging Scale. For the Anxiety about Aging Scale subscales, students had mean scores of 20.74±3.69 (5–25) for fear of older people, 16.32±3.26 (5–25) for psychological concerns about ageing, 16.74±2.7 (7–23) for anxiety about physical appearance and 12.78±3.85 (5–23) for fear of losses associated with ageing. There was a significant moderate correlation between the UCLA-GA Scale and Anxiety about Aging Scale scores (Pearson: 0.34, p=0)

No significant difference was found between the scores for the scales with respect to sex, place of living and presence of an older relative. First-year students, nutrition and dietetics students and students not participating in nursing home practicums had significantly lower scores on the UCLA-GA Scale. Students with older relatives staying at their homes had significantly higher scores on the Anxiety about Aging Scale. First-year students, nutrition and dietetics students and students sharing their home with an older relative had significantly higher scores for the Anxiety about Aging Scale subscale for fear of older people. Students staying with an older relative and those taking part in activities for older people had significantly higher scores on the psychological concerns about ageing subscale.

Table 1. Characteristics of the participants

Characteristics	Frequency	Percent
Gender		
Women	208	88.1
Men	28	11.9
Year in school		
1	38	16.1
2	52	22.0
3	67	28.4
4	79	33.5
School		
Nursing	146	61.9
Midwifery	54	22.9
Dietetic	36	15.2
Place of longest residence		
Urban	117	49.6
Rural	119	50.4
Education of mother		
Primary school or less	142	60.2
Secondary school	25	10.6
High school	55	23.3
University	12	5.1
No answer	2	0.8
Education of father		
Primary school or less	89	37.7
Secondary school	40	16.9
High school	69	29.2
University	38	16.2
Living with elderly relative		
Yes	46	19.5
No	178	75.4
No answer	12	5.1
Visiting nursing home		
Yes	103	43.6
No	133	56.4
Participation in service to the elderly		
Yes	106	44.9
No	130	55.1

Students with older relatives staying at their homes had significantly higher scores on the anxiety about physical appearance subscale. No correlation was found between fear of losses associated with ageing and any of the tested variables (Table 2). Results from the multiple linear regression analysis revealed that there were no relationships between scores on the UCLA-GA Scale and independent variables. The students living with an older relative at home had significantly higher scores for the Anxiety about Aging Scale and subscales for fear of older, psychological concerns and physical appearance.

Table 2. Mean scores on the geriatrics attitudes and the anxiety about aging scale subscale according to sociodemographic characteristics

	UCLA-GA	Ageing anxiety	Fear of people	Psychological Con.	Physical Ap.	Fear of losses
Sex						
Women	48.32±5.52	66.16±8.97	20.65±3.70	16.09±3.23	16.62±2.76	12.92±3.82
Men	47.50±4.87	68.04±6.78	21.42±3.59	17.96±2.99	17.60±2.85	11.72±4.04
School						
Nursing	48.78±5.25	67.58±8.00	21.35±3.53	16.95±2.84	16.82±2.65	12.72±3.93
Midwifery	48.61±6.09	65.78±9.53	20.69±3.20	16.46±3.79	17.06±3.09	12.36±3.96
Dietetic	46.08±4.69	65.51±7.29	19.22±3.55	16.19±3.031	16.57±2.17	13.79±3.19
F Sig.	3.47, 0.033	5.36, 0.005				
Year in school						
1	44.85±4.52	63.52±9.90	18.89±4.37	15.21±3.48	16.31±2.49	13.14±3.24
2	49.06±5.44	65.53±10.80	20.76±3.68	16.08±3.93	17.20±3.20	12.19±4.12
3	48.40±5.14	68.26±7.40	21.16±3.12	16.17±2.45	16.56±2.58	13.49±3.56
4	49.26±5.62	66.92±7.66	21.38±3.55	16.54±3.07	16.80±2.87	12.21±4.16
F Sig.	6.09, 0.001	4.39, 0.005				
Presence of elderly relative						
Yes	48.29±5.43	66.55±8.80	20.97±3.65	16.34±3.22	16.78±2.78	12.76±3.95
No	47.74±5.61	65.22±8.47	19.13±3.60	16.13±3.53	16.44±2.87	12.92±3.16
Living with elderly relative						
Yes	49.50±6.410	70.47±8.52	22.43±2.69	17.91±3.44	17.51±2.50	12.83±4.78
No	48.05±5.12	65.44±8.67	20.40±3.81	15.89±3.04	16.52±2.87	12.82±3.64
t. p	3.22, 0.001	3.38, 0.001	3.84, 0.000	2.06, 0.040		
Visiting nursing home						
Yes	49.18±5.07	67.08±8.42	21.17±3.70	16.71±3.11	16.72±2.54	12.58±4.08
No	47.43±5.63	65.82±8.99	20.42±3.66	16.01±3.34	16.75±2.97	12.93±3.68
t. p	2.43, 0.016					
Participation in service to the elderly						
Yes	48.68±4.82	67.46±8.13	20.95±3.61	16.86±2.97	16.79±2.35	12.87±3.96
No	47.81±5.92	65.47±9.17	20.58±3.75	15.86±3.43	16.70±3.11	12.71±3.78

DISCUSSION

Ageing anxiety refers to anxiety about changes and losses which occur during the ageing process (7). Studies have shown that adolescents with anxiety about their own ageing processes can have more negative attitudes towards older people as their contact with older people decreases (5). Here attitudes towards older people and ageing anxiety were investigated in students studying at Adnan Menderes University in Aydin, Turkey. Results of the study showed that attitudes towards older people and ageing anxiety were related. Indeed, students



with high scores on the UCLA-GA Scale had lower scores on the Anxiety about Aging Scale, which is consistent with other published results (13).

The students in this study had a positive attitude towards older people. In other studies using the same scale to evaluate attitudes towards older people, nursing and pharmacy students attained scores of 48.64±5.51 and 47.23±5.93, respectively (14,15). Beliefs about older people and ageing vary from culture to culture. The positive attitudes of the Turkish society towards older people, which are influenced by traditions and cultural norms, may explain the positive attitudes identified in this study.

Studies have emphasised that healthcare workers are influenced by societal attitudes towards older people (16). In the current study, nutrition and dietetics students and first-year students scored lower on the UCLA-GA Scale, which suggested that they had more negative attitudes. This result may be attributed to the fact that these students had not yet acquired appropriate knowledge during their occupational education. Misconceptions about ageing can cause negative attitudes towards and discrimination against older people (17).

In this study, the students got higher scores for ageing anxiety than those reported by other studies (6,7,12,18). Ageing anxiety is reportedly affected by societal culture. One study found a significant difference between Turkish and American students in terms of ageing anxiety (12); it was also found to differ between Arab and Jewish students in a study conducted in Israel (19).

Here sex had no impact on ageing anxiety. However, women have higher ageing anxiety (4). Women are most affected by the importance placed by the media on physical appearance of women and the encouragement to invest in physical appearance related to strong materialistic values. The female body, which modern society targets for change into a perfect figure, has become a tool for the survival of the consumer society. Therefore, women are exposed to more pressure to meet societal standards of beauty. Women also recognise that their social opportunities are determined by physical characteristics. The emergence of physical and functional losses and increase in diseases during the ageing process have a greater effect on women (13).

Here students with older relatives staying at their homes had higher scores on the Anxiety about Aging Scale and its subscales, which indicated negative attitudes towards ageing. A study by Allan and Johnson (13) found that participants staying with older relatives had higher anxiety levels about ageing (13). Similarly, here, students participating in activities with older people had high scores on the concerns about physical appearance subscale. A study on Turkish participants conducted by McConatha et al. (12) found high psychological concerns about physical appearance that were ascribed to social and economic chaos and uncertainty in Turkey. The researchers also commented that their participants received no information about ageing except through observation of older relatives, which might have explained their psychological concerns (12). Another Turkish study found that ageing anxiety was related to the degree of emotional connection between grandchildren and their grandparents (18). A study by Bergman (19) emphasised that Arab students spent more time with and had greater respect and value for older people owing to cultural factors. However, the study also found that low education levels in older relatives could be obstacles in communication between generations.

Here nutrition and dietetics and first-year students had lower scores on the fear of older people subscale. In other words, they reported less fear of their older relatives. Unlike the other students in the study, these two groups of students had less responsibility for the care of older people during practicums. In a qualitative study on nursing students, more than half of the students had negative thoughts about ageing, and nearly half considered ageing a negative phenomenon.

Although the students in the present study had a positive attitude towards older people, they were anxious about the ageing process. McGuin et al. reported in their study that participants were

concerned about the aging process (5). Students in this study who were staying with older relatives were more anxious about ageing. Physical and functional losses and social and financial problems resulting from ageing have a considerable effect on young people living with older relatives, and anxiety in students likely to provide care for ageing people may affect their career choices. Voluntary, friendly communication with older people and nurturing of equality between these groups of individuals may have positive influences on their choices (13). Therefore, young people should be provided opportunities to interact with older people in appropriate environments to foster positive attitudes about ageing and ageing people (20). Such interactions will also help young people cope with concerns about ageing.

This study had some limitations. The descriptive study design of the study did not allow complete explanations of causal relationships. Furthermore, the study was conducted in a single centre and an elective lecture's students. therefore, its results do not represent all health sciences students in Turkey. However, this study is the first study on ageing anxiety in health sciences students.

In conclusion, compared with subjects from other countries, Turkish health sciences students, who may eventually provide care for older people, had more severe ageing anxiety despite their positive attitude towards the ageing population. Restructuring the education of these students to allow positive experiences with older people during their practicums will diminish their anxiety about ageing and eliminate negative attitudes towards older people.

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RESEARCH

LIFE SATISFACTION AND QUALITY OF LIFE AMONG THE ELDERLY: MODERATING EFFECT OF ACTIVITIES OF DAILY LIVING

Abstract

Introduction: Increased human life expectancy has led to increases in the elderly population, both in developed and developing countries. Consequently, maintaining and raising the elderly's quality of life has become an important issue. Most studies on aging have found that a person's life satisfaction is strongly associated with their quality of life. This study investigated the moderating effect of activities of daily living on life satisfaction and quality of life.

Materials and Method: The sample comprised 360 elderly people (≥65 years old) who resided in Karabük City, Turkey, and visited the Republic of Turkey Ministry of Health Karabük 100. Yıl Family Health Center for treatment or checkup. Data were collected using the Satisfaction with Life Scale, the World Health Organization Quality of Life Assessment—Old Version, the Instrumental Activities of Daily Living, and a demographic information form. To determine the factors that affect the elderly's quality of life, hierarchical multiple regression analysis was employed.

Results: As elderly individuals' levels of independently maintaining activities of daily living rise, the relationship between their satisfaction with life and quality of life grows stronger.

Conclusion: Life satisfaction positively predicted the elderly's quality of life, whereas activities of daily living did not. In addition, activities of daily living moderated the relationship between life satisfaction and quality of life.

Key Words: Aged; Life satisfaction; Quality of life; Instrumental activities of daily living.

ARAŞTIRMA

YAŞLI BİREYLERDE YAŞAM DOYUMU VE YAŞAM KALİTESİ: GÜNLÜK YAŞAM AKTİVİTELERİNİN DÜZENLEYİCİ ETKİSİ

Öz

Giriş: Beklenen yaşam süresinin uzaması hem gelişmiş hem de gelişmekte olan ülkelerde yaşlı nüfusun artmasına neden olmuştur. Yaşlı nüfusun artmasıyla birlikte, yaşam kalitesinin korunması ve yükseltilmesi önemli bir konu haline gelmiştir. Yaşlılıkla ilgili yapılan pek çok çalışmada bireylerin yaşam doyumları ile yaşam kaliteleri arasında güçlü bir ilişki olduğu saptanmıştır. Bu çalışmada da yaşam doyumu ve yaşam kalitesi arasındaki ilişkide günlük yaşam aktivitelerinin aracı etkisi incelenmiştir.

Gereç ve Yöntem: Araştırmanın örneklemini Karabük ilinde yaşayan yaşlılar oluşturmaktadır. Çalışma 65 ve üstü yaş grubunda olan, tedavi veya kontrol amacı ile "100. Yıl Aile Sağlık Merkezi'ne başvuran toplam 360 yaşlı birey ile yürütülmüştür. Veriler Yaşam Doyumu Ölçeği, Yaşlılar için Dünya Sağlık Örgütü Yaşam Modülü, Enstrümantal Günlük Yaşam Aktiviteleri ve demografik bilgi formu ile toplanmıştır. Yaşlı bireylerin yaşam kaliteleri üzerinde etkili olan faktörleri analiz etmek amacıyla "aşama sıralı regresyon" analizi uygulanmıştır.

Bulgular: Yaşlı bireylerin günlük yaşam aktivitelerini bağımsız sürdürme düzeyleri yükseldikçe, yaşam doyumu ve yaşam kaliteleri arasındaki ilişki de güçlenmektedir.

Sonuç: Çalışmada yaşam doyumu yaşlı bireylerin yaşam kaliteleri üzerinde pozitif bir etkiye sahip iken, günlük yaşam aktivitelerinin yaşam kalitesinin belirleyicisi olmadığı sonucuna ulaşılmıştır. Bununla birlikte günlük yaşam aktivitelerinin yaşam doyumu ve yaşam kalitesi arasındaki ilişkide aracı bir role sahip olduğu sonucuna ulaşılmıştır.

Anahtar Sözcükler: Yaşlı; Yaşam doyumu; Yaşam kalitesi; Enstrümantal günlük yaşam aktiviteleri.

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INTRODUCTION

With the increasing population and lifespan of the elderly population, the concept of old age has been elevated in importance and quality of life has received more attention. Attention should be paid to not only extending the human lifespan but also raising quality of life (1).

Although studies have emphasized that quality of life, which has received much attention in recent years, is vital in all periods of life, it requires greater focus with regard to old age. This is because increased health problems, loss of roles and status, loneliness, reduced cognitive skills, retirement, disconnection from social life, and other factors considerably influence quality of life during this period (2).

Health is an important indicator of quality of life (3), particularly during old age. The ability to perform activities of daily living adequately in all circumstances is the most important health status indicating the quality of life level (4).

Aging is a chronic and universal process leading to diminished overall functioning. This process involves physical deterioration and deteriorating abilities and reflexes due to diminished regeneration in organs and accumulated wear. Consequently, the elderly cannot independently perform activities of daily life and self-care and require assistance, thereby negatively influencing their quality of life (5). Satisfaction with life, which refers to a subjective aspect of quality of life, is an important factor influencing the preservation of quality of life and is affected by activities of daily living (6). From a theoretical viewpoint, it is reasonable to assume that satisfaction with life decreases with activity limitations, thereby negatively affecting quality of life.

Considering the growth of the elderly population and its expected continuance into the next century, it is imperative to explore the effects of activities of daily living on satisfaction with life and quality of life. This will contribute to not only preserving or improving elderly individuals' quality of life but also formulating services and policies for them. In this regard, this study investigates the moderating effect of elderly individuals' activities of daily living on their satisfaction with life and quality of life.

MATERIALS AND METHOD

Sample

The study was conducted in the province of Karabük. In the year 2015, the number of people that aged 65 and older, and lived in the province of Karabük was approximately 7102. The researcher determined the sample size to be 257 participants using sample size formula, with a confidence level of 95%, 50% frequency for event and a confidence interval of 0.6. Calculation formulas were based on ratios or variance. However, there was no variance estimation regarding the current population thus, this study used ratio approach to maximize the sample size. In addition, to decrease sampling error and to take missing value situation under control, the researcher reached to 400 people (7). The participants to be included in the sample were selected from 100.Yıl District, where the residents were elderly individuals in general.

The study group consists of voluntary individuals aged ≥ 65 who visited the 100. Yıl Family Health Center for treatment or checkup. Data were collected via face-to-face interviews conducted between March 14 and May 25, 2016. All participants were informed of the purpose of the study and assured that their answers would be anonymously used for research purposes only. Individuals who did not consent to the interview or did not want to participate in the study were excluded. The research forms were filled in 30 to 60 minutes. Four hundred interviews were conducted. However, 40 research forms filled imperfectly or inadequately were excluded from the analysis; thus, 360 forms were included for the evaluation.

Ethics Statement

Before collecting data, research approval was obtained from the Ethics Committee of Karabük University Medical Faculty. The investigation conformed to the principles outlined in the Declaration of Helsinki. The researcher provided monitoring information to the 100. Yıl Family Health Center.

Instruments

The research data were collected via a measurement tool comprising two parts: first, a demographic information form and, second, the Satisfaction with Life Scale (SWLS), the World Health Organization Quality of Life Assessment (WHOQOL-OLD), and the Instrumental Activities of Daily Living (IADL).

Demographic Form: The demographic form comprised demographic questions designed to obtain information about the elderly individuals participating in the study (gender, age, marital status, monthly income, perceived adequacy of income, educational level, and physical health status).

The Satisfaction with Life Scale (SWLS): The SWLS was developed by Diener, Emmons, Larsen, and Griffin to measure the satisfaction level individuals felt regarding the quality of their lives as a whole (8). The SWLS comprises five items. Responses are given on a seven-point Likert scale ranging from "1=certainly disagree" to "7=certainly agree". The total score ranges from 7 to 35 and a high score indicates high life satisfaction. The reliability and validity study conducted with the SWLS has a high coefficient (0.87), and the two-month test–retest stability coefficient is 0.82. The scale was translated into Turkish by Köker in 1991, and its internal consistency is 0.85 (9). Afterwards; Durak, Şenol-Durak, and Gençöz conducted a study with a sample that included elderly individuals, performed confirmatory factor analysis, and determined that the scale met the one-factor goodness of fit index criteria. The Cronbach's alpha coefficient of the scale was calculated to be 0.89 (10). In this study, internal consistency of the scale was 0.88.

World Health Organization Quality of Life Assessment (WHOQOL-OLD): The World Health Organization developed two quality of life instruments: The WHOQOL-100 and the WHOQOL-BREF. The WHOQOL-100 was developed to examine individuals' perceptions of life through a multidimensional and multicultural approach (11). The WHOQOL-BREF is a short version of the WHOQOL-100. The WHOQOL-OLD was designed as an additional module for use with elderly samples. The WHOQOL-OLD instrument is recorded on a five–point Likert scale ranging from 1 to 5. For each instrument, the lowest and highest scores are 4 and 20, respectively. Higher scores indicate greater quality of life. The WHOQOL-OLD comprises 24 items and a six-facet module for assessing quality of life in older adults. These facets include the following (with Cronbach's alpha values for each within parentheses): Sensory Abilities (0.81); Autonomy (0.72); Past, Present, and Future Activities (0.77); Social Participation (0.86); Death and Dying (0.82); and Intimacy (0.80). The instrument demonstrates good internal consistency (12).

The WHOQOL-OLD was adapted for Turkey by Eser et al. and has psychometric properties similar to the original. This modified instrument demonstrates an internal consistency of 0.85 and the subscales internal consistency was ranges between 0.68 and 0.88 (13).

Instrumental Activities of Daily Living (IADL): The IADL, developed by Lawton and Brody, is measured with an eight-item form (14). The items assess adaptive functioning versus disability in areas important in independent living, including using the telephone, shopping, preparing food, housekeeping, doing laundry, traveling away from home, taking medications properly, and handling personal finances. The most common method is to score the independent activities performed by the individual as 3, the assisted activities as 2, and the activities that the individual cannot perform at all as 1. According to IADL, the individuals having scores between 0 and 8 are evaluated as dependent, while those with scores between 9 and 16 are evaluated as half-dependent, and those having scores between 17 and 24 are evaluated as independent (14, 15).



The IADL was translated into Turkish by the researchers of this study. Principle component analysis (PCA) was implemented on the scale used in order to measure IADL. The results of PCA of the IADL the scale was found to have two factors structure that had an eigenvalue of above 1 and that explained 57.85% of the total variance. This rate of variance explained by two factors was out on acceptable level. Factor 1 has an eigenvalue of 4.56 and explained of variance 43.60%, 5 items are grouped together under the head of this factor. The factor loading of 5 items in the Factor 1 vary between 0.58 to 0.78. Factor 2 explained 14.25% of the total variance and had an eigenvalue of 1.14. Items (3 items) that indicated on Factor 2 with loadings between 0.70 and 0.84.

The researchers made a general calculation of the Cronbach's alpha internal consistency coefficient for the entire scale, and found it to be 0.88. For the two factors included in the scale, the Cronbach's alpha internal consistency coefficients were 0.74 (Factor 1), and 0.75 (Factor 2). The researchers determined that the Turkish translation of IADL scale had sufficient validity and reliability.

Data Analysis

To analyze the data obtained in the study, descriptive statistics (number and percentage distribution, means, standard deviations) were calculated first. Validity and reliability analyses were conducted using the independent (Satisfaction with Life—SWLS), dependent (Quality of Life-WHOQO-OLD), and moderator variables (Instrumental Activities of Daily Living—IADL). Spearman Correlation Analysis were performed to determine the level and direction of the relationship between the dependent and independent variables.

The method proposed by Aiken and West was then used for testing the mediating effect in order to answer the following question: "Do elderly people's activities of daily living have a moderating effect on the relationship between satisfaction with life and quality of life?" (16).

To prevent a multicollinearity problem, means were subtracted from total scores, thereby centralizing the scores before the independent and moderator variables were subjected to regression analysis. Standard z-scores were used for diminishing the possible multicollinearity problem in the analyses. The unstandardized regression coefficients, means, and standard deviations of the independent and mediator variables and the unstandardized regression coefficients of the moderator variable were entered. Significant interactions were interpreted via a simple slope test (16).

The moderating effect of activities of daily living was tested through a range of hierarchical multiple regression analyses based on the steps for mediation and moderation indicated by Baron and Kenny (17).

After it was determined, through hierarchical multiple regression analysis, that activities of daily living have a moderating effect on the relationship between elderly people's satisfaction with life and quality of life, the graph presented by Aiken and West was drawn (16).

RESULTS

Table 1 summarizes demographic information of the elderly people. Of the 360 participants, 178 were female and 182 were male. Ages ranged from 65 to 96 years and the average age was 70.23 years (S: 6.84). The percentage of married females (53.4%) was higher than that of married males (25.8%). The average monthly income was 866,96±405,49 TL. Of the total participants, 46.9% perceived that their monthly income adequacy was unclear (don't know), 29.2% perceived that their monthly income was adequate, and 16.4% stated that their monthly income was inadequate. Nearly 34% had a primary school degree. However, the illiteracy rate was higher among female participants (44.4%) than male participants (11.5%).

Table 1. Demographic variables

Demographic Variables	Female (n=178)		Male (n=182)		Total (n=360)	
	F	%	F	%	F	%
Age (M: 70.23; S: 6.84)						
Less than 74 years	127	71.3	141	77.5	268	74.4
More than 75 years	51	28.7	41	22.5	92	25.6
Marital status						
Single (single, divorced, or widowed)	83	46.6	135	74.2	218	60.6
Married	95	53.4	47	25.8	142	39.4
Monthly income (TL) (M: 866,96; S: 405,49)						
750 TL and less	117	65.7	73	40.1	190	52.8
751–1.250 TL	44	24.7	84	46.2	128	35.5
More than 1.250TL	17	9.6	25	13.7	42	11.7
Perceived income (PI)						
Certainly bad	5	2.8	4	2.2	9	2.5
Bad	29	16.3	30	16.5	59	16.4
Don't know	85	47.8	84	46.2	169	46.9
Good	52	29.2	53	29.1	105	29.2
Certainly good	7	3.9	11	6.0	18	5.0
Education						
Illiterate	79	44.4	21	11.5	100	27.8
Literate	32	18.0	33	18.1	65	18.1
Primary school	50	28.1	71	39.0	121	33.6
Secondary school	10	5.6	25	13.8	35	9.7
High school	7	3.9	32	17.6	39	10.8
Physical health status (PHS)						
Certainly bad	7	3.9	1	.5	8	2.2
Bad	19	10.7	14	7.7	33	9.2
Don't know	103	57.9	80	44.0	183	50.8
Good	48	27.0	80	44.0	128	35.6
Certainly good	1	0.5	7	3.8	8	2.2



According to Table 2, there was a significant negative relationship between elderly individuals' perceived adequacy of income (r=-0.22; p<0.01), physical health status (r=-0.25; p<0.01) and quality of life whereas there were significant positive relationships between quality of life and the following variables: monthly income (r=0.19; p<0.01), educational level (r=0.13; p<0.05), life satisfaction (r=0.46; p<0.01), and activities of daily living (r=0.19; p<0.01).

Table 2. Means, standard deviations (sd), and Spearman correlations for measured variables

Variables	Mean (Esd)	1	2	3	4	5	7	8	9
1. Age	70.2 (6.8)	1,000							
2. Monthly income (TL)	866.96 (405.49)	-.18**	1.000						
3. Perceive income		.08	-.45**	1.000					
4. Education		-.36**	.41**	-.16**	1.000				
5. Physical health status		.26**	-.30**	.27**	-.33**	1.000			
6. SWLS[1]	20.7 (7.2)	-.09	.23**	-.41**	.18**	-.36**	1.000		
7. IADL[2]	5.8 (2.2)	-.42**	.31**	-.13*	.40**	-.44**	.30**	1.000	
8. WHOQOL-OLD	80.1 (11.3)	-.05*	.19**	-.22**	.13*	-.25**	.46**	.19**	1.000

** p<0.01;*p<0.05 [1] SWLS= The Satisfaction with Life Scale; [2] IADL= Instrumental Activities of Daily Living

Hierarchical multiple regression analysis was utilized to explore the moderating role of activities of daily living in the relationship between elderly individuals' level of satisfaction with life and quality of life. Satisfaction with life (SWLS) was taken as an independent variable, quality of life as a dependent variable (WHOQOL-OLD), and activities of daily living (IADL) as a moderating variable. Before hierarchical multiple regression analyses were conducted, the variables of satisfaction with life (independent variable) and activities of daily living (IADL) (moderator variable) were centralized as recommended by Aiken and West, and the interaction term was obtained by multiplying these two centralized terms (16).

While physical health status (don't know) (β=-0.20, p<0.05) and physical health status (certainly good) (β=-0.19, p<0.05) negatively predicted elderly individuals' quality of life (see Table 3), monthly income (β=0.19, p<0.05) positively predicted it. Demographic variables explained 18% of the quality of life result, independently of other variables (R=0.421, R^2=0.177, F=1.895, p<0.05). The centralized variables of satisfaction with life and activities of daily living, which were included in the second stage of the regression analysis, explained 37% of the total variance (R=0.611, R^2=0.373, F=4.502, p<0.001). The standardized regression coefficients (β) and t-test results concerning significance indicated a statistically significant relationship between satisfaction with life (β=0.56, p<0.001) and quality of life and a non-significant relationship between activities of daily living (β=-0.07, p>0.05) and quality of life.

The interaction of satisfaction with life and activities of daily living, which was included in the third stage of the regression analysis, yielded an increase of 3% in the adjusted R^2 value by raising it to 40%, leading to a significant increase (R=0.633, R^2=0.401, F=4.728, p<0.001) (Table 3). This indicates that the effect of satisfaction with life on quality of life varied depending on activities of daily living. This relationship is depicted with a linear regression curve in Figure 1.

Table 3. Hierarchical multiple regression analysis of SWLS and WHOQOL-OLD as a moderator IADL

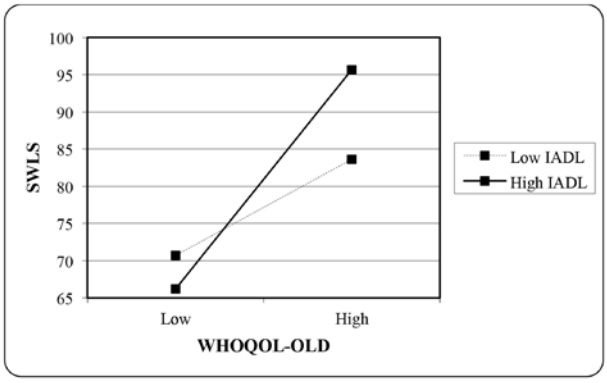
MODEL		B	Beta	t	Sig.	R	R^2	R^2 Adj.	F
1						.42	.18	.09	1.895*
	Age	-0.32	-0.14	-1.560	.121				
	Monthly income	0.01	0.19	2.006	.047*				
	Education Literate	1.81	0.07	.723	.471				
	Education Primary school	0.20	0.01	.079	.937				
	Education Secondary school	1.85	0.03	.348	.728				
	Education High school	7.60	0.15	1.726	.087				
	PHS – Certainly bad	2.27	0.02	.235	.814				
	PHS – Don't know	-4.59	-0.20	-1.993	.048*				
	PHS – Good	-0.79	-0.03	-.229	.819				
	PHS – Certainly good	-11.61	-0.19	-2.116	.036*				
	PI – Certainly bad	-0.87	-0.02	-.157	.875				
	PI – Bad	4.01	0.15	1.696	.092				
	PI – Good	0.61	0.02	.210	.834				
	PI – Certainly good	4.62	0.08	.954	.342				
2						.61	.37	.29	4.502***
	SWLS[1]	0.89	0.56	6.061	.000***				
	IADL[2]	0.21	0.07	.708	.480				
3						.63	.40	.32	4.728***
	SWLS[1] × IADL[2]	0.07	0.20	2.368	.019				

*p<0.05;**p<0.01; ***p<0.001 [1] SWLS= The Satisfaction with Life Scale; [2] IADL= Instrumental Activities of Daily Living

To create regression curves demonstrating the interaction between the two variables in the analyses in which interaction was found to be significant, a regression equation of the dependent variable was computed on the independent variable, taking one standard deviation below the mean and one standard deviation above the mean as the high and low levels of the moderator variable, respectively (16). The means consequently obtained allowed a simple regression curve to be constructed.

According to the results of the simple slope test performed to interpret the interactions on the basis of the high (+1SS) and low (−1SS) activities of daily living, the relationship between quality of life and satisfaction with life was significant and positive for both high and low activities of daily living. When elderly individuals have a low level of satisfaction with life due to a low level of activities in daily living, they tend to have a low quality of life (see Figure 1).

Figure 1. Interaction effects of life satisfaction and activities of daily living on quality of life



DISCUSSION

Aging leads to clear deficiencies in individuals' physical, mental, and cognitive functions, limiting and even preventing their activities of daily living over the course of time. Such limitations lessen satisfaction with life (18) and quality of life (19). In this regard, the present study explored the effect of elderly individuals' activities of daily living on the relationship between quality of life and satisfaction with life, which involves both cognitive and physiological aspects of well-being.

The correlational analysis indicated that quality of life decreases with age but increases as monthly income, perceived adequacy of income, and educational level rise; physical health status improves; satisfaction with life increases; and the ability to maintain activities of daily living independently continues. This corroborates the viewpoints in the literature (19-21).

According to the study's results, elderly individuals' activities of daily living play a moderating role in the relationship between satisfaction with life and quality of life. The mediating effect of the ability to maintain activities of daily living independently of the relationship between elderly individuals' satisfaction with life and quality of life was found to be significant at both low and high levels. Chen also found out that individuals' satisfaction with life lessens as their levels of activity decrease after the age of 65 (20). Investigating the factors influencing elderly individuals' quality of life, Özyurt et al. found that requiring assistance for activities of daily living is a leading factor influencing quality of life (22). Accordingly, as elderly individuals' ability to maintain activities of daily living independently rises, the relationship between their satisfaction with life and quality of life grows stronger. This study result corroborates past studies (6,21,23-24).

With the increase in the elderly population, the maintenance and betterment of the elderly's quality of life is and will be a priority. Therefore, dependence should be minimized in activities of daily living, which considerably influences satisfaction with life and quality of life. To this end, elderly individuals should take protective measures against health problems and engage in efforts that improve their mental and physical functions.

The present study has some methodological limitations. The study sample only included elderly participants from Karabük, which limits the generalizability of the results. Data from different cities should be included in future research.

The results of this study help to further document the moderating effect of activities of daily living on life satisfaction and quality of life in a selected group of elderly Turkish people. This study's results also have significant implications for individuals, families, policymakers, and academics.

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CASE REPORT

SACRAL STRESS FRACTURE IN GERIATRICS: A CASE REPORT

Abstract

The diagnosis of sacral stress fractures in geriatrics is often neglected because of lumbar pains and referred pains. We report regarding a 67-year-old woman who complained of chronic back pain and right hip pain that persisted despite analgesic therapy. Flexion-abduction-external-rotation (FABER), Gaenslen's, and Scour test were positive on the right side of the patient's examination, but squish test was not. The patient's neurologic examination was normal. Although computed tomography and X-rays of the hip and lumbosacral areas revealed no obvious pathology, sacral stress fracture was diagnosed using magnetic resonance imaging, which was performed because of the patient's chronic pain. This report aimed to draw attention to low back and hip pains in geriatrics because of probable sacral stress fractures and to emphasize on the importance of available radiological modalities for an accurate diagnosis.

Key words: Geriatrics; Fractures, Stress; Magnetic resonance imaging;

OLGU SUNUMU

GERİATRİK SAKRUM STRES KIRIĞI; BİR OLGU SUNUMU

Öz

Geriatri yaş döneminde görülen sakral stres kırıkları bel ağrıları ve yansıyan ağrılar nedeniyle tanıda ihmal edilen karmaşık bir durum olarak görülür. Bu çalışmada, bu dönemde bel ve sağ kalça ağrısı olup analjezik tedavisi ile ağrısı geçmeyen 67 yaşında kadın hasta değerlendirildi. Hastanın yapılan muayenesinde fleksiyon-abdüksiyon eksternal rotasyon (FABER), Gaenslen, ve Scour testi sağda pozitif; fakat squish testi negatif değerlendirildi. Hastanın nörolojik muayenesi normal olarak değerlendirildi. Çekilen lumbosakral ve kalça röntgenleri ve Bilgisayarlı Tomografisinde (BT) belirgin patoloji izlenmedi. Hastanın ağrılarının devam etmesi sonucu çekilen Manyetik Rezonans Görüntülerinin (MRG) incelenmesi sonucunda sakral stres kırığı teşhisi kondu. Bu çalışmanın amacı, geriatrik dönemdeki bel ve kalça ağrısının dikkate alınması gerektiği ve sakral stres kırıklarının olabileceğine dikkat çekmek ve kesin tanı açısından radyolojik bütün modalitelerin kullanılması gerekliliğinin vurgulanmasıdır.

Anahtar sözcükler: Geriatri; Sakral stres kırığı; MRG

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INTRODUCTION

Sacral stress fractures, initially described by Lourie in 1982, results from a normal load on a weakened bone that has reduced elasticity. Although considered a rare cause of low back pain, sacral stress fractures are overlooked because of the lack of specific symptoms (1). Diagnosis of a sacral stress fracture is either delayed or misdiagnosed because of less awareness regarding its clinical entity (2).

Sacral insufficiency fracture, a stress fracture subtype, occurs as a result of exposure of bones with reduced mineralization and elasticity to withstand normal load (3).

Because of hormonal influences and mechanical stresses, the body undergoes some hormonal and anatomical changes during menopause, osteoporosis, and the geriatric period. These changes lead to musculoskeletal pains such as low back and hip pains (4, 5).

Magnetic resonance imaging (MRI) has a high sensitivity in revealing bone marrow edema at a fracture line, which is distinct from metastases. Bone marrow edema caused by inflammation at the fracture line appears hypointense on T1-weighted MRI sequences and hyperintense on T2-weighted MRI sequences; however, the fracture line is hypo- or isointense on T2-weighted MRI sequences (2).

CASE REPORT

A 67-year-old female patient with complaints of low back pain was given a preliminary diagnosis of lumbar disc herniation. The patient was unable to sustain any weight bearing with the right limb. No findings of neurological abnormalities were found during the clinical investigation. The patient reported tenderness over right paraspinal muscle and over the right superior gluteal region and pain during palpation at right sacral and iliac compression. She complained of a localized pain that stretched out from the right hip to the right sacral area. She was unable to identify a specific traumatic event or movement when the pain first manifested itself. Lumbar computed tomography (CT) and MRI examinations revealed no pathology; therefore, the patient was administered analgesics and anti-inflammatory medications. She was referred to our clinic because of ongoing complaints. She stated that her pain increased with activity and decreased with rest and that she had no incontinence, numbness, or tingling in the legs and no history of trauma. Flexion-abduction-external-rotation (FABER), Gaenslen's, and Scour test were positive on the right side of the patient's examination, but squish test was not. She had no endocrine (such as hypogonadism, hyperthyroidism, and hyperparathyroidism), tumoral (such as multiple myeloma), or metabolic (including diabetes mellitus) diseases, which generally cause decreased bone mass by affecting bone metabolism, and she had no history of drug use, which are known to cause osteoporosis. Performed examinations were evaluated, and sacral MRI was performed. Evaluations of the T1- and T2-weighted axial and coronal sections of her MRI led to a definitive diagnosis of a sacral stress fracture (Figures 1-4).

DISCUSSION

Diagnosing sacral stress fractures is challenging and is often overlooked, leading to delayed and/or improper treatments and eventually, to the application of improper/inappropriate and invasive diagnostic processes (6). Furthermore, prolonged diagnostic processes delay recovery and result in the emergence of harmful effects of immobilization by reducing the likelihood of early rehabilitation (7). Sacral stress fractures can cause severe low back pain, and thus, should be considered in differential diagnosis of low back pain in elderly patients with no history of trauma. This case report aimed to emphasize on the importance of accurately diagnosing low back and hip pains in geriatric patients and to draw attention to probable sacral stress fractures, despite being rare. MRI or CT and/or bone scintigraphy should be performed in patients with suspected sacral stress fractures. MRI is the most sensitive screening method and is considered as the gold standard for diagnosing sacral stress fractures (8). MRI usually provides a diagnosis (9). We believe that this case report will increase the awareness regarding sacral stress fractures in geriatrics and will be helpful in determining the most accurate diagnostic method.



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Life Satisfaction and Quality of Life Among the Elderly: Moderating Effect of Activities of Daily Living
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Sacral Stress Fracture in Geriatrics: A Case Report
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