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From The Editor In Chief

Fifth Course on Geriatrics and Gerontology was held during the 25 th-29 th of April, 2016 in Ankara. All aspects of geriatrics and gerontology were presented and discussed during this interactive course which was organized in collaboration with Turkish Geriatrics Society-TGS, the International Institute on Ageing-INIA, United Nations Malta and Hacettepe University Research Center of Geriatric Sciences-GEBAM.

Prof. Dilek ASLAN, Assoc. Prof. Tolga Reşat AYDOS, Prof. Terken BAYDAR, Prof. Mehmet BEYAZOVA, Prof. Sedat BOYACIOĞLU, Prof. Banu CANGÖZ, Assoc. Prof. Ozlem ERDEN AKI, Prof. Fethiye ERDİL, Dr. Marvin FORMOSA, Prof. Yeşim GÖKÇE KUTSAL, Prof. Nur HERSEK, Prof. Gerald KOH, Prof. Haldun MÜDERRİSOĞLU, Dr. Osman ORSEL, Prof. Neslişah RAKICIOĞLU, Dr. Meltem ŞENGELEN, Assist. Prof. Zahide TUNA took part as the trainers from International Institute on Aging-INIA, Malta Üniversity, Faculty for Social Wellbeing, Saw Swee Hock School of Public Health, National University of Singapore, National University Health System, Hacettepe University, Medical School, School of Dentistry, School of Pharmacy, Scool of Health Sciences, School of Psychology, School of Nursing, Baskent University School of Medicine, Gazi University School of Medicine, Darusssafaka Rehabilitation Center and Atatürk Chest Diseases Hospital.

Because of the great interest and the admiration of the participants, the committee decided to organize new courses in the coming years.

Prof. Yesim GOKCE KUTSAL

Editor in Chief

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RESEARCH

NONTHYROIDAL ILLNESS SYNDROME IN SEVERE CHRONIC OBSTRUCTIVE PULMONARY DISEASE EXACERBATIONS IN THE ELDERLY

ABSTRACT

Introduction: Aging is often associated with decreased serum triiodothyronine levels. There is growing evidence that critical illness can cause thyroid dysfunction and nonthyroidal illness syndrome. Elderly patients with severe chronic obstructive pulmonary disease exacerbations may be more prone to thyroid function impairment. We evaluated nonthyroidal illness syndrome incidence in elderly patients with chronic obstructive pulmonary disease during severe exacerbations and the possible impact on short-term prognosis.

Materials and Method: Elderly patients (≥65 years) admitted with a diagnosis of acute respiratory failure due to an acute exacerbation were included in the study. All patients were evaluated for thyroid function and its relationship with clinical outcomes.

Results: Forty-four patients with a median age of 71.5 years were included. Nonthyroidal illness syndrome incidence was 65.9% (n = 29) and it was related with increased noninvasive ventilation failure rate (p=0.04). Compared with survivors, nonsurvivors had lower triiodothyronine levels (p=0.02). Only the Glasgow coma score and noninvasive ventilation failure were found to be independent predictors of hospital mortality in logistic regression analysis.

Conclusion: In this study, nonthyroidal illness syndrome was found to be relatively common in elderly patients with chronic obstructive pulmonary disease having severe exacerbations. The presence of nonthyroidal illness syndrome in these high-risk patients may affect response to treatment, and eventually, outcomes.

Key Words: Pulmonary Disease, Chronic Obstructive; Disease Progression, Aged; Euthyroid Sick Syndromes; Triiodothyronine; Mortality.

ARAŞTIRMA

İLERİ YAŞ KOAH HASTALARINDA AĞIR ALEVLENMEDE NONTİROİDAL HASTALIK SENDROMU

ÖZ

Giriş: Yaşlanma genellikle serum triiodotironin seviyesinde azalma ile ilişkilidir. Ayrıca kritik hastalık varlığında tiroid disfonksiyonu ve nontiroidal hastalık sendromu geliştiğine dair kanıtlar gün geçtikçe artmaktadır. Özellikle kronik obstrüktif akciğer hastalığı olan ileri yaştaki hastalar bu durumun gelişmesi için yatkın olabilir. Bu çalışmada ileri yaştaki kronik obstrüktif akciğer hastalığı olan olgularda ağır alevlenme esnasında nontiroidal hastalık sendromu gelişim sıklığını ve kısa dönem prognoza etkilerini değerlendirmeyi amaçladık.

Gereç ve Yöntem: Kronik obstrüktif akciğer hastalığı akut alevlenmesi ile akut solunum yetmezliği gelişen yaşlı hastalar (?65yaş) çalışmaya dahil edilmiştir. Hastaların demografik ve klinik özellikleri ile hastane başvurusundaki tiroid fonksiyonları kaydedilmiş ve klinik sonuçlara etkisi değerlendirilmiştir.

Bulgular: Kırk dört hasta (ortanca yaş 71,5) çalışmaya dahil edilmiştir. Nontiroidal hastalık sendromu görülme sıklığı %65,9 (n=29) olarak bulunmuştur ve nontiroidal hastalık sendromu olan hastalarda noninvaziv ventilasyon başarısızlığı daha sık saptanmıştır (p=0,04). Sağkalan hastalar ile karşılaştırıldığında ölen hastaların ortanca triiodotironin seviyelerinin daha düşük olduğu görülmüştür (p=0,02). Hastane mortalitesi için yapılan lojistik regresyon analizinde sadece Glasgow koma skoru ve noninvaziv ventilasyon başarısızlığı bağımsız faktörler olarak bulunmuştur.

Sonuç: Bu çalışmada ileri yaştaki kronik obstrüktif akciğer hastalığı ağır alevlenmesinde nontiroidal hastalık sendromu varlığı sık saptanmıştır. Yüksek riskli gruplarda nontiroidal hastalık sendromu tedaviye yanıtı ve dolayısı ile klinik sonuçları etkileyebilir.

Anahtar Sözcükler: Kronik Obstrüktif Akciğer Hastalığı; Alevleme; Yaşlı; Nontiroidal Hastalık Sendromu; Triiodotironin; Mortalite.

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Introduction

Aging is an important factor associated with impaired thyroid function, and several changes in thyroid hormone secretion, metabolism, and action occur with increasing age (1). Impaired thyroid function can present as subclinical hypothyroidism, overt hypothyroidism, and nonthyroidal illness syndrome (NTIS). Nonthyroidal illness syndrome is characterized by low serum triiodothyronine (T3) levels with normal or low thyroid stimulating hormone (TSH) levels. It is relatively common in elderly patients, with an incidence of approximately 32%–62% in the hospitalized geriatric population (2-4). The serum T3 level is accepted as a prognostic biomarker for acutely ill elderly patients and is reported to be the most sensitive independent predictor for short-term mortality (2). Alterations in thyroid function during hospitalization have been associated with long-term mortality in elderly patients (3). Therefore, clinical consequences of thyroid dysfunction should be well defined in elderly patients at a higher risk of death.

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality worldwide, resulting in premature death because of its complications (5). It's expected to be the third cause of death in 2020. Chronic obstructive pulmonary disease is now considered to be a systemic disease because of ongoing systemic chronic inflammation. Several effects occurring outside the lungs are often associated with extrapulmonary abnormalities and have been described as systemic effects of COPD. Cardiovascular disease, skeletal muscle dysfunction, metabolic syndrome, diabetes, osteoporosis, depression, and lung cancer are the most commonly described comorbid conditions. Among endocrinological disorders, thyroid abnormalities are often observed in patients with COPD (6,7). Impaired thyroid function can present as subclinical hypothyroidism, overt hypothyroidism, and NTIS. Of these, NTIS is the most common issue observed in COPD, reported in 20% of stable patients and 70% of patients experiencing an exacerbation (8). However, there are limited data regarding the impact of NTIS in patients with COPD having severe exacerbations.

Low T3 levels are now accepted as a predictor for poor outcomes during critical illness (9). Here we evaluated NTIS incidence in elderly patients with COPD during critical illness and its correlation with short-term prognosis.

Methods

Patients

The study was approved by local ethics committee. Elderly patients (≥65years) admitted to the intensive care unit (ICU) with a diagnosis of acute respiratory failure due to COPD exacerbation were included into the study between May 2011 and January 2013. Patients with a known history of thyroid disease, patients previously administered drugs that may affect thyroid function (oral corticosteroids, amiodarone, and lithium), and patients who stayed in ICU for <24 h were excluded. The study flowchart is presented in Figure 1. Patients' demographic characteristics and clinical characteristics including pulmonary function tests from within the previous year (if available), Glasgow coma score (GCS), acute physiology and chronic health evaluation (APACHE) II score, blood gas values, mechanical ventilatory support, length of stay in the ICU and hospital, and hospital mortality were recorded.

Mechanical Ventilation Support

After ICU admission all patients required mechanical ventilatory support due to hypercapnic respiratory failure. Mechanical ventilation support was initiated either invasively or noninvasively according to the degree of respiratory failure and the patient's clinical condition. Invasive mechanical ventilation was initiated if intubation was necessary. Noninvasive ventilation (NIV) was performed by experienced ICU staff using pressure support with an oronasal mask. NIV failure was defined as requiring endotracheal intubation at any time.

Thyroid Function Assessment

Thyroid function assessment was performed within the first 24 h of admission to ICU. Venous blood serum was separated, serum levels of free T3, free thyroxine (T4), and TSH were determined using an immunoassay (Advia Centaur, Siemens). The normal ranges were considered to be 2.30–4.20 pg/mL for T3, 0.74–1.52 pg/mL for T4 and 0.55–4.48 μIU/mL for TSH. NTIS was diagnosed according to the *Turkish Society of Endocrinology and Metabolism* guideline (10) and defined as decreased serum T3 levels with normal or decreased TSH levels.

Statistical Analysis

The primary study outcome was the frequency of NTIS in severe exacerbations in elderly patients with COPD. Secondary outcomes were NIV failure, length of ICU and hospital stay,

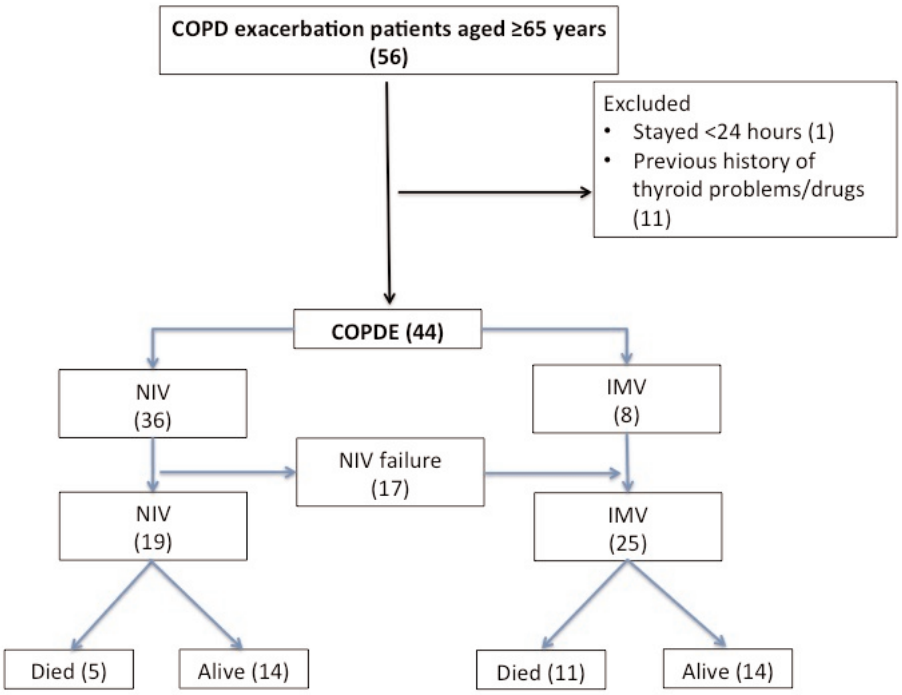


Figure 1— Study flowchart.

and hospital mortality. All continuous variables were expressed as medians with interquartile range (IQR). For bivariate analysis, categorical variables were compared using the chi-square test and continuous variables were compared using the Mann–Whitney U test. Logistic regression analysis with backward elimination was used to obtain independent predictors for hospital mortality. A two-sided p value of <0.05 was considered to be statistically significant. All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) for Windows program, version 17 (SPSS Inc., Chicago, IL, USA).

Results

Forty-four patients >65 years were included in the study; their general characteristics are presented in Table 1. The median age was 71.5 (63.5–77.8) years. Spirometric measurement was available in the medical records of 23 patients, and all patients had airflow obstruction with a median forced expiratory volume in 1 sec (FEV1) of 0.83 L. The most common comorbidities were hypertension (61.4%) and congestive heart failure (50%). All patients had severe hypercapnic respiratory failure during admission with a median partial pressure of carbon dioxide in arterial blood ($PaCO_2$) of 73.8 (62.0–84.0) mmHg and a pH of 7.26 (7.19–7.33). In 36 patients, initial ventilatory support was with NIV; among them, 17 required intubation during follow-up. The median T3 level of the study population was 1.93 (1.60–2.38) pg/ml, and T3 levels were below normal in 29 patients. There was a negative correlation between T3 levels and APACHE II score (r=-0.491, p=0.008; Figure 2). However there was no association between T3 levels and the partial pressure of oxygen in arterial blood (PaO_2; data not shown). Intubated patients (n=25) had lower T3 levels than patients with NIV (1.8 vs 2.31).

Nonthyroidal illness syndrome incidence in the study population was 65.9% (n=29). Six patients had low serum T4 levels and these patients had significantly higher APACHE II scores (41 vs 23; p=0.014). Bivariate analysis between NTIS positive and negative groups is shown Table 2. Median (IQR) T3 levels were 1.8 (1.3–1.9) pg/mL in the NTIS positive group, whereas they were 2.6 (2.3–2.8) pg/mL in the NTIS negative group. On admission, NTIS positive patients had a lower pH than NTIS negative patients [7.22 (7.15–7.30) and

Table 1— General Characteristics of The Study Population (n = 44)

Male gender	32 (72.7)
Age (years)	71.5 (65.5–77.8)
Smoking history	
Smokers	9 (20.5)
Ex-smokers	23 (52.3)
Never smokers	12 (27.3)
FEV1*	
Liters	0.85 (0.58–1.26)
% of predicted	31.7 (19.6–42.6)
GCS	15 (8–15)
APACHE II score	24 (18–34)
Admission arterial blood gases	
pH	7.26 (7.19–7.33)
$PaCO_2$ (mmHg)	73.8 (62.0–84.0)
PaO_2 (mmHg)	52.5 (39.4–64.6)
Thyroid function	
T3 (pg/mL)	1.93 (1.60–2.38)
T4 (pg/mL)	1.04 (0.90–1.22)
TSH (μIU/mL)	0.68 (0.18–1.25)
Presence of NTIS	29 (65.9)
Initial ventilatory support	
Noninvasive	36 (81.8)
Invasive	8 (18.2)
NIV failure	17 (38.6)
Length of ICU stay (days)	15.0 (9.5–22.5)
Length of hospital stay (days)	16.0 (11.5–24.0)
Hospital mortality	16 (36.4)

*Available in 23 patients.

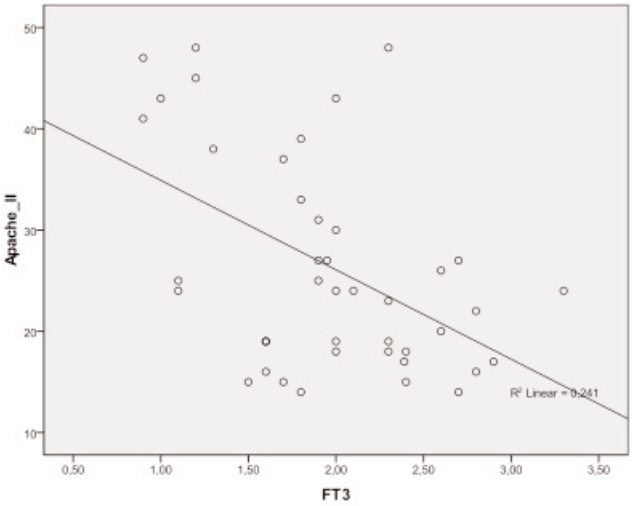


Figure 2— Negative correlation between T3 levels and APACHE II (r = ?0.491; p < 0.01)

7.31 (7.28–7.36) respectively, p=0.01]. Patients with NTIS had a higher NIV failure than patients without NTIS (60.9% and 23.1% respectively; p = 0.04). There were no statistically significant differences between the two groups for the length of ICU and hospital stay or hospital mortality.

Sixteen patients (36.4%) died during their hospital stay. Table 3 shows the characteristics of survivors and nonsurvivors. Compared with survivors, nonsurvivors had lower GCS scores [15 (14.5–15.0) vs 8 (4.5–12.5); p<0.01], higher APACHE II scores [20 (16–27) vs 27 (23–41); p=0.02], a higher NIV failure rate (21.4% vs 68.8%; p < 0.01) and lower T3 levels [2.0 (1.73–2.55) vs 1.8 (1.13–2.0) pg/mL; p=0.02]. Only GCS score and NIV failure were found to be independent predictors of hospital mortality in logistic regression analysis (Table 4).

Discussion

There is growing evidence that critical illness causes thyroid dysfunction. We hypothesized that elderly patients with COPD who are critically ill due to a severe exacerbation may be more prone to thyroid function impairment. In this study, we found that NTIS was relatively common (65.9%) in this patient population. Nonthyroidal illness syndrome incidence has been reported to be as high as 60%–70% in critically ill patients (11). Plikat et al reported NTIS incidence to be 44.1% in medical ICUs, and in another study by Wang et al low levels of thyroid hormones were found in nearly half of the patients (9,12).

Thyroid dysfunction in pulmonary diseases has been studied less. NTIS incidence was approximately 50% in patients with respiratory failure in one study (13). With regard to patients with COPD, there are different incidence rates for stable periods and exacerbations; however, most studies show that exacerbations result in decreased T3 levels (8,14). A study performed by Karadag et al reported that NTIS incidence was 20% in patients with stable phase COPD; however, it was 70 % in patients with exacerbations (8). Reportedly, average T3 levels were lower in patients with COPD exacerbations than in both stable COPD cases and controls (14). Another study demonstrated that thyroid function was restored after the exacerbation resolved (15). These data show that COPD exacerbations are disease periods characterized by prominent thyroid dysfunction. Significant inflammatory responses may be responsible for changes in the neuroendocrine axis and hormonal profile, which could cause a decrease in T3 levels during exacerbations.



Table 2— Bivariate Analysis of Patients According to Presence of NTIS

	NTIS (-) n=15	NTIS (+) n=29	p
GCS	15 (15–15)	11 (6–15)	0.01
APACHE II score	19 (17–24)	27 (19–39)	0.02
Admission arterial blood gases			
pH	7.31 (7.28–7.36)	7.22 (7.15–7.30)	0.01
$PaCO_2$ (mmHg)	77.0 (62.0–86.1)	71.8 (61.3–83.9)	0.68
PaO_2 (mmHg)	49.4 (43.2–67.3)	53.0 (38.5–64.1)	0.76
Initial ventilatory support			
Noninvasive	13 (86.7)	23 (79.3)	0.70
Invasive	2 (13.3)	6 (20.7)	
NIV failure	3 (23.1)	14 (60.9)	0.04
T3 (pg/mL)	2.60 (2.30–2.80)	1.80 (1.25–1.93)	<0.01
T4 (pg/mL)	1.23 (1.16–1.34)	0.98 (0.82–1.10)	<0.01
TSH (μIU/mL)	0.52 (0.14–1.36)	0.73 (0.19–1.04)	0.85
Hospital mortality	3 (20.0)	13 (44.8)	0.19

Table 3— Bivariate Analysis According to Hospital Mortality

	Survivors n = 16	Nonsurvivors n = 28	p
Male gender	11 (68.8)	19 (65.5)	0.73
Age (years)	74.0 (66.5–79.5)	71.0 (62.0–74.0)	0.09
GCS	8 (4.5–12.5)	15 (14.5–15)	<0.01
APACHE II score	20 (16–27)	27 (23–41)	0.02
Admission arterial blood gases			
pH	7.23 (7.20–7.35)	7.28 (7.19–7.33)	0.62
$PaCO_2$ (mmHg)	76.6 (63.4–86.6)	73.4 (60.9–81.2)	0.40
PaO_2 (mmHg)	51.7 (39.0–61.3)	54.2 (40.2–66.5)	0.57
Initial ventilatory support			
Noninvasive	11 (68.8)	25 (89.3)	0.12
Invasive	5 (31.3)	3 (10.7)	
NIV failure	11 (68.8)	6 (21.4)	<0.01
Length of ICU stay (days)	17.5 (12.3–35.0)	13.0 (9.0–20.5)	0.25
Length of hospital stay (days)	17.5 (12.3–35.0)	15.0 (11.0–22.0)	0.24
NTIS	13 (81.3)	16 (57.1)	0.19
T3 (pg/mL)	1.80 (1.12–2.00)	2.0 (1.73–2.55)	0.02
T4 (pg/mL)	0.98 (0.73–1.17)	1.12 (0.92–1.28)	0.12
TSH (μIU/mL)	0.53 (0.22–1.80)	0.72 (0.16–1.03)	0.59

Table 4— Independent Factors for Hospital Mortality

	Odds ratio	95% Confidence Interval	p
APACHE II score	0.92	0.81–1.05	0.26
GCS	0.72	0.53–0.98	0.04
NIV failure	36.3	3.23–408.10	<0.01
T3	0.19	1.02–2.32	0.19

Our study indicates that there was a negative correlation between T3 and APACHE II score. These results are similar to previously reported data in the literature; the study performed by Plikat et al showed that patients with reduced serum T3 had the highest APACHE II scores (12). Furthermore, examining thyroid hormone levels in addition to calculating the APACHE score may improve the prediction of mortality for patients in ICU (16). In the present study NTIS was associated with lower GCS and higher APACHE II scores. These scores are considered to be important measures of disease severity and predictors of outcomes in critical illness. Similar to other critical states, clinicians should consider that patients with COPD with high APACHE II scores and low GCS have a higher risk of NTIS during exacerbations.

Previous data have shown that the degree of hypoxemia is correlated with the T3/T4 ratio in patients with COPD (17). In our study, all patients were hypoxemic and either noninvasively or invasively required mechanical ventilatory support; however, we could not identify a correlation between the degree of hypoxemia and T3 levels. This may be because most of our patients had severe COPD with a predicted FEV1 <30% and were probably chronically hypoxemic.

Low T3 levels and the presence of NTIS have been reported as predictors of outcomes in respiratory failure (13,18). We found that NTIS was associated with lower pH and an increased NIV failure rate. The correlation between thyroid impairment and respiratory failure was evaluated in different patient populations. Plikat et al evaluated 247 (33.2%) of 743 patients in ICU whose thyroid hormone test results were available and found that impaired thyroid function was more common in mechanically ventilated patients than in those without mechanical ventilation (12). For respiratory failure cases, presence of NTIS increased invasive mechanical ventilation requirement (13). Other studies showed that NTIS was correlated with prolonged ventilation (19,20). All these studies evaluated invasive mechanical ventilation. However, in our study most patients were under NIV, and this is the first study evaluating the correlation between NTIS and NIV failure. Thyroid hormones are critical determinants of metabolic activity in adults, and they can regulate metabolic rate and, particularly, respiratory drive. The impaired respiratory drive in patients with a low T3 status may result in NIV failure.

Hospital mortality in COPD exacerbation was found to be 36.4% in this study. Hospital mortality in patients with COPD exacerbations is approximately 11%–24%; however, it is increased seven-fold in severe exacerbations (21). Reportedly, age is an additional risk factor for mortality; in one study, patients with COPD>75 years had increased mortality (22). Another factor associated with increased hospital mortality is the requirement for mechanical ventilation support: mortality is increased to 25% in patients who need NIV support. High mortality rate in our study may be associated with the coexistence of additional risk factors such as severe exacerbation, increased age, and mechanical ventilation requirement.

Nonsurvivors had lower GCS and higher APACHE II scores, a higher NIV failure rate, and lower T3 levels. In the logistic regression model for hospital mortality, only GCS score and NIV failure were independent predictors for mortality. NIV failure is accepted as a major risk factor for increased mortality in COPD exacerbations (23). In the European COPD audit study, the risk factors for hospital mortality were older age, presence of acidotic respiratory failure, subsequent ventilatory support requirement, and presence of comorbidity (24). Our study population had most of those factors associated with mortality. Low GCS is considered to be a risk factor for NIV failure. For elderly hypercapnic respiratory failure cases with NIV, a GCS of >9 points is associated with a better survival (25).

Our study has several limitations. First, the study was performed with a limited number of patients in one center. Second, we only included elderly patients; therefore, there was no comparison with younger patients with COPD. However, comparison with younger patients is not easy because COPD is a progressive disease and most patients with severe COPD are >65 years. Third, we did not evaluate survivors after exacerbation for reversal of thyroid dysfunction.

However, we believe that our study has important strengths. This is the first study evaluating the effect of NTIS on NIV therapy in a geriatric population. In addition, all patients had a severe COPD exacerbation with acute respiratory failure; therefore, we are confident that our sample represents critically ill elderly patients. Last, COPD will be one of the major cause of death worldwide in future years and we think that our results have great value for the management of elderly COPD patients.

In conclusion, we suggest that the presence of NTIS may have an adverse effect on outcomes in elderly patients with severe COPD exacerbations. Whether the low T3 level in these conditions is an adaptive physiologic response or a result of a maladaptive state is yet unclear. Because there is no evidence for tissue hypothyroidism to date, thyroid replacement therapy is not advised. However, it should be considered that the magnitude of these changes is associated with the underlying disease severity, and further studies are required to evaluate the significance of NTIS in the critically ill elderly population.



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RESEARCH

FACTORS AFFECTING THE DURATION OF ADMISSION AND DISCHARGE IN A PALLIATIVE CARE CENTER FOR GERIATRIC PATIENTS

ABSTRACT

Introduction: The factors that have an impact on the stay and discharge of geriatric patients who were admitted to palliative care center (PCC) were investigated.

Materials and Method: 111 were included in the study. Age, gender, marital status, primary diagnoses, nutritional status, decubitus ulcer, pain issues, palliative performance scale (PPS) scores, duration of PCC and "wanting to be discharged" status of patients were recorded.

Results: Distribution of patients were as follows: neurological disease 47 (42.3%), cancer 26 (23.4%), chronic systemic conditions 46 (41.4%), infections 12 (10.8%), nutritional problems 58 (52.2%), decubitus ulcers 45 (40.5%) and pain 14 (12.6%). The median duration of PC was 24 days. Duration of hospitalization in patients with nutrition and decubitus ulcers were detected longer ($p<0.05$). "Wanting to be discharged" rate was lower in patients with neurological disease, poor PPS scores, decubitus ulcer and nutritional problems whereas higher in patients with cancer. According to the binary logit model, a diagnosis of cancer and PPS score were increased whereas nutritional problems and decubitus ulcers were decreased the probability of wanting to be discharged.

Conclusions: A coordinated effort between palliative care and home health care may shorten the duration of in-patient palliative care and hasten the process of discharge.

Key Words: Geriatrics; Palliative Care; Home Health Nursing; Patient Discharge.

ARAŞTIRMA

GERİATRİK YAŞ GRUBUNUN PALYATİF BAKIM MERKEZİNDEKİ YATIŞ SÜRESİ VE TABURCULUĞUNDA ETKİLİ FAKTÖRLERİN İNCELENMESİ

ÖZ

Giriş: Bu çalışmada palyatif bakım merkezinde yatırılarak palyatif bakım sağlanan geriatrik yaş grubununun yatış süresi ve taburculuklarında etkili faktörlerin incelenmesi amaçlandı.

Gereç ve Yöntem: 111 hasta çalışmaya dahil edildi. Hastaların yaşı, cinsiyeti, medeni durumu, primer tanıları, beslenme, dekibüt ülseri ve ağrı problemleri, palyatif performans skalaları (PPS), PB kalış süreleri ile taburculuğu isteyip istemedikleri kaydedildi. "Taburcu olmayı isteme" üzerinde olası etkili faktörler için Binary Logit modeli oluşturuldu.

Bulgular: Nörolojik hastalıklar 47 (%42,3), kanser 26 (%23,4), kronik sistemik hastalık 46 (%41,4) ve enfeksiyon 12 (%10,8) tanısı ile takip edilen hastaların 58 (%52,2) de beslenme, 14' (%12,6) de ağrı ve 45 (%40,5) de ise dekibüt ülseri mevcuttu. PB kalış süreleri 24 gün olarak belirlendi. Beslenme ve dekibüt ülseri olan hastaların PB kalış süresi daha uzun idi ($p<0,05$). "Taburcu olmayı isteme" oranı nörolojik hastalığı, kötü PPS skorlu, dekibüt ülserli, beslenme problemi bulunan hastalarda düşük, kanser tanısı olanlarda yüksekti. Binary logit modeli sonuçları değerlendirildiğinde taburcu olmayı isteme olasılığını kanser tanısı ve PPS değerinin artırdığı, beslenme ve dekibüt ülserinin ise azalttığı tespit edildi.

Sonuç: Palyatif bakım ve evde bakım hizmetlerinin birlikte koordine çalıştırılması yoluyla hastaların eve taburculuğu hızlanabilir ve bu sayede palyatif bakımda yatış süresinin kısalabileceğini düşünüyoruz.

Anahtar Sözcükler: Geriatrik; Palyatif Bakım; Evde Bakım; Taburculuk.

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Introduction

Recent data shows a global increase in the proportion of elderly individuals in the general population, leading to increased incidence of chronic and degenerative diseases (1). Consequently, the annual rate of deaths is also expected to rise continuously and reach 74 million by the year 2030 (2). Despite the absence of a universal definition of old age, many countries accept an age limit of over 65 years of age as defining the geriatric population. The World Health Organization (WHO) accepts a chronological age of 65 years or older as people who are of "old age" and ≥85 years as people who are of a "very old age" Gerontologists divide the elderly population into these three groups: young elderly (65–74 y), moderately old elderly (75–84 y), and old elderly (> 85 y) (3, 4). According to data provided by the Turkish Statistics Agency, the proportion of individuals ≥65 years of age in the general population of Turkey was 4.2% in 1995, 4.7% in 2000, 5.7% in 2010, and 7.8% in 2015. This percentage is expected to double within 20 years and Turkey is expected to harbor the highest number of elderly individuals in Europe by the year 2050 (5). A direct consequence of the increase in the number of elderly people within a given society is the increased need for palliative care services. WHO considers the development of public health policies to address the palliative care of the geriatric age group as a priority (6). In many developed countries, the majority of the deaths of elderly patients have been reported to occur in hospitals, where they have been admitted into against their wishes (7). A significant proportion of the elderly patients discharged from hospitals may not experience a complete clinical and functional recovery. The less the functional recovery, the higher the dependence on others, hence, the higher use of socio-economic resources (8, 9). Several conditions including cancer, ischemic heart disease, diabetes mellitus, hemorrhagic or ischemic stroke, hypertension, musculoskeletal disorders, chronic lung diseases, and nutritional problems occur more commonly in the elderly than in other age groups (10). Also, the need for palliative care is on the rise among the elderly and is reaching significant proportions, except for cancer patients (11). As in other countries, in Turkey, there is an urgent need to improve the availability and quality of palliative care services to alleviate such health problems associated with multi-systemic conditions that are common in the geriatric population and to provide care for elderly Turkish individuals and their family members. According to a report from the Turkish Public Hospitals Association (August 2015), the total number of in-bed facilities for palliative care in Turkey is 1049, which is exceedingly far below the actual need (12). Creating a better definition of the patient profile and factors that have an impact on the duration of in-patient palliative care in existing palliative care centers may provide further insights into the need for the number of patient beds as well as contribute to more effective use of existing services. Therefore, our objective was to identify the duration of inpatient care and factors affecting the discharge process in geriatric patients admitted to this center.

Materials and Method

This study was conducted in accordance with the Principles of the Declaration of Helsinki. The study protocol was approved by the Ankara Numune Research and Training Hospital Ethics Committee (Nov 11, 2015; No. 636). There were 120 case reports for the initial retrospective screening of patients over 65 years of age admitted to the Palliative Care Center, Ulus State Hospital, Ankara between January 2013 and October 2015. Of the initial population screened, nine were excluded due to missing data, leaving 111 patients in the study. Age, gender, marital status, neurological conditions, cancer, chronic systemic diseases (chronic pulmonary, cardiac, renal conditions, and diabetes mellitus) and infections, nutritional status, need for percutaneous endoscopic gastrostomy (PEG), nasogastric tube (NGT), or total parenteral nutrition (TPN), decubitus ulcers, pain, palliative performance scale (PPS) scores, and the duration of palliative care were recorded. The PPS is based on an 11-point scale in 10% increments up to 100% and assesses five domains: level of consciousness, nutrition, self-care, activity, and mobility. These domains are assessed at the time of admission. A score of 0% signifies death. A score of 10% indicates complete dependence and a bed-ridden patient, and a score of 100% indicates a normal activity level with no requirement for special care (13). Also, the number of patients who could not be discharged due to problems arising after an initial decision to discharge the patient was recorded. These patients were categorized as patients who did not want to be discharged.

Statistical Analyses

Data obtained from the patients in the study who received palliative care was recorded digitally with appropriate verifications for correctness. The normal distribution of the continuous variables (age and duration of hospital stay) was assessed using a Shapiro-Wilk test and displayed in graphics. Variables with normal distribution were tested using a Student's t-test, and those without normal distribution were evaluated using a Mann-Whitney U test. Cross-tables were prepared for

the association between categorical variables, which were assessed using the chi-square test. In cross-tables, numbers (%) and mean ± standard deviation or median (IQR) were used depending on the distribution of variables in other tables. A Binary Logit model was developed to identify potential factors that may influence patient requests to be discharged. A P-value of less than 0.05 was considered statistically significant for all analyses.

All statistical analyses were performed using MS-Excel 2010, IBM SPSS Statistics Ver. 23.0 (IBM Corp. IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.) and EViews (ver. 9). A P-level of less than 0.05 was considered statistically significant.

RESULTS

A total of 120 patients over 65 years of age who were admitted to the Palliative Care Center, Ulus State Hospital, Ankara, Turkey between January 2013 and October 2015 were screened. Of the initial population screened, nine were excluded due to missing data leaving 111 patients in the study with a mean age of 78.0±7.2 years (range: 65-94). Of the participants 51 (45.9%) were female and 60 (54.1%) were male with respective mean ages of 79.8±6.8 and 76.5±7.3 years and a significantly higher age in females than in males (p<0.05). Their illnesses included: neurological disease 47 (42.3%), cancer 26 (23.4%), chronic systemic conditions (chronic pulmonary, cardiac, and renal disease, and diabetes mellitus) 46 (41.4%), and infections 12 (10.8%). Also, 58 patients (52.2%) had nutritional problems, 14 (12.6%) were suffering with pain, and 45 (40.5%) had decubitus ulcers (Table 1).

The median duration of time for in-patient care was 24 days (6-212). Table 2 shows the average duration of in-pati-

Table 1— Demographic and Clinical Characteristics of the Patients at Presentation

Variable		Value
Age*		
	Female	79.8±6.8
	Male	76.5±7.3
	Total	78.0±7.2
Gender**		
	Male/Female	51/60 (45.9/54.1)
Marital status**		
	Married/Single	55/56 (49.5/50.5)
Diagnosis**		
	Neurologic disease	47 (42.3)
	Cancer	26 (23.4)
	Chronic systemic disease	46 (41.4)
	Infection	12 (10.8)
Comorbid conditions**		
	Nutrition	58 (52.2)
	Pain	14 (12.6)
	Decubitus ulcers	45 (40.5)
PPS**		
	Poor and Very Poor (≤40)	59 (53.2)
	Moderate and Good (>40)	52 (46.8)

*Values are presented as mean ± standard deviation. Assessed by Student's t test (p=0.014).

** Values are presented as percentage n (%)

Table 2— Duration of Inpatient Palliative Care According to Demographic Data, Diagnosis, and Comorbid Conditions

Variables	Duration of Hospital Stay Median (IQR)	p
Gender		
Female (n=51)	24.0 (32.0)	0.663
Male (n=60)	23.0 (28.0)	
Marital status		
Single (n=56)	20.0 (32.0)	0.426
Married (n=55)	26.0 (28.0)	
Neurologic Disease		
No (n=64)	22.0 (27.0)	0.639
Yes (n=47)	26.0 (38.0)	
Cancer		
No (n=85)	22.0 (32.0)	0.492
Yes (n=26)	27.5 (26.0)	
Infection		
No (n=99)	21.0 (27.0)	0.136
Yes (n=12)	35.0 (35.0)	
Chronic systemic Disease		
No (n=65)	26.0 (39.0)	0.126
Yes (n=46)	20.0 (23.0)	
Nutrition problems		
No (n=53)	20.0 (22.0)	**0.036***
Yes (n=58)	30.5 (48.0) *	
Pain		
No (n=97)	22.0 (29.0)	0.335
Yes (n=14)	27.5 (34.0)	
Decubitus ulcers		
No (n=66)	20.0 (22.0)	**0.001***
Yes (n=45)	38.0 (64.0)*	

*p<0.05



ent palliative care according to patient characteristics. Patients with nutritional problems or decubitus ulcers had significantly longer in-patient care than those without these conditions ($p < 0.036$ and 0.001, respectively). For other patient health problems, the median duration of in-patient palliative care was similar ($p > 0.05$). The PPS scores in the study patient group varied between 30 and 60. Two sub-group of patients were defined based on the PPS scores, i.e. those with moderate to good scores (score > 40) and those with a poor to very poor scores (score ≤ 40). The number of patients requesting to be discharged was assessed in relation to PPS scores and illustrated in cross-tables. Accordingly, 40 of the 59 patients (69.0%) patients with poor or very poor PPS said they wanted to be discharged versus 51 of the 52 patients (96.2%) with a PPS score defined as moderate to good ($c^2=13.933$; $p < 0.001$) asked to be discharged.

The proportion of patients who wish to be discharged was 70.2% of those with neurological disorders and 90.6% of those without neurological disorders, for a statistically significant difference between the two groups (p=0.006). Also, this figure was significantly higher among patients with no nutritional problems (p<0.001), decubitus ulcers (< 0.001) or who had a diagnosis of cancer (<0.032). Other patient health issues showed no meaningful association with the wish to be discharged (p>0.05). The proportion of patients wanting to be discharged in relation to patient health issues is shown in Table 3.

According to the Binary Logit model, the following were found to be significant: a diagnosis of cancer, presence of nut-

Table 3— Willingness for Discharge According to the Patient Characteristics

	Wish to Be Discharged		
Variables	**Yes n (%)**	**No n (%)**	**p**
Gender			
Female (n=51)	44 (86.3)	7 (13.7)	0.278
Male (n=60)	47 (78.3)	13 (21.7)	
Marital status			
Single	48 (85.7)	8 (14.3)	0.302
Married	43 (78.2)	12 (21.8)	
Neurologic Disease			
No (n=64)	58 (90.6) *	6 (9.4)	0.006
Yes (n=47)	33 (70.2)	14 (29.8)	
Cancer			
No (n=85)	66 (77.6)	19 (22.4)	0.032
Yes (n=26)	25 (96.2) *	1 (3.8)	
Infection			
No (n=99)	83 (83.8%)	16 (16.2%)	0.144
Yes (n=12)	8 (66.7%)	4 (33.3%)	
Chronic systemic Disease			
No (n=65)	50 (76.9)	15 (23.1%)	0.099
Yes (n=46)	41 (89.1%)	5 (10.9%)	
Nutrition problem			
No (n=53)	51 (96.2%) *	2 (3.8%)	<0.001
Yes (n=58)	40 (69.0%)	18 (31.0%)	
Pain			
No (n=97)	78 (80.4%)	19 (19.6%)	0.257
Yes (n=14)	13 (92.9%)	1 (7.1%)	
Decubitus ulcers			
No (n=66)	65 (98.5%) *	1 (1.5%)	<0.001
Yes (n=45)	26 (57.8)	19 (42.2%)	

* Significantly higher number of subjects wish to be discharged p<0.05

Table 4— The Results of The Binary Logit Model for the Patient Wish to Be Discharged. R-square Estimated as =0,64

Variable	Coefficient	Z	p	Odds Ratio
Constant	-2.3511	-1.3455	0.1784	0.0953
Cancer	-4.0758	-1.9665	0.0492	0.017
Nutrition problems	2.2414	1.9296	0.0537	9.4064
Decubitus ulcers	3.0046	2.395	0.0166	20.1783
Length of stay	0.0309	2.5419	0.011	1.0313
PPS	-1.9233	-2.5423	0.011	0.1461

ritional problems or decubitus ulcers, duration of palliative care, and PPS score. Of these, a diagnosis of cancer and a higher PPS score were associated with a 0.0170- and 0.1461-fold increase in the wish to be discharged, while patients with nutritional problems or decubitus ulcers or those with a more prolonged in-patient palliative care stay were less likely to express a wish to be discharged. The presence of decubitus ulcers reduced requests for discharge by 20.17-fold. This figure was 9.40-fold for patients with nutritional problems. Table 4 shows the variables that had a significant impact according to the Binary Logit model.

Discussion

In the study, geriatric patients admitted for in-patient palliative care, nutritional problems and decubitus ulcers were associated with an increase in the duration of care, and an increase in an unwillingness to be discharged. While a higher PPS score (moderate or good scores) and a diagnosis of cancer resulted in more requests to be discharged, the presence of nutritional problems and decubitus ulcers were associated with 9.40- and 20.17-fold decreases in requests to be discharged, respectively.

In a retrospective study by Kelly et al. that examined the duration of hospital stays in geriatric patients, a shorter duration of in-patient care was found for cancer patients than for patients who suffered cardiac disease or stroke (14). The length of hospital stays in cancer patients was of short or medium duration with quickly worsening bodily functions, while it was longer with more gradual and progressive functional loss in chronic cardiac or stroke patients. In the instant study, although there were no significant differences in terms of the duration of palliative care in patients with different diagnoses, individuals with cancer were more likely to want to be discharged than patients diagnosed with other chronic conditions such as neurological disease or cardiac disease.

In a 2003 study by Haupt et al. that examined the length of stay and discharge process among a group of patients admitted to a hospice care facility, a longer duration of stay was found among patients who had limited daily activities or who were immobile. The length of the hospice stay in mobilized patients was 29.4 days vs. 56.7 days in immobile subjects (15). Primary diagnosis also had an effect on the average length of stay which was 16.2 days for those with cerebrovascular conditions, 43.3 days for malignant tumors, and 61.2 days for patients with cardiac disease. The shorter duration of hospice stays in that study among patients with cerebrovascular disease compared to the results in the instant study may be explained by way of the fact that there is more widespread availability and accessibility of hospice or long term care centers in the US. These facilities in the US are not available in our country. Therefore the great majority of geriatric patients are hospitalized by palliative care centers in Turkey. Longer duration of stays in our country may be resulted from the absence of those facilities.

According to Carlsson et al., the single most important unmet need in the management of stroke patients is in the lack of adequate nutritional intake and the associated complications (16). Treatment directed at improving the underlying illnesses of patients in the instant study who also had nutritional problems included several approaches such as nutritional support, feeding through a nasogastric tube, and percutaneous endoscopic gastroscopy. Forty-four percent of our patients had nutritional problems which caused them to need significantly longer in-patient care (mean 30.5 days) than those without such problems (mean 20.0 days; $p = 0.036$). Similarly, Rodriguez found longer durations of hospice/in-patient palliative care in geriatric patients with symptoms such as nausea, vomiting, decubitus ulcers, or weight loss (17). Again, patients with decubitus ulcers in the instant study had significantly longer durations of palliative care than those without such ulcers (38.0 and 20.0 days respectively; $p = 0.001$).



Factors that were reported to preclude speedy discharge for elderly patients in a study by Popejoy et al. included the need for ventilation support, hemodialysis, chemotherapy, radiotherapy, wound vacuum therapy, and the need for care due to mental impairment (18). Mudge investigated the re-admission rates in the first six months after discharge of elderly patients and found unscheduled re-admissions in 37% of the patients due to chronic disease, depressive symptoms, or weight loss. These authors emphasized the importance of nutritional and psychological counselling to reduce such re-admissions (19). Combined utilization of hospital and home care for geriatric patients has been reported to increase the effectiveness of planned discharge (20). Multi-disciplinary, home-based, end-of-life care and treatment were also shown to lead to increased patient satisfaction and decreased days of nursing care and the use of emergency care services (21).

In a study by Naylor carried out between August 1992 and March 1996 with a group of older individuals, it was shown that the duration of time between discharge and re-admission was longer when discharge was planned by advanced nurse practitioners in conjunction with home care interventions, which also led to reduced healthcare costs (22). The results of a study by Arbaje et al. also suggests that a more comprehensive implementation of interventions such as wound care and nutritional strategies before and after discharge may help reduce early re-admissions. Such interventions may also include home-based provisions for health care, patient activation, and comprehensive discharge planning (23).

A review by Teasell and coworkers in 2003 (24) reported that patients receiving home-based management had shorter durations of hospital stays with similar functional outcomes between home-based or in-patient treatment approaches.

In another study, two proposed potential factors for delayed discharge included inadequate discharge planning and a lack of alternative care strategies after the discharge (25). Discharge planning is not a common practice in Turkey, and the Palya-Türk project initiated in 2010 for palliative care has not yet been implemented nationwide. In our palliative care center, discharge planning is also not being implemented at an institutional level and most of the after care for geriatric cases continues to be provided by family members due to the lack of proper home care services. However, if issues such as nutritional problems or decubitus ulcers, which have precluded patients from being discharged and increased the need for palliative in-patient care, can be effectively dealt with by home-care teams, the available in-patient facilities may be used more efficiently and may support an increase in the number of patients benefiting from such services.

In conclusion, specific health problems associated with aging and multi-systemic conditions in geriatric patients are associated with an increased need for palliative care. However, the availability of palliative care services is far from adequate, even in developed countries. Obviously, the existing palliative care facilities should also function more efficiently to meet the increasing requirements for palliative care. A cooperative effort between in-patient and home-based care teams will facilitate earlier discharge and help reduce re-admission rates in patients with conditions such as decubitus ulcers and nutritional problems, especially with continued nutritional support and decubitus ulcer care at home. These additional strategies can lead to shortened durations in hospital stays.

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RESEARCH

FACTORS AFFECTING DROWNING-RELATED MORTALITY OF ELDERLY FOREIGNERS ACCORDING TO AUTOPSY RESULTS

ABSTRACT

Introduction: We aimed to determine age-related factors associated with fatal drowning by analyzing the demographic data of drowning victims. In addition, we discuss possible measures to reduce drowning-associated deaths.

Materials and Method: We retrospectively reviewed autopsy reports of foreign tourists, who died due to drowning, and then, whose autopsy and pathological sampling were carried out in Antalya Forensic Medicine Institution. The included cases were divided into two groups; Group I comprised cases who were ≥65 years at the time of death, and Group II comprised cases <65 years. The groups were compared with respect to demographic data, water source from which they were taken out, season, narcotics, alcohol level and presence of coronary artery diseases.

Results: 48 of 89 cases that we included in the study account for Group I while the rest, 41 cases, account for Group II. Statistically significant difference was determined between the groups with respect to nationality, season, water source from which they were taken out, alcohol levels and coronary artery diseases ($p<0.05$). No statistically significant difference was determined between the groups with respect to gender, narcotics and BMI ($p>0.05$).

Conclusion: We therefore recommend that people, particularly those with CAD, choose mornings and afternoons for swimming, thereby avoiding the midday hours in which temperature and humidity are high. Furthermore, they should not strain their effort capacity and should avoid imbibing alcoholic drinks before swimming.

Key Words: Drowning; Aged; Autopsy; Mortality.

ARAŞTIRMA

BOĞULMA NEDENİ İLE OTOPSİ YAPILAN YAŞLI YABANCI OLGULARINDA MORTALİTEYİ ETKİLEYEN FAKTÖRLER

ÖZ

Giriş: Bu çalışmada suda boğulma vakalarında yaşla birlikte ortaya çıkan önlenebilir nedenleri belirleyerek ölümlerin azaltılması için alınması gereken önlemlerin tartışılması amaçlanmıştır.

Gereç ve Yöntem: Suda boğulma nedeni ile ölen ve Antalya adli tıp kurumunda açık otopsisi ve patolojik örneklemesi yapılan yabancı uyruklu turistlere ait otopsi raporları geriye dönük incelendi. Çalışmaya dahil edilen olgular 65 yaş ve üstü Grup I, 65 yaş altı olgular ise Grup II olarak iki gruba ayrıldı. gruplar demografik veriler, çıkarıldıkları su kaynağı, mevsim, uyuşturucu madde, alkol düzeyleri ve koroner arter hastalığı varlığı yönünden karşılaştırıldı.

Bulgular: Çalışmaya aldığımız 89 olgunun 48''i Grup I, 41''i Grup II'yi oluşturmuştur. Gruplar arasında uyruk, mevsimsel, çıkarıldıkları su kaynakları, alkol düzeyleri, koroner arter hastalığı yönünden istatistiksel olarak anlamlı fark tespit edildi ($p<0,05$). Cinsiyet, uyuşturucu madde ve BMI yönünden her iki grup arasında istatistiksel olarak anlamlı fark tespit edilmedi ($p>0.05$).

Sonuç: Özellikle yaşla birlikte termoregulatuvar kapasitenin azalması ve komorbid hastalıkların eşlik etmesi nedeni ile yaşlı nüfusun, nemin ve sıcaklığın yüksek olduğu öğlen saatleri yerine sabah ve öğleden sonra suya girmeleri, efor kapasitelerini zorlamamaları ve suya girmeden önce alkol almamaları önerilmektedir.

Anahtar Sözcükler: Boğulma; Yaşlılık; Otopsi; Mortalite.

Introduction

Drowning is ranked as the third most common cause of accidental death among all age groups combined. Approximately 500,000 drowning-related deaths per year occur worldwide (1). The World Health Organization defines old age as age ≥65 years. Currently, more than 10% of the population of developed countries comprises people ≥65 years of age. As age increases, there is a significant increase in the presence of chronic disease. In particular, the incidence of coronary artery disease (CAD) and cerebrovascular disease increases with age. It has been reported that cardiovascular disease and malignancy are the primary causes of death in old age but the incidence of death due to accident has decreased (2).

Antalya, a Mediterranean city in Turkey, is one of the most popular travel destinations in the world and is visited annually by over 10 million people, of which the majority are ≥65 years of age. In the present study, we aimed to determine age-related factors associated with fatal drowning in Antalya by analyzing the demographic data of drowning victims. In addition, we discuss possible measures to reduce drowning-associated deaths.

Materials and Method

In the present study, autopsy reports of foreign individuals ≥18 years of age who died because of drowning between January 2012 and December 2014 and were autopsied at the Antalya Forensic Medicine Institution were reviewed retrospectively.

The included cases were divided into two groups; Group I comprised cases who were ≥65 years at the time of death, and Group II comprised cases <65 years. For each case, age, sex, nationality, weight, height, site of drowning (body of water), season, narcotic level, alcohol level, and presence of CAD were recorded. For CAD, pathology reports were reviewed for the presence of medium or advanced obstruction in the coronary arteries or the presence of cardiac scar tissue; the presence of either was considered to be CAD. Cases in which the manner of death was determined to be suicide or in which accidents were caused by water sports were excluded from the study.

Statistical Analysis

Data were evaluated using the Statistical Package for the Social Sciences (SPSS) version 21 (IBM, USA). Frequency, mean±standard deviation, and percentages were calculated. The chi-square test was used for comparisons. A p-value <0.05 was considered statistically significant in the chi-square test.

Results

Of the 89 cases included in the present study, 48 were in Group I and 41 were in Group II. The mean age in Group I and Group II was 74.35±6.41 years and 45.95±14.02 years, respectively. Group I was composed of 37 men (77.1%) and 11 women (22.9%), and Group II was composed of 32 men (78%) and 9 women (22%). There was no statistically significant difference between the groups with respect to sex (p>0.05).

With respect to season, in Group I, 26 cases drowned in the fall, 14 in the summer, and 8 in the spring; in Group II, 20 cases drowned in the summer, 11 in the spring, 9 in the fall, and 1 in the winter. A statistically significant difference was discovered between groups with respect to season (p<0.05) (Figure 1).

Time of death was significantly different (p=0.038) between groups; in Group I, 87.5% of cases (n=42) cases drowned around midday compared with 65.9% (n=27) in Group II.

With respect to the body of water, 47 cases in Group I drowned in the sea (97.9%), whereas only 30 cases in Group II drowned in the sea (73.1%). This difference was statistically significant (p=0.008) (Figure 2).

There was a statistically significant difference (p=0.025) between the groups with respect to nationality; 19 cases (39.5%) were German and 13 cases (27%) were Russian in

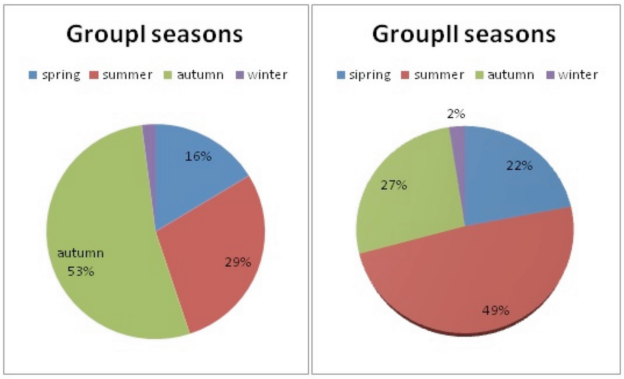


Figure 1— Distribution of cases depending on seasons.

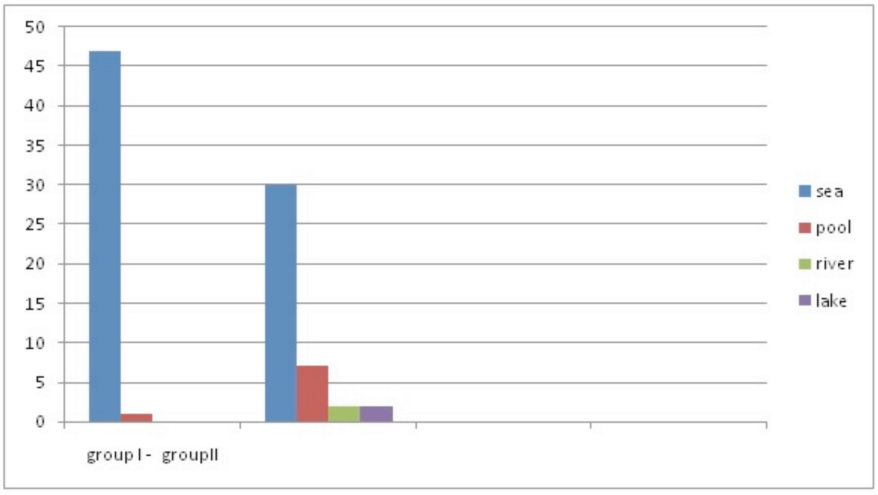


Figure 2— The place at which the cases happened.

Group I, whereas 14 cases (34.1%) were Russian, 7 cases (17%) were German, and 4 cases (9.7%) were Ukrainian in Group II (Table 1).

Significant differences were discovered between the groups with respect to the presence of alcohol (p=0.035), blood alcohol level (p=0.02), and CAD (p=0.01) whereas no significant difference was found between the groups with respect to the use of narcotics (p=0.235) and body mass index (BMI) (p=0.637) (Table 2).

Discussion

Aging is generally characterized as being in decline both physically and mentally. People at an older age are more susceptible to trauma because of the presence of chronic disease, which worsens with increasing age, and old age physiology (3).

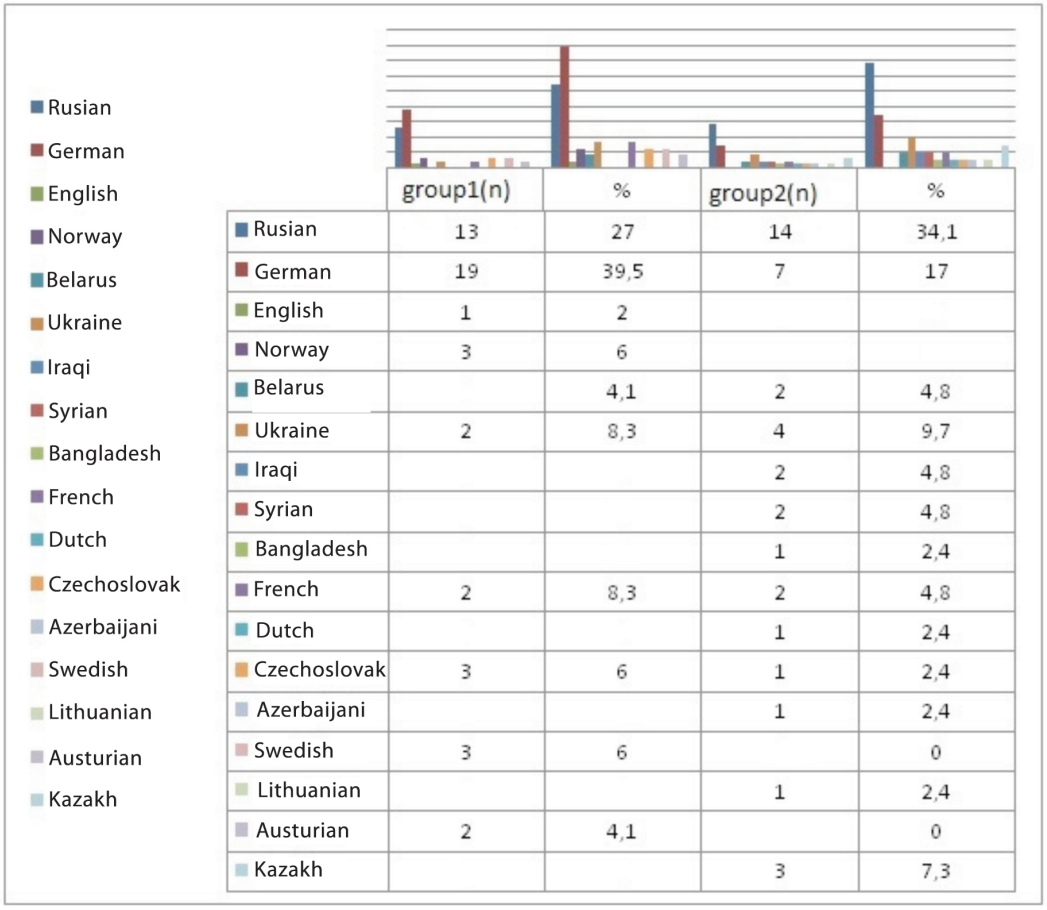
Although most cases of accidental drowning in water are preventable, drowning is still the third most common cause of accidental death in all age groups combined. According to data from the 2010 Global Burden of Disease Study, the mean number of cases of drowning at an advanced age worldwide is 39.732 per year (4). Many studies in the literature emphasize childhood in cases of drowning (5,9); however, the elderly population is increasing, particularly in developed countries, and we must shift our attention to this demographic as well.

Studies have reported higher mortality rates for drowning in males across every age group. This is because male individuals are more active in daily life, are involved in dangerous and/or high-risk activities, are encouraged to show unnecessary bravery, and particularly, they imbibe greater amounts of alcohol (1,6,7,8). Consistent with the literature, men in both groups of our study were more likely to drown than women.

In tourist destinations, particularly in the summer, drowning cases increase significantly because of the increase in swimming and sea activities (1,9,10). Although any study may report drowning in fresh water, drowning more frequently occurs in the sea in coastal destinations (11-13). Antalya, the source of the present study data, is a coastal town that is a particular popular global tourist destination. Drowning cases frequently occurred in the sea for both of the groups in our study. However, comparing the groups, 97.9% of the cases in Group I (n = 47) versus 73.1% (n = 30) of the cases in Group II occurred in the sea. We have associated this significant difference between the groups with the fact that elderly people are less active compared with the young, and they may avoid activities that require more courage and fitness, such as swimming in rivers and pools.

Temperature is the most important climatic element having an effect on almost every kind of human activity. When certain thresholds are exceeded, temperature affects the physical, physiological, and psychological conditions in humans. One study has reported that ambient temperature should be maintained between 16.7°C and 24.7°C for comfort with respect to climate for humans (14). In particular, because thermoregulatory capacity decreases in elderly people, excessive

Table 1— Distribution of The Groups Versus Nationality



	group1(n)	%	group2(n)	%
Rusian	13	27	14	34,1
German	19	39,5	7	17
English	1	2		
Norway	3	6		
Belarus		4,1	2	4,8
Ukraine	2	8,3	4	9,7
Iraqi			2	4,8
Syrian			2	4,8
Bangladesh			1	2,4
French	2	8,3	2	4,8
Dutch			1	2,4
Czechoslovak	3	6	1	2,4
Azerbaijani			1	2,4
Swedish	3	6		0
Lithuanian			1	2,4
Austurian	2	4,1		0
Kazakh			3	7,3

temperature may cause an exacerbation of cardiovascular and cerebrovascular diseases (15). In our study, more drowning cases occurred during midday hours, when the sunlight is at a high angle, in both groups but particularly in Group I. In our region, the average temperature is much higher than is comfortable for many people, particularly during the summer and it often feels much hotter than the reported temperature because of the high humidity (16). We believe that the high temperature affects the individual's physical and physiological balance and causes drowning.

Regarding seasonality, in our study, most of the cases in Group I drowned in the fall followed by the summer, whereas the cases in Group II drowned mostly in the summer. We believe that the difference between the groups with respect to seasons is that the younger population prefer summers for vacation involving entertainment and intense activities, whereas elderly people prefer fall vacations for peace and rest.

According to the data from the Antalya Culture and Tourism Directorate, the city was visited by an average of 10,976,075 foreign tourists every year between the years 2012 and 2014. Of these, 29.07% were Russian and 26.48% were German (17). In our study, drowning cases consisted of mostly German and Russian tourists. Most cases in Group I were German, and most cases in Group II were Russian. We have associated this with the fact that young people from Russia prefer our country for vacation compared with most older Germans.

Alcohol disturbs cognitive functions and causes problems with balance, and high alcohol intake is one of the most important preventable risks for drowning. In one study, it was reported that presence of alcohol in the blood was found in approximately 30%–40% of deaths resulting from drowning



Table 2— Comparison of The Groups With Respect to Alcohol, Narcotics, CAD and BMI

	Group I n: 48	Group II n: 41	p
Alcohol positivity	n: 11 (%23)	n: 18 (%44)	0.035
Promille (median±sd)	0.42±0.50.204	1.73±1.08.867	0.002
Narcotics positivity	n: 1 (%2)	n: 3 (%7)	0.235
CAD presence	n: 39 (%81.2)	n: 18 (%44)	0.001
BMI (median±sd)	30.3±5.3	30.1±5.7	0.637

(18). In a study conducted in New Zealand, alcohol was associated with 7.1% of drowning-related deaths in subjects older than 65 years versus 20.1% of cases for those 18–65 years of age (19). In our study, alcohol was present in 23% of Group I cases and 44% of Group II cases, which is consistent with the literature. The high blood alcohol level found in Group II was also significant between the young and old age groups.

Elderly persons' lesser alcohol intake, compared with the young, may be explained by the fact that they lead more sedentary lives and do not attend parties as often as young people do. Although alcohol was detected in a large proportion (23%) of the geriatric age group, the mean blood alcohol level of 0.42 permille (parts per 1000) was unlikely to cause serious cognitive disturbance and imbalance. However, it is a preventable risk.

The use of narcotics is associated with drowning-related mortality (20). In our study, non-narcotic drug use was found in three people in Group II: tetrahydrocannabinol was reported in two, and benzodiazepine use was reported in one. Benzodiazepine use was reported in one case in Group I.

Aging is associated with serious increases in cardiovascular, cerebrovascular, and respiratory diseases; in addition, because of the decrease in thermoregulatory capacity at older ages, the severity of comorbid disease is increased in the summer (15). Because such persons' effort capacity is reduced and swimming requires high effort, comorbid disease in association with the effect of high temperature and humidity is a serious risk factor. According to a study conducted in Japan, most of the drowning cases, particularly in the geriatric age group, occurred in bath tubs, and cardiovascular and cerebrovascular disease was frequently encountered during autopsy (21). In our study, CAD was found in 81.2% of cases in the geriatric age group, confirming that the presence of CAD is a serious risk factor for drowning.

Two-thirds of the adult population in the United States and at least half of the population of many other developed countries are currently overweight or obese (22). A high BMI (calculated as the weight in kilograms divided by the square of the height in meters) is associated with increased mortality from heart disease, stroke, and many specific cancers, but the precise relationship between BMI and all-cause mortality remains uncertain (23). In our study, BMI was found to be at the threshold of obesity in both groups. Obesity may be a significant risk factor in drowning at any age because obesity decreases motion capacity and increases the risk of heart disease and stroke.

A limiting factor in our study is that only drowning cases involving foreign persons were included. This is because there is a legal requirement for autopsy in every case involving the death of a foreigner, whereas only external examination is required for Turkish citizens; thus, autopsy results and pathological and toxicological evaluation are not available in every case.

As conclusion; in the present study, drowning rates increase in the fall and summer, particularly during midday hours, during which time the increase in temperature and humidity lowers the thermoregulatory capacity of elderly people. Furthermore, additional comorbid diseases in the elderly, particularly the presence of CAD, as well as alcohol intake and obesity were discovered to be preventable serious risks. We therefore recommend that people, particularly those with CAD, choose mornings and afternoons for swimming, thereby avoiding the midday hours in which temperature and humidity are high. Furthermore, they should not strain their effort capacity and should avoid imbibing alcoholic drinks before swimming.

Acknowledments

İB is responsible for the integrity of the work as a whole from inception to published article; ÖC, NK are responsible for the integrity of the work as a whole from inception to published article and has a contribution to interpretation of data, FY has

a contribution to conception and design of article, GT is responsible of analyzing the data, BMS has a contribution of drafting the article, İK has a contribution to data acquisition.

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RESEARCH

ORAL HEALTH STATUS OF ELDERLY RESIDENTS IN A NURSING HOME: CROSS-SECTIONAL, ANALYTICAL STUDY IN A WESTERN CITY IN TURKEY

ABSTRACT

Introduction: The aim of this study was to investigate the oral health status of elderly residents in the Nursing Home of Aydin Social Services, and to determine related risk factors.

Materials and Method: The assessment of oral health was performed by first-year dental students using a structured questionnaire and by clinical examinations performed by an experienced physician in an examination room. Mann–Whitney U and Kruskal–Wallis tests were performed for the comparison of non-parametric continuous variables in independent groups.

Results: A total of 114 (78.6%) elderly residents were included. Of these, 5 (4.4%) visited a dentist regularly, 7 (6.1%) had not visited a dentist yet, and 78 (68.4%) had presented to a dentist with a complaint. No significant difference was found in the dental status between genders, and community periodontal indices did not significantly differ between age groups or gender. Decayed crown ($p<0.002$), decayed root ($p<0.011$), and filled teeth ($p<0.006$) scores were significant in the ≤74-year-old age group than in the 75–84-year-old age group. In contrast, missing teeth ($p<0.001$) and decayed, missing, and filled teeth scores ($p<0.001$) were significant in the 75–84-year-old age group than in the ≤74-year-old age group. Dental and periodontal statuses did not increase with age.

Conclusion: The findings of the present study are important for the development of preventative and promotional dental health programs for the elderly. Oral health services may require better organization in nursing homes. The presence of a dental practitioner or access to regular dental visits to a specific dental unit will provide support in maintaining oral health in the elderly.

Key Words: Oral health; Aged; Nursing Homes.

ARAŞTIRMA

HUZUREVİNDE KALAN YAŞLILARIN AĞIZ SAĞLIĞI DURUMU: TÜRKİYE'NİN BATISINDAN KESİTSEL ANALİTİK BİR ÇALIŞMA

ÖZ

Giriş: Bu çalışmanın amacı, Aydın Sosyal Hizmetler Huzurevi'nde kalan yaşlıların ağız sağlığı durumunu araştırmak ve ilgili risk faktörlerini belirlemektir.

Gereç ve Yöntem: Değerlendirme, yapılandırılmış bir anket aracılığı ile birinci sınıf diş hekimliği öğrencileri tarafından, klinik inceleme ise bir muayene odasında, tecrübeli bir hekim tarafından uygulandı. Mann-Whitney U and Kruskal Wallis testleri de, bağımsız gruplarda parametrik olmayan devamlı değişkenleri karşılaştırmak için kullanıldı.

Bulgular: Toplamda 114 (%78.6) yaşlı çalışmaya dahil edildi. Bunlardan %4.4'ü (5) diş hekimine düzenli olarak giderken, %6.1'i (7) henüz bir diş hekimine gitmemişti ve %68.4'ü (78) ise sadece şikayet olduğunda diş hekimine gitmekteydi. Cinsiyet grupları arasında dental durum açısından, hem cinsiyet hem de yaş grupları arasında da CPI skorları açısından anlamlı bir fark bulunamadı. Çürük kron ($p<0.002$), çürük kök ($p<0.011$) ve dolgulu diş ($p<0.006$) skorları 74 yaş ve altı grubunda, 75-85yaş grubuna göre istatistiksel olarak anlamlı bulundu. Bunun aksine, eksik diş ($p<0.001$) ve DMFT skorları ($p<0.001$) ise 75-84 yaş grubunda, 74 yaş ve altı grubuna göre istatistiksel olarak anlamlı bulundu. Sunulan çalışma bulgularına göre, dental ve periodontal durum yaşla paralel olarak artış göstermedi.

Sonuç: Sunulan çalışmanın sonuçları yaşlılarda dental sağlığın korunması ve tanıtılması programları açısından oldukça önemlidir. Ağız sağlığı merkezleri huzurevlerinde daha iyi organize olmalıdır. Bu kurumlarda bir diş hekiminin varlığı ya da düzenli diş hekimine gidilmesi, yaşlıların ağız sağlığının gelişimine katkıda bulunacaktır.

Anahtar Sözcükler: Ağız Sağlığı; Yaşlı; Huzurevi.

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Introduction

Aging is a complicated phenomenon that results in social and health problems worldwide. It is estimated that there will be 2 billion people aged ≥60 years worldwide by 2050, which will pose challenges in providing sufficient care (1). Elderly people have various physical disabilities and chronic diseases, which reduce their quality of life (2). These problems adversely affect the oral health of elderly people, and their general health is also influenced by their oral health status (3,4).

Residents of nursing homes are generally more affected by oral health problems due to individual limitations and the fact that maintaining good oral health is not a high priority in these institutions. Oral health-related quality of life is important for these residents to enable them to remain independent and be involved in the community (2,5).

The aim of the present study was to assess the oral health status of elderly residents of the Nursing Home of Aydin Social Servicesand to determine related risk factors and requirements in terms of oral health.

Materials and Method

This cross-sectional, analytical study was approved by the Ethics Committee of Adnan Menderes University, Aydin, Turkey (Protocol no. 2015/549). The Turkish Republic Ministry of Family and Social Policies also approved this study. Written informed consent was obtained from all residents prior to data collection. Data collection was performed between April and July 2015.

Study Population

Elderly residents (n=145) from the Nursing Home of Aydin Social Services were recruited. All residents were included, with no sample selection. The inclusion criteria were as follows: living in the Nursing Home, volunteering to participate, and not suffering from health disorders such as Alzheimer's disease, dementia, or any mental health, psychiatric, or speaking problems affecting communication with the elderly.

Assessment

Before commencement of the interview, dental students received training on the research and the questionnaire for 2 h. After informing the elderly residents about the study, they were interviewed in their own rooms prior to the clinical examination. First-year dental students asked questions to the residents, and a dental practitioner performed the clinical examination in an examination room.

Questionnaire and Clinical Examination Form

Assessments were made using a structured questionnaire with two parts and a clinical examination form. The first part was about the sociodemographic characteristics of the residents such as age, gender, education level, occupation, and social security. The second part was related to the self-reported oral health status of the elderly residents and associated oral hygiene practices. The clinical examination form used was standard, which was recommended by the World Health Organization (WHO) (WHO-2013). The form was used to determine the decayed, missing and filled teeth (DMFT) index, community periodontal index (CPI), and clinical attachment loss.

Clinical Examination

Following the questionnaire, the nursing home physician determined the medical conditions of the residents. The residents then underwent a clinical examination using a dental mirror and CPI probe (Martin, Solingen, WHO 973/80, Germany) by an experienced dental practitioner from the Faculty of Dentistry, Adnan Menderes University in accordance with the WHO criteria. The numbers of DMFT were recorded to calculate the DMFT index. CPI was used for evaluating the periodontal status of the teeth and was scored as follows: 0, no treatment needed; 1, bleeding on gentle probing; 2, presence of dental calculus; 3, presence of 4–5-mm periodontal pockets; and 4, 6 mm or deeper periodontal pockets. The relationship of the gingival margin to the cemento–enamel junction was detected, and attachment loss was measured as follows: score 0: attachment loss of ≤3 mm; score 1, attachment loss of 4–5 mm; score 2, attachment loss of 6–8 mm; score 3, attachment loss of 9–11 mm; and score 4, attachment loss of ≥12 mm. The highest scores in six sextants, in accordance with both methods used to measure the periodontal status, were recorded.

Statistics

Research data were evaluated using the SPSS 15.0 statistical program (SPSS Inc., Chicago, IL). The suitability of each continuous variable to abnormal distribution was investigated using the Kolmogorov–Smirnov test. For the descriptive components, normally distributed data were expressed as the mean and standard deviation; for data that were not normally distributed, the median, minimum, and maximum values were indicated. Mann–Whitney U and Kruskal Wallis tests were used to compare non-parametric continuous variables in independent groups. The Mann–Whitney U test was performed



to determine the significance of pairwise differences using the Bonferroni correction to adjust for multiple comparisons. An overall 0.05 type 1 error level was used to infer statistical significance.

Results

Following the exclusion of 31 residents (16 due to Alzheimer's disease and dementia, 9 due to psychiatric and physiological problems, and 6 rejected the questionnaire or clinical examination), a total of 114 (78.6%) elderly residents participated.

In terms of the sociodemographic characteristics of the residents; 67 (58.8%) were females and 47 (41.2%) were males. The mean age of the residents was 78.49±8.59 years. Of the residents, 35 (30.7%) were aged ≤74 years, 47 (41.2%) were aged 75–84 years, and 32 (28.1%) were aged ≥85 years. As only 7 residents were aged <65 years, they were included in the ≤74-year-old age group for statistical analysis. In total, 94 (82.5%) residents were illiterate or received only primary school education.

Neuropsychological disorders were the most common diseases (n = 43), followed by hypertension (n = 39) and diabetes mellitus (n = 24). Kidney disease (n = 9) and cancer (n = 5) were rare, and only 5 residents were free from illness in the nursing home.

Table 1 displays the oral health-related habits and behavior of the elderly residents.

Only 5 (4.4%) residents visited a dentist regularly and 7 (6.1%) had not visited a dentist yet. Most residents (n=78, 68.4%) visited a dentist when symptomatic. Approximately half of the elderly residents (n=64, 56.1%) had no toothbrush, and 89 (78%) residents used no aids to assist with oral hygiene. Toothpicks (n=14, 12.3%) were the most commonly used aids, followed by mouthwash (n=6, 5.3%) and dental floss (n=2, 1.8%). A major portion of the residents (n=98, 86.0%) reported that they regularly ate three meals a day. The last visit to the nursing home by a dentist was more than two years ago (n=26, 22.8%) or never (n=88, 77.2%).

Table 2 displays the distribution of number of teeth and types of denture in the elderly residents.

Almost half the residents (n = 54) were edentate, and many other residents retained very few natural teeth. In the different age groups, 9 (25.7%) residents in the ≤74-year-old age group, 28 (59.6%) in the 75–84-year-old age group, and 17 (53.1%) in the ≥85-year-old age group were edentate. Of the 54 residents who had no teeth, only 26 had dentures.

Table 1— Oral Health-related Habits and Behavior of The Elderly Residents.

		n	%
Regularity of dental visits	Regular	5	4.4
	With a complaint	78	68.4
	Irregular	24	21.1
	Never	7	6.1
Time of last dental visit (n=107)	0–6 months	21	18.4
	6 months–1 year	13	11.4
	1–2 years	21	18.4
	+2 years	52	45.6
Reason for last dental visit (n=101)	Control check-ups	6	5.9
	Pain	28	27.7
	Gum problems: bleeding	7	6.9
	Trauma	1	1.0
	TMJ problems	4	4.0
	Denture	52	51.5
	Other*	3	3.0
Frequency of brushing teeth (n=50)	2-3 in a day	11	9.6
	1 in a day	15	13.2
	1 in a week	8	7.0
	Irregular	16	14.0
Frequency of toothbrush changing (n=50)	0-6 months	12	10.5
	1 year	17	14.9
	Never	21	18.4
The last visit to the institution by a dentist	+2 years	26	22.8
	1–2 years	0	0.0
	In 1 year	0	0.0
	Never	88	77.2
Tobacco products	Everyday	27	23.7
	Couple of days a week	4	3.5
	Never	83	72.8
Alcohol	Everyday	2	1.8
	2–3 times a week	3	2.6
	1 time a week	2	1.8
	1 time a month	9	7.9
	Never	98	86.0
Snacks**	Biscuits	57	
	Pastry	36	
	Candy/Chocolate	13	
	Tea/Coffee	69	
	Coke/Lemonade	5	
	Juice	49	
	Milk/Yoghurt	58	

* Oral lesions, tooth mobility.

**Percentages could not be calculated as more than one option was marked.

Table 2— Distribution of the Number of Teeth Present and Type of Denture in the Elderly Residents

	Types of Denture											
	No Denture		Fixed Dentures		Partial Removable Dentures		Complete Dentures		Complete + Partial Dentures		Total	
No of teeth	n	%	n	%	n	%	n	%	n	%	n	%
0	28	51.9	0	0.0	0	0.0	26	48.1	0	0.0	54	47.4
1-10	10	32.3	0	0.0	17	54.8	0	0.0	4	12.9	31	27.2
11-20	6	40.0	3	20.0	6	40.0	0	0.0	0	0.0	15	13.2
21+	7	50.0	6	42.9	1	7.1	0	0.0	0	0.0	14	12.3
Total	51	44.7	9	7.9	24	21.1	26	22.8	4	3.5	114	100.0

Considering the oral lesions of the residents examined, 25 had at least one oral lesion. The most frequently detected lesions were denture stomatitis (n=12), epulis fissuratum (n=7), and geographic tongue (n=3).

The dental status, DMFT number, and DMFT scores are displayed in Table 3.

The mean DMFT score of all residents was 25.80±7.47. No significant difference was found between genders in terms of oral health status. In the different age groups, the decayed crown ($p<0.002$), decayed root ($p<0.011$), and filled teeth ($p<0.006$) scores were significant in the ≤74-and 75–84-year-old age groups, with lower scores in the ≤74-year-old age group. The missing teeth ($p<0.001$) and DMFT scores ($p<0.001$) were also significantly different between these same groups, although the scores were higher in the 75–84-year-old age group.

The percentage distribution of periodontal status of the dentate residents (n=60) is shown in Table 4. The presence of calculus (n=23, 38.3%) on the CPI index and 6–8 mm (n=18, 30.0%) attachment loss were the most common periodontal status scores among the residents.

The periodontal statuses of the residents are presented in Table 5.

The overall CPI score of the dentate residents was 2.36±1.02, whereas the attachment loss score was 1.70±1.27. There were no significant differences in the CPI scores between the age groups and genders. Although there was a significant difference between the age groups in terms of attachment

Table 3— Dental Status of the Elderly Residents

			Decayed Crown	Decayed Root	Missing Teeth	Filled Teeth	DMFT
Gender	Female	χ±SD	0.42±0.85	1.07±1.55	22.72±7.92	0.46±0.92	26.57±7.09
		Median (Min–Max)	0.0 (0.0–3.0)	0.0 (0.0–6.0)	0.0 (4.0–28.0)	0.0 (0.0–3.0)	32 (8.0–32.0)
	Male	χ±SD	0.76±1.36	0.82±1.35	21.10±8.59	0.59±1.11	25.26±7.73
		Median (Min–Max)	0.0 (0.0–6.0)	0.0 (0.0–7.0)	25.0 (2.0–28.0)	0.0 (0.0–4.0)	27 (5.0–32.0)
	U/Kw		1424.0/-	1453.5/-	1395.0/-	1506.5/-	1425.0/-
	p		0.273	0.429	0.274	0.608	0.362
Age Groups	≤74 years	χ±SD	1.22±1.68	1.28±1.38	17.74±9.02	0.97±1.33	22.25±7.81
		Median (Min–Max)	0.0 (0.0–6.0)	1.0 (0.0–5.0)	21.0 (2.0–28.0)	0.0 (0.0–4.0)	23.0 (5.0–32.0)
	75–84 years	χ±SD	0.27±0.64	0.61±1.13	24.46±6.55	0.21±0.50	27.95±6.39
		Median (Min–Max)	0.0 (0.0–2.0)	0.0 (0.0–4.0)	28.0 (2.0–28.0)	0.0 (0.0–2.0)	32.0 (7.0–32.0)
	≥85 years	χ±SD	0.46±0.87	1.15±1.88	22.21±8.38	0.56±1.10	26.53±7.34
		Median (Min–Max)	0.0 (0.0–3.0)	0.0 (0.0–7.0)	28.0 (4.0–28.0)	0.0 (0.0–3.0)	32.0 (5.0–32.0)
	U/Kw		-/10.200	-/6.241	-/13.569	-/7.606	-/13.436
	p		**0.006**	**0.044**	**0.001**	**0.022**	**0.001**



Table 4— Percentage Distribution of Periodontal Status

CPI		n	%
	Healthy	3	5.0
	Bleeding on probing	7	11.7
	Calculus	23	38.3
	Shallow pockets (4–5 mm)	19	31.7
	Deep pockets (6mm, +)	8	13.3
Attachment loss			
	0–3 mm	13	21.7
	4–5 mm	14	23.3
	6–8 mm	18	30.0
	9–11 mm	8	13.3
	12+ mm	7	11.7
Total		60	100.0

loss scores (p=0.036), on analyzing the difference between pairs, the Bonferroni correction revealed no significant differences. This situation was considered to have occurred due to an insufficient number of groups. To overcome this limitation, the groups were recombined into two instead of three. The group of elderly residents was divided into two groups: ≤74 and ≥75 years. The scores were significant between the two groups (p=0.015), with lower attachment loss scores in the ≤74-year-old age group.

Discussion

The current increasing population of elderly individuals is important worldwide (1). In Turkey, the elderly population is increasing at a rate higher than that of other age groups. According to population projections, the proportion of the elderly population will increase, and Turkey will be among the countries considered to have a population deemed "too old". Although the proportion of elderly individuals (≥65 years old) was 8% in 2014, it is expected to rise to 20.8% in 2050 and to 27.7% in 2075 (6). This indicates that the number of health service institutions and nursing homes will proportionally increase, in association with the increasing elderly population.

Nursing homes offer a normal quality of life and access to necessary facilities for elderly individuals (7). According to the elderly residents, the last visit to the nursing home by a dentist was "more than two years ago or never," which was the most striking outcome of the questionnaire. Majority of the residents had no toothbrush (n=64) and visited a dentist only when they had a complaint (n=78). These are indicators of poor oral health and lack of oral hygiene practice in the nursing home and are similar to the findings of previous studies performed on elderly institutionalized individuals (3,8,9,10). Only 14 residents had a functional tooth number (≥21 teeth). Of the 54 residents who required a complete denture, 28 had

Table 5— Periodontal Status of the Elderly Residents

Periodontal Status	Gender		Age Groups		
	Male (n=38)	Female (n=22)	≤74 years (n=26)	75–84 years (n=19)	≥85 years (n=15)
CPI					
Median	2.0	3.0	2.0	3.0	2.0
Min	0.0	0.0	0.0	0.0	1.0
Max	4.0	4.0	4.0	4.0	4.0
Mean	2.31	2.45	2.34	2.36	2.40
SD	0.93	1.18	1.16	0.95	0.91
p	0.430			0.980	
U/Kw	369.0/-			-/0.040	
Attachment loss					
Median	1.5	2.0	1.0	3.0	2.0
Min	0.0	0.0	0.0	0.0	0.0
Max	4.0	4.0	4.0	4.0	4.0
Mean	1.55	1.95	1.23	2.26	1.80
SD	1.17	1.43	1.06	1.52	1.01
p	0.266			0.036	
U/Kw	347.5/-			-/6.669	

no denture. These results showed that the elderly might not be aware of their need of a denture. In a previous study (2), the number of dentate patients was relatively large (94.1%) compared with that in present study (52.6%). This difference may be a result of different levels of education in the groups. The educational level of the residents in the present study (illiterate + primary school, 82.5%) was lower than that in the previous study (secondary + tertiary education, >60%). Low literacy levels have been found to be associated with low health literacy (11).

In a previous study (12) conducted in a nursing home between 2002 and 2012 in the Netherlands, the number of patients with remaining teeth increased significantly, between 7.9% and 28.7%. According to a previous study (9) on elderly individuals in a residential home in Ankara (Turkey) in 2007, only 32.6% of the individuals were dentate and 7.3% had functional teeth. In the present study, however, the dental status of the residents remained poor, but after 8 years, it was encouraging to find that these values were 52.6% and 12.3%, respectively, in the same country. Despite this, further studies are required to confirm whether there is also an increase in the number of remaining teeth among the elderly in Turkey. The previous study in Ankara (9) and the present study represent cross-sectional studies performed in different groups at different times. However, the study (12) performed in the Netherlands involved the same group and was a prospective study.

In a population-based Turkish study (13), 47.5% of the elderly individuals were dentate, 16.2% had not visited a dentist in the previous 10 years, and 3% visited a dentist for control check-ups. In the present study, 47.4% of the residents were edentate, 6.1% had not visited a dentist yet, and 5.9% visited a dentist for control check-ups. The DMFT index and periodontal status were not calculated in the previous study (13). Although the oral health status may be expected in a controlled population, there appears to be no difference in oral health practices between institutionalized and non-institutionalized elderly individuals in Turkey.

In the present study, denture stomatitis (n=12) and epulis fissuratum (n=7) were the most common oral lesions identified on clinical examination. In recent studies, oral lesions related to wearing a denture were also the most common type of lesion in the mouth (3,8,14).

When the dental status was considered, the proportion of missing teeth was higher than the proportions of decayed and filled teeth and comprised majority of the DMFT score. In a recent study (10) on elderly individuals in Cameroon, the proportion of decayed teeth was higher than that of missing teeth. A small proportion of the subjects were edentate (1.1% maxilla and 1.6% mandible) in this previous study, whereas the proportion of edentate subjects in the present study was 47.4% (in both jaws), and this may be the reason for the differences in the proportion of missing and decayed teeth between these studies. The mean DMFT score of residents in the present study was 25.80±7.47. This was similar to previous studies conducted in Austria (DMFT, 25.6) (15), Spain (DMFT, 25.1) (16), and Chile (DMFT, 25.7) (17); lower than in studies conducted in Slovenia (DMFT, 30.75) (18), Ankara, Turkey (DMFT, 29.3) (9), and Piracicaba, Brazil (DMFT, 28.5) (19); and higher than in studies conducted in Belgium (DMFT, 20.3) (8), Valencia, Spain (DMFT, 16.83) (20), Barcelona, Spain (DMFT, 22.8) (21), Mexico (DMFT, 17.2) (22), and Hong Kong (DMFT, 21.35) (5). In a study in Hong Kong (5), the DMFT score was higher (21.35) in institutionalized elderly individuals than in non-institutionalized (17.67) individuals. The mean DMFT score was 22.25±7.81 in the ≤74-year-old age group, 27.95±6.39 in the 74–85-year-old age group, and 26.53±7.34 in the ≥85-year-old age group. Although the highest score was in the 74–85-year-old age group, a statistically significant difference was only found between this group and the ≤74-year-old age group. Of the total number of residents in the present study, 9 in the ≤74-year-old age group, 28 in the 74–85-year-old age group, and 17 in the ≥85-year-old age group were edentate. Therefore, higher numbers of edentate residents may be the reason for the highest DMFT score in the 74–85-year-old age group.

In terms of the periodontal status of the residents, calculus had the highest percentage distribution (38.3%) of the CPI index and the most common attachment loss score was 6–8 mm (30.0%). These results differed from those of an Australian study (2) conducted in Chinese migrants (calculus, 4.2%; 6–8 mm attachment loss, 24.2%), with only 6.3% of those migrants requiring complex periodontal treatment and the dental status being better than that observed in the present study. In a different study, the calculus percentage was higher (68.4%) than that in the present study, whereas the attachment loss percentage (6–8 mm attachment loss, 33.2%) was similar to that in the present study. The calculus (16.6%) and shallow pocket (21.8%) percentages were lower and the deep pocket percentage (19.7%) was higher in a Polish study (23) than those in the present study. On comparing the age groups and genders in the present study, there were no significant differences between CPI scores among the residents.



When the residents were divided into two age groups, ≤74and ≥75years, the attachment loss score was lower in the ≤74-year-old age group.

In the present study, the dental and periodontal statuses did not increase with age. There were no difference between the ≥85-year-old age group and other age groups. According to a recent study (8), the oral health status is declining with age because of malnutrition and dementia. These changes may be due to the mental status of the elderly residents in the current study or the catering facilities in the nursing home. Therefore, in the present study, residents with dementia were excluded, and the elderly in the nursing home were regularly provided with three proper meals under the supervision of a dietician.

The Nursing Home of Aydin Social Services is the only state-owned nursing home in Aydin city. No sampling was performed, and all residents meeting the inclusion criteria were included. Therefore, the results of the present study provide an institutional representation for structuring oral health services in Turkey; they may also be used to structure a systematic program across the country as a whole.

There are a few limitations in the present study. Clinical examination was performed in daylight without radiographs, which can result in hidden caries being undetected. Additionally, due to the nature of cross-sectional studies, the causality remains unclear and prospective studies are needed.

In conclusion, general dental health services are heavily focused on curative treatment, whereas the focus on preventive treatment and health promotion activities are low. However, due to the aging population, the costs of dental treatment are becoming a serious issue in health system. Additionally, low literacy levels are common in the elderly population, which results in poor health literacy. Poor health literacy increases the cost of treatments. In nursing homes, there is an opportunity for direct supervision and guided schedules for oral hygiene practices, if the presence of a dental practitioner can be obtained. The presence of a dental practitioner will support the oral health of elderly individuals and also improve their quality of life. In situations where a dental practitioner cannot be present, regular dental visits to a specific dental clinic are necessary.

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RESEARCH

EFFECTS OF CHRONIC LOW BACK PAIN ON POSTURAL STABILITY IN THE ELDERLY

ABSTRACT

Introduction: The aim of the present study was to investigate the effects of chronic low back pain on postural stability in an elderly population.

Materials and Method: The study enrolled 30 patients >65 years with chronic low back pain and 30 age-matched healthy controls. To assess postural stability, the centre of foot pressure sway was examined using a foot pressure platform. The chair stand, 10-m walk and timed up and go tests were conducted in both groups.

Results: There was no difference between the two groups with respect to the mean age and gender. The centre of pressure sway was increased in the anteroposterior and mediolateral directions in the group with low back pain. A marked reduction in postural stability was observed during measurements with the eyes closed. This reduction was more prominent in the anteroposterior direction ($p<0.001$). The elderly group with low back pain showed worse dynamic balance as assessed by the timed up and go test ($p<0.001$). The elderly patients with low back pain also showed considerably diminished performance during the chair stand and 10-m walk tests ($p<0.001$).

Conclusion: Chronic low back pain leads to impaired postural stability, loss of dynamic balance and reduced functional mobility in the elderly. Consequently, rehabilitation for postural instability should not be overlooked while planning treatment for low back pain in older patients.

Key Words: Low Back Pain; Postural Balance; Aged.

ARAŞTIRMA

YAŞLILARDA KRONİK BEL AĞRISININ POSTURAL STABİLİTE ÜZERİNE ETKİLERİ

ÖZ

Giriş: Bu çalışmanın amacı yaşlı populasyonda kronik bel ağrısının postural stabilite üzerine etkilerini incelemektir.

Gereç ve Yöntem: Çalışmaya 65 yaş üstünde kronik bel ağrılı 30 hasta ile aynı yaş grubunda 30 sağlıklı kontrol alındı. Postural stabilitenin değerlendirilmesi amacı ile basınç platformu kullanılarak katılımcıların ayak basınç merkezi salınımları değerlendirildi. Her iki gruba sandalyede kalkma testi, süreli kalk yürü testi ve 10 metre yürüme testleri uygulandı.

Bulgular: Gruplar arasında yaş ortalaması ve cinsiyet dağılımı açısından fark saptanmadı. Bel ağrılı grupta ayak basınç merkezi salınımları anteroposterior ve mediolateral doğrultularda artmış bulundu. Gözler kapalı yapılan ölçümlerde postural stabilitenin belirgin şekilde azaldığı görüldü. Bu azalmanın anteroposterior doğrultuda daha belirgin olduğu gözlendi ($p<0,001$). Süreli kalk yürü testi ile değerlendirilen dinamik dengenin bel ağrılı grupta daha kötü olduğu saptandı ($p<0,001$). Sandalyede kalkma ve 10 metre yürüme testlerinde bel ağrılı yaşlıların belirgin şekilde düşük performans sergiledikleri görüldü ($p<0,001$).

Sonuç: Yaşlılarda kronik bel ağrısı postural stabilitede bozulma, dinamik denge kaybı ve azalmış fonksiyonel mobilite ile sonuçlanmaktadır. Yaşlı hastalarda bel ağrısı tedavisi planlanırken postural instabilite rehabilitasyonu ihmal edilmemelidir.

Anahtar Sözcükler: Bel Ağrısı; Postural Stabilite; Yaşlılık.

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Introduction

Chronic low back pain (LBP) is a condition that results in substantial limitations in activity. Balance, which is fundamental for performing activities of daily living, is affected in patients with LBP (1). LBP is associated with some changes in postural control (2-4). The majority of studies on postural control in patients with LBP have shown increased postural sway in these individuals (1). A prolonged reaction time of the trunk muscles to sudden postural changes has been reported in the presence of LBP (5).

Aging is associated with impaired postural control and an increased risk of falls (6). Sensory and motor performance declines with aging. Elderly individuals with poor proprioception have been found to have greater postural sway. The factor that most commonly affects postural control is reduced proprioception of the joint position (7).

In recent years, foot pressure platforms that examine the centre of foot pressure sway have been utilized to quantify postural stability. While lower amplitude sway indicates good postural stability, higher amplitude sway indicates reduced postural stability. Although the impact of aging and chronic LBP is well recognized, the effects of LBP on postural control have not been fully elucidated in the elderly.

The aim of the current study was to investigate the impact of chronic LBP on postural stability in an elderly population and the changes in dynamic balance and mobility in these individuals.

Materials and Method

The study enrolled 30 patients >65 years with at least a 6-month history of chronic LBP and 30 age- and sex-matched healthy controls without LBP. Patients with spinal deformities, such as scoliosis and spondylolisthesis, neurological deficits, a history of spinal surgery, peripheral or central nervous system disease, vertigo, severe cardiac, respiratory and rheumatic conditions or malignancies were excluded. Approval was obtained from the local ethics committee of our hospital before the initiation of the study. All of the participants signed a written informed consent before entering the study. The characteristic features that were recorded for all participants included age, sex, body weight, height and a history of falls within the previous year.

Assessment of Postural Stability

Centre of pressure (CoP) sway measurements were performed to assess the postural stability of each patient. A Win-Track (Medicapteurs, France) pressure platform was used for measuring CoP sway. Win-Track is a 150x50 cm device that measures vertical ground reaction force with 12,288 sensors located on a highly sensitive surface. During the measurements, the feet were placed 22 cm apart for patients with a height of 76–140 cm, 26 cm apart for patients with a height of 141–165 cm and 30 cm apart for patients with a height of 166–203 cm (4). Measurements were taken while the patients were in a standing position with the arms placed right next to the body. Postural stability data were obtained using 30-s CoP sway recordings taken on the pressure platform. All measurements were conducted twice, once with the eyes closed and once with the eyes open. Data for total trajectory (T-Trajectory) and total area (T-Area) parameters were obtained. T-Trajectory is the length of trajectory drawn by CoP sway in all directions and T-Area indicates total sway area; both parameters were calculated using the Win-Track software. In addition, the amounts of CoP displacement in the anteroposterior (AP-Trajectory) and mediolateral (ML-Trajectory) directions were evaluated. Furthermore, mean CoP sway velocity was analysed in the anteroposterior (AP-Velocity) and mediolateral (ML-Velocity) directions.

Chair Stand Test

The chair stand test (CST) was performed on both groups in order to assess functional mobility. In the CST, the subject is asked to sit in an upright position at the centre of a chair with a seat height of 43 cm, with the hands placed on the contralateral shoulders. The subject is instructed to sit on the chair and stand up from the chair repeatedly within a 30-s period following a 'Start' command. The test score is determined on the basis of the number of chair stands in 30 s.

Ten-metre Walk Test

The 10-m walk test was used to evaluate the brief walking performance of the participants. In this test, the time taken to walk a 10-m distance briskly is recorded. For each subject, the average of three measurements was used in the analysis.

Timed Up and Go Test (TUG)

The TUG test is used to assess dynamic balance. It measures the time a participant takes to stand up from a chair, walk a 3-m distance and return and sit on the chair again. The TUG test has been demonstrated to be valid and reliable for the evaluation of functional mobility in older individuals (8).



Statistical Analyses

Statistical analyses of the study findings were conducted using SPSS (Statistical Package for Social Sciences) for Windows version 19.0. For analysis of the study data, descriptive statistical methods (mean, median, standard deviation and minimum-maximum) were used. The Student-t test was used for between-group comparisons of normally distributed quantitative data, and the Mann–Whitney U test was used for between-group comparisons of non-normally distributed quantitative data. The results were interpreted at a 95% confidence interval (CI) with a significance level set at $p<0.05$.

Results

The mean age of the LBP patients who were enrolled in the study was 69.5±4.9 years, which was not significantly different from the mean age of the control group (70.5±5.5 years). The patient and control groups did not differ in gender distribution or mean body mass index (Table 1). Compared to the control group, the LBP patients had a statistically significant higher number of falls within the previous year. The LBP group had significantly lower CST scores and took significantly longer to finish the 10-m walk test and the TUG test in comparison to the control group (Table 1).

The results of postural analysis on the pressure platform with the eyes open are presented in Table 2. For all the study parameters, the CoP sways were markedly greater in the LBP group than in the control group.

The results of the postural analysis with the eyes closed showed significantly greater CoP sways in the LBP group than in the control group (Table 3).

Table 4 shows the magnitude of changes in postural balance during the postural stability tests with the eyes closed as compared to that with the eyes open in both groups. The shifts in postural stability were greater in the LBP group than in the control group when the eyes were closed, with highly significant differences for T-Trajectory, T-Area, AP-Velocity and AP-Trajectory parameters.

Discussion

Brumagne et al. (2) suggested that major changes in postural control occur in patients with LBP. To achieve postural control, such patients use proprioceptive information that

Table 1— Characteristics of Study Groups

Characteristics	Low Back Pain Group (n=30)	Control Group (n=30)	p
Age, mean±sd, years	69.5±4.9	70.5±5.5	0.476
Gender (female), n (%)	21 (70%)	20 (66.6%)	0.781
BMI, mean±SD, kg/m²	29.5±3.5	28.4±3.7	0.244
Number of falls	0 (0-2)[a]	0 (0-1)[a]	0.046*
CST, mean±sd	8.5±2.2	10.6±1.6	0.000**
10 meter walk test, mean±sd	10.5±1.8	8.9±1.8	0.000**
TUG, mean±sd, second	10.9±2.3	8.9±1.4	0.000**

Median (minimum-maximum), * p<0.05, ** p<0.001, BMI: body mass index, CST: chair stand test, SD: standard deviation, TUG:timed up and go test

Table 2— Comparison of Groups With Respect to CoP Sway Parameters Measured with Eyes Open

	LBP Group Median (min-max)	Control Group Median (min-max)	p
$CoP_{T\text{-}Trajectory}$	80.4 (34.6-172.6)	53.9 (33.3-110.1)	0,006**
$CoP_{T\text{-}Area}$	21.4 (2.1-141.2)	9.5 (1.3-52.6)	0,004**
$CoP_{ML\text{-}Velocity}$	1.5 (0.8-3.5)	1 (0.7-2.3)	0,002**
$CoP_{AP\text{-}Velocity}$	1.8 (0.7-4.6)	1.2 (0.7-3)	0,020*
$CoP_{ML\text{-}Trajectory}$	0.9 (0.2-2)	0.7 (0.2-1.3)	0,004**
$CoP_{AP\text{-}Trajectory}$	1 (0.3-5.4)	0.7 (0.2-1.5)	0,020*

* p<0.05, ** p<0.01, AP: anteroposterior, CoP: center of pressure, LBP: low back pain, max: maximum, min: minimum, ML: mediolateral, T:total

Table 3— Comparison of Groups with Respect to CoP Sway Parameters Measured with Eyes Closed

	LBP Group Median (min-max)	Control Group Median (min-max)	p
$CoP_{T\text{-}Trajectory}$	137.1 (63.5-370.4)	84.9 (38.5-126.5)	0,000**
$CoP_{T\text{-}Area}$	68.2 (11.4-298.1)	18 (2.5-73.8)	0,000**
$CoP_{ML\text{-}Velocity}$	2.3 (1-5.4)	1.4 (0.7-2.4)	0,000**
$CoP_{AP\text{-}Velocity}$	3 (1.6-10.1)	2 (0.8-3.5)	0,000**
$CoP_{ML\text{-}Trajectory}$	1.3 (0.6-3.6)	0.9 (0.4-2.3)	0,001*
$CoP_{AP\text{-}Trajectory}$	1.9 (0.7-9.1)	1.2 (0.4-2.6)	0,000**

* p<0.01, ** p<0.001, AP: anteroposterior, CoP: center of pressure, LBP: low back pain, max: maximum, min: minimum, ML: mediolateral, T:total

Table 4— Comparison of Groups with Respect to Changes in Postural Sway Tested with Eyes Closed and Open

	LBP Group Median (min-max)	Control Group Median (min-max)	p
CoPT-Trajectory	41.8 (2.3-260.1)	18.3 (0.3-66.5)	0,000***
CoPT-Area	30 (0.4-285.3)	7.4 (3.2-39.1)	0,000***
CoPML-Velocity	0.6 (0-3.7)	0.2 (0-0.9)	0,002**
CoPAP-Velocity	1.1 (0.2-7.1)	0.5 (0-2.1)	0,000***
CoPML-Trajectory	0.4 (0.1-2.6)	0.2 (0-1.4)	0,016*
CoPAP-Trajectory	1 (0-5.4)	0.4 (0-1.5)	0,000***

* p<0.05, ** p<0.01, *** p<0.001, AP: anteroposterior, CoP: center of pressure, LBP: low back pain, max: maximum, min: minimum, ML: mediolateral, T:total

is obtained from muscles surrounding the ankles rather than the trunk muscles. It has been reported that while this postural control strategy is adequate for simple activities, they fail to achieve postural stability during complex tasks.

Maintaining a fixed position on stable surfaces has no effect on postural stability in young adults with LBP; however, stability was impaired when testing was performed on a foam surface with the eyes closed and the arms in an abducted position (9,10). According to Caffaro et al. (4), increased CoP oscillation is more likely in patients with chronic LBP in comparison to the controls. Unstable surfaces and loss of vision increase postural instability. Braga et al. (11) reported that the CoP sway area was wider in LBP patients than in healthy individuals but with no difference in average sway velocity. Our results showed increases in all of the studied parameters, including the length and area of CoP sway trajectory and the average sway velocity, in older patients with LBP as compared to their healthy counterparts.

Volpe et al. (3) determined that postural control in individuals with LBP is impaired only on mobile surfaces. That study was conducted on younger patients and reported that anteroposterior stability was particularly affected in individuals with LBP. Tanaka et al. (6) found that although anteroposterior stability was impaired even when the eyes were open, mediolateral stability was only impaired when the eyes were closed in healthy older people. Our results indicated that both the anteroposterior and mediolateral stabilities were impaired in the presence of LBP in the elderly.

It is apparent that most of the studies on the relationship between LBP and postural stability have been conducted in younger subjects, and that the findings of these studies show that postural balance is usually impaired on unstable surfaces and/or with the eyes closed in LBP patients. Our results showed that balance is impaired even with eyes open, at a fixed position, and on a stable surface in older people with LBP. Consistent with our findings, a study with older patients as part of the study population demonstrated that CoP sway was increased in LBP patients when tested at a fixed standing position. The same study showed that the time to restore postural stability following perturbation of proprioceptive feedback



by applying vibration to the ankle muscles was longer in the elderly people. These findings were interpreted as 'aging and low back pain diminish the sensitivity of paraspinal muscle spindles or alter the capability of the central nervous system to process this afferent information' (2).

Our findings showed that impairment of postural stability was more prominent when visual input was removed in older patients with LBP as compared to age-matched healthy controls. This result is consistent with all of the available literature (3,4,9,12). Older people were reported to use visual sensory information in an attempt to compensate for reduced proprioception in order to achieve postural control. In the elderly, postural control has been shown to be considerably impaired, particularly when the eyes are closed (6,13). While our results showed increased postural sway in both directions when the subjects were tested with the eyes closed, the finding of greater impairment in anteroposterior stability is remarkable.

In a study examining the dominant side in LBP patients, stability was significantly worse while standing on one foot and this was attributed to reduced lumbopelvic control (14). Sitting-standing performance is negatively affected due to suboptimal lumbar proprioception in patients with chronic LBP (15). Similarly, in the present study, the LBP patients were found to have a lower performance in the CST.

Kiers et al. (16) found that CoP sway was irregular and at a higher frequency in LBP patients and this was attributed to greater co-contraction of muscles and insufficient cognitive control in such patients. Furthermore, they reported diminished proprioception due to increased postural sway on a foam surface in LBP patients. Postural sway is reduced by the trunk muscles, which control the gravitational forces applied on the spine because of rotational motion on the axis of the ankle joint (1). According to Leionen et al. (17), impaired lumbar proprioception and motor control account for the reduced postural control in patients with LBP.

Using kinematic analyses, unbalanced functioning of the trunk muscles contributes to postural instability in patients with recurrent LBP (12). Higher resting activity has been demonstrated in the trunk and ankle muscles by electromyography in LBP patients and has been associated with increased muscle stiffness. In that study, acute muscular activity was diminished (18). Subsequently, a delay in CoP displacement according to a new body position has been shown on dynamic postural assessments in LBP patients (19).

Reorganization of trunk muscle representation at the motor cortex has been reported in individuals with recurrent LBP, and it has been suggested that this reorganization is associated with deficits in postural control (20). The effects of chronic LBP on postural stability are quite complicated. Factors that include pain, neurological problems, impaired muscular performance, fear of pain and adoption of alternative mobility strategies have all been implicated (1,21,22,23).

At present, little is known about postural stability problems in older individuals with LBP. The fact that more than half of the healthy elderly population is at a moderate to high risk for falls underscores the importance of postural stability (24). Our study showed that, in contrast to younger people, LBP affects postural stability even on stable surfaces in older individuals, that increased postural sway is common in all directions and that anteroposterior stability, in particular, is substantially impaired when visual input is removed. One limitation of our study is that we assessed postural stability only on a stable surface. Further studies are warranted to investigate the effect of various rehabilitation methods on postural stability.

Optimal postural control is essential in order to be able to perform activities of daily living. Given the adverse impact of aging and LBP on postural stability, it should be kept in mind that older patients with LBP are more likely to experience balance problems and that the risk of falls is aggravated by irregular surfaces and the dark. It is obvious that rehabilitation for postural instability should be a part of LBP treatment in older patients.

Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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RESEARCH

EVALUATION OF EUSTACHIAN TUBE FUNCTION TESTS AND IMMITANCEMETRIC MEASUREMENTS IN A GERIATRIC GROUP

ABSTRACT

Introduction: Atrophy in the middle ear and degeneration of muscle fibers, fibrous tissue ligament, and bone as well as calcification of Eustachian cartilage occurs with aging. We aimed to evaluate the middle ear system and changes in Eustachian tube functions in a geriatric group.

Materials and Method: Study participants comprised 30 older and 30 younger individuals between the age of 65 and 84 years (74.3±5.4 years) and 18 and 45 years (30.4±4.2 years), respectively. All participants underwent immitancemetric measurements and Eustachian tube function tests after ear, nose, and throat examination. For the immitancemetric measurements, the ear canal volume, compliance, middle ear pressure, and gradient were evaluated. Valsalva and Toynbee maneuvers were used to perform the Eustachian tube function tests.

Results: Non-significant differences were found between the two groups for the ear canal volume and middle ear pressure ($p>0.05$). While no significant difference was found for the left ear compliance values between the two groups ($p>0.05$), a significant difference between the left ear compliance and gradient values for both ears was found ($p<0.05$). Eustachian tube function tests showed no significant differences between the groups, based on the values obtained by Valsalva and Toynbee maneuvers.

Conclusion: Eustachian tube functions in the geriatric group were found to be normal in this study. Bilateral gradient and right ear compliance values were higher in the geriatric group than in the control group indicating that the middle ear system in the geriatric group was more active.

Key Words: Hearing Tests; Aged; Eustachian Tube; Audiometry.

ARAŞTIRMA

GERİATRİK GRUPTA İMMİTANSMETRİK ÖLÇÜM VE ÖSTAKİ TÜP FONKSİYON TESTLERİNİN DEĞERLENDİRİLMESİ

ÖZ

Giriş: Yaşa bağlı orta kulakta atrofi, kas liflerinin, fibroz doku ligamentlerinin, kemik gelişiminin dejenerasyonu ve östaki tüpünün kıkırdaksı kısmında kireçlenmeler gözlenmektedir. Bu çalışmanın amacı; geriatrik grupta orta kulak sistemi ve östaki tüp fonksiyonlarında meydana gelen değişimleri değerlendirmektir.

Gereç ve Yöntem: Bu çalışmaya 65–84 yaş arasında (74,3±5,4) 30 yaşlı birey ile 18–45 yaş arasında (30,4±4,2) 30 birey katılmıştır. Katılımcılara Kulak Burun Boğaz muayenesinden sonra immitansmetrik ölçüm ve östaki tüp fonksiyon testleri yapılmıştır. İmmitansmetrik ölçümlerde kulak kanal volümü, komplians, orta kulak basıncı ve gradient değerlendirilmiştir. Östaki tüp fonksiyonları ise Valsalva ve Toynbee manevraları ile incelenmiştir.

Bulgular: İmmitansmetrik ölçümlerde geriatrik ve kontrol grubu arasında kulak kanal volümü ve orta kulak basıncı arasında istatistiksel olarak anlamlı bir fark bulunamamıştır ($p>0,05$). Sol kulak compliance değerleri arasında istatistiksel olarak anlamlı bir fark mevcut değilken ($p>0,05$), sağ kulak compliance ve bilateral gradient değerleri arasında istatistiksel olarak anlamlı bir fark mevcuttur ($p<0,05$). Östaki tüp fonksiyonları Valsalva ve Toynbee manevraları ile değerlendirilmiş, gruplar arasında istatistiksel olarak anlamlı bir fark bulunamamıştır (p?0,05).

Sonuç: Elde edilen bulgulara göre geriatrik grupta östaki tüp fonksiyonları normal sınırlardadır. Bilateral gradient ve sağ kulak komplians değerleri kontrol grubuna göre yüksek elde edilmiştir. Bu durum geriatrik grupta orta kulak sisteminin daha hareketli olduğunu göstermektedir.

Anahtar Sözcükler: İşitme Testleri; Yaşlı; Östaki Tüpü; Odiometri.

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Introduction

The World Health Organization (WHO) defines older people according to the calendar age as the young old (60–64), middle-old (65–74), old (75–84), and old-old (85+) (1). Although aging exhibits individual differences, it is influenced by life style and chronic diseases, as well as by physiological, genetic, and environmental factors. Physiological changes encountered during old age often occur in single or multiple organs (2).

In the geriatric group, certain age-dependent changes are observed in the middle ear. These changes are seen in the tympanic membrane; ossicular chain; middle ear joints; and cartilages in the joint surfaces, middle ear muscles, and fibrous tissue ligaments. Previous middle ear structural and histological studies have reported many old age-related changes. Other age-related changes include atrophy and degeneration of bone as well as fibrous tissue bands in the middle ear muscle fibers (3,4). It has been reported that the cartilaginous support of the Eustachian tube gets calcified and there is muscle fiber atrophy. Age-related reduction of muscle functions may present problems in opening the Eustachian tube, especially while gulping (2). Although the middle ear goes through some age-related anatomical changes, the effects of ageing on the physiological and behavioral tests of the middle ear are very low (5).

The most detailed information concerning the middle ear system is obtained by immitancemetric measurements. According to the definition adopted by the American National Standards Institute (ANSI) in 1987, tympanometry is the process of acoustic immitance as a function of the air pressure in the outer ear canal (6).

Currently, all measuring instruments measure admittance. Impedance is the resistance shown by the middle ear system to the flow of the acoustic energy; conversely, admittance is the permeability of the middle ear system to the flow of acoustic energy (7). Immitancemetric measurements are performed with tympanometric instruments. Tympanometry involves a probe that is placed outside the outer ear. This probe has three main components: 1) a speaker that gives sinusoidal signals at known frequencies, 2) a microphone that collects signals coming back from the tympanic membrane, and 3) a manometer that can change the pressure that exists between the probe and the tympanic membrane. A tympanogram is a graph that shows values estimated from tympanometry.

For immitancemetric measurements, a probe that is placed in the outer ear track applies pressure between +200 daPa and -400 daPa. A tympanogram is drawn between the changing pressure levels. The peak of the tympanogram graph in the normal middle ear is the pressure near 0 daPa. Thus, this is the condition with highest acoustic energy passage. As the pressure moves toward positive or negative pressure, the tympanic membrane and the middle ear system hardens, which means that the acoustic admittance decreases indicating that more energy is reflected toward the middle ear track. In the cases, where the pressure is either highly positive or negative, the middle ear assumes a stiffness, and the admittance is at the lowest level. As the pressure decreases from +200 daPa to -400 daPa, the middle ear pressure where maximum passage occurs is determined (8). The parameters for immitancemetric measurements are the outer ear volume, compliance, middle ear pressure, and pressure gradient (9,10).

The Eustachian tube plays an important role during the assessment of the middle ear function. It balances the pressure in the middle ear with the atmospheric pressure. Improper functioning of the Eustachian tube leads to problems in the middle ear. Valsalva and Toynbee maneuvers are used to measure the functions of the Eustachian tube. The Valsalva test is based on increasing the middle ear pressure. The mouth and nose of the patient are closed to ensure passage of air into the middle ear. However, the Toynbee test is a maneuver which decreases the pressure in the middle ear. By gulping or drinking water, air exiting from the patient's middle ear is ensured. The patient is asked to clamp her/his nose and to gulp. After the test, the tympanogram is taken. The aim of this study was to evaluate the geriatric groups' middle ear systems as well as Eustachian tube functions.

Materials and Method

The present study was carried out at the Audiology Tertiary Referral Center and Speech Disorders Clinic. Ethical approval was given by the University Medical School, Non-Medication Clinical Researches Ethical Board by its meeting decision dated 26/09/2014 and No. 30. All study participants signed an informed consent form.

Participants comprised 30 old individuals between the age of 65–84 years (mean 74.3±5.4 years) and 30 individuals between the age of 18–45 years (mean 30.4±4.2 years). After the otolaryngology [ear, nose, and throat (ENT)] examinations, each participant underwent pure tone audiometry (Interacoustics AC 40 Audiometer Assens, Denmark), an immitancemetric examination and Eustachian tube function tests (ETF (Interacoustics AZ26 tympanometer Assens, Denmark))



Following were the inclusion criteria of the study: 1) individuals with normal routine ENT examinations, 2) individuals without otological problems, 3) individuals whose average hearing thresholds were ≤25 dB (hearing loss of high frequency were ignored), and 4) individuals who had a maximum of 5 dB difference in air and bone track hearing thresholds.

Following were the exclusion criteria of the study: 1) individuals who had undergone ear surgery, 2) use of a hearing device, 3) outer and middle ear problems (such as ear infections), 4) perforated tympanic membrane, 5) exposure to noise, 6) ototoxicity, 7) otological trauma history, and 8) systemic diseases.

For immitancemetric measurements, the outer ear canal was plugged with a probe suitable to the ear canal, and the measurements were made automatically. Pressure was applied between +200 daPa and -400 daPa, and with a probe tone of 226 Hz and 85 dBSPL sound pressure level, the ear canal volume, compliance, middle ear pressure, and pressure gradient were measured. For the ETF test, the normal tympanogram (P1) was drawn without removing the probe. The study subject was then asked to perform the Toynbee maneuver (gulping) and another tympanogram (P2) was drawn. After the Toynbee maneuver, the patient was asked to perform the Valsalva maneuver (pumping air into the ear by inflating the mouth and the cheeks), and the third tympanogram (P3) was drawn, which concluded the test.

Statistical Analysis

Statistical analyses were performed using SPSS for Windows 20.0 (SPSS Inc., Chicago, IL, USA). Kolmogorov Smirnov test was performed to see if there was normal distribution between the normal and the geriatric groups. A paired t-test was used for groups that showed normal distribution in the right and left ear evaluations, and the Wilcoxon test was performed to evaluate the groups who did not show a normal range of distribution. For ETFs, differences between the values in P1, P2, and P3 group (P1-P2, P1-P3, and P2-P3) for right and left ears were evaluated with the independent two-sample t-tests.

RESULTS

Non-significant differences were found for the immitancemetric measurements in the intra- and intergroup ear canal volumes between the control and geriatric group ($p>0.05$). Values are shown in Table 1.

Geriatric and control group compliance values are shown in Table 2.

Significant differences were found in the right ear compliance values ($p<0.05$), while there were no significant differences for the left ear compliance values ($p>0.05$) between the control and geriatric group.

Middle ear pressure values for geriatric and control groups are shown in Table 3.

Table 1— Values of Right and Left Ear Canal Volume

	Control Group				Geriatric Group				
	Min.	Max.	Mean	sd	Min.	Max.	Mean	sd	p
Right	0.16	0.96	0.52	0.218	0.27	1.23	0.54	0.212	p?0.05
Left	0.22	0.92	0.47	0.190	0.22	1.01	0.54	0.213	p?0.05

SD: Standart Deviation

Table 2— Right and Left Ear Compliance Values

	Control Group				Geriatric Group				
	Min.	Max.	Mean	sd	Min.	Max.	Mean	sd	p
Right	0.22	1.11	0.43	0.191	0.11	1.89	0.50	0.334	p<0.05
Left	0.24	0.82	0.45	0.152	0.19	1.63	0.50	0.288	p>0.05

SD: Standart Deviation

Table 3— Right and Left Ear Middle Ear Pressure Values

	Control Group				Geriatric Group				
	Min.	Max.	Mean	sd	Min.	Max.	Mean	sd	p
Right	-64.00	48.00	-28.66	22.775	-60.00	-4.00	-33.46	14.873	p>0.05
Left	-64.00	-12.00	-33.46	12.272	-64.00	24.00	-25.46	18.834	p>0.05

SD: Standart Deviation

Table 4— Right and Left Ear Gradient Values

	Control Group				Geriatric Group				
	Min.	Max.	Mean	sd	Min.	Max.	Mean	sd	p
Right	0.15	0.75	0.27	0.113	0.17	1.33	0.33	0.220	p>0.05
Left	0.16	0.49	0.26	0.829	0.17	1.24	0.33	0.197	p>0.05

SD: Standart Deviation

No significant differences were found (p>0.05) for the intra- and intergroup middle ear pressures between the control and geriatric group.

Pressure gradient values of geriatric and control groups are shown in Table 4.

Significant differences were found (p>0.05), for the intergroup pressure gradient values between the control and geriatric group.

The Eustachian functions of the geriatric group were evaluated based on the Toynbee and Valsalva maneuvers. Decrease in ear pressure along with the Toynbee maneuver delays the increase in ear pressure as well as the ability to perform the Valsalva maneuver. Non-significant differences were found between the geriatric and control group (p>0.05) based upon the maneuver values obtained.

Discussion

Acoustic immitancemetric measurements are made with a tympanometer and have been routinely used in the clinical practice since 1970s. Compliance and ear pressure values are of utmost importance in such measurements. In addition, the ear canal volume shows tympanic membrane perforations, while the pressure gradient shows middle ear effusion (11).

Although there are anatomical differences among older individuals, ear canal volume differences up to 2.00 ml are considered normal. Ear canal volumes above normal value show tympanic membrane perforations. Values obtained from immitancemetric measurements play an important role in diagnosing small ear tympanic membrane perforations.

Jerger et al. (1972) demonstrated that normal compliance values are between 0.3 ml and 1.6 ml. Brooks et al. (1968) reported that the compliance values are between 0.35 ml and 1.4 ml, and that the middle ear pressure is between -100 daPa and +50 daPa. They stated that in a normal otoscopic examination, the middle ear pressure up to -150 daPa is acceptable (12,13).

In the present study, significant differences between compliance values of the geriatric and control groups were present. This shows that in the geriatric group, the middle ear admittance values are higher for the right ear, which means that their middle ear systems are more active compared with those of the control group. Middle ear pressure showed meaningful differences between the groups. These results are similar to those of the studies conducted by Jerger et al. and Brooks et al. (3,7).

In addition, pressure gradient values included in the immitancemetric measurements also provide information on the middle ear functions. In some cases, the fact that the gradient value was low, even if the middle ear pressure was within normal limits, suggests middle ear fluid effusion or accumulation. Brooks et al. stated that a gradient value of <0.15 ml suggests considerable middle ear fluid effusion or accumulation (3). In the present study, high gradient values were obtained from the control group. These values agreed with compliance values found in the right ear. No statistically meaningful va-



lues were found for the left ear compliance values, although the values were high among the geriatric group.

Bernstein stated that a change of 10 daPa in the Eustachian tube measured by the Valsalva maneuver is a normal Eustachian tube function (2). In addition, Bernstein emphasized that a difference of 15 daPa between the maximum and minimum limits of the normal values is to be considered as normal function (14).

In this study, the lowest pressure change in ETFs both in the geriatric and control groups was 4 daPa. This value is 6 daPa lower than the value found by Bernstein (1992). According to the outcomes of the present study, in order to state that the Eustachian tube has a normal function, a pressure change of at least 4 daPa must be obtained by the Valsalva and Toynbee maneuvers.

Immitancemetric measurements are routinely used in audiology clinics, while the Eustachian tube function tests are sparingly used. Availability of literature that examines the use of these tests in the geriatric group is very limited. Even though immitancemetric measurements and the ETF tests play an important role in audiological testing, they do not possess much clinical value. These tests play an important role in the geriatric group where it is difficult to interpret in some cases whether the abnormal values are due to age or due to pathological changes. This explains why these tests play an important diagnostic role in the geriatric group (15-17). Newman and Spitzer (1981) suggested that ETF is valuable in geriatric group as it could possibly explain the hypofunction of the aged Eustachian tube (18). Results of our study are also very important as they present ET hypofunction in geriatric group.

Smith et al. (2016) emphasises that The Eustachian tube is a complex structure. In their review on ET imaging, they claimed that best method for ET imaging can be achieved by Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) (19). However, same results could also be gained by ETF tests that are conducted in audiological clinics. Thus, ETF tests should primariliy be prefered as MRI and CT are expensive methods.

Llewellyn et al. (2014) reported that future studies are needed to define Eustachian tube dysfunction (ETD) in adults, broader middle ear ventilation problems and differential diagnose criteria as well to provide consensus on differential diagnose on ETD (20).

As a result, high values for right ear compliance and bilateral pressure gradient clearly show that probe tone sound in the geriatric group passed more easily at 226 Hz. Increase in the compliance and gradient value ratios are in proportion with each other. Both compliance and gradient values are in agreement as they both have high values. Thus, the activity of the middle ear systems of the geriatric group gives rise to the concept that aging could lead to system atrophy along with the degeneration of the middle ear muscle fibers, fibrous tissue ligaments, and middle ear ossicles. No significant ETF differences were found between the geriatric and control group. These results give important diagnostic information about abnormal Eustachian test results. A pressure change of 4 daPa obtained with the Valsalva and Toynbee maneuvers should be accepted as normal.

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RESEARCH

LIGAMENTUM FLAVUM HYPERTROPHY IN ELDERLY PATIENTS WITH LOW BACK PAIN: A MRI STUDY

ABSTRACT

Introduction: Lumbar spinal canal stenosis (LSCS) is the most common spinal disorder in elderly patients. Ligamentum flavum (LF) hypertrophy contributes to the development of this disorder. We examined the correlations between LF thickness, measured on the magnetic resonance images, and age, gender, LSCS, disc degeneration, and disc herniation.

Materials and Method: Three hundred and forty patients complaining of low back pain were evaluated (mean age: 57.8±11.2 years). LF thickness was measured at the L2-3, L3-4, L4-5, and L5-S1 levels using axial T1-weighted magnetic resonance images at the facet joint level. All patients were examined for spinal stenosis, disc degeneration, and disc herniation.

Results: LF thickness was significantly greater in the LSCS group at the L2-3, L3-4, and L4-5 levels ($p<0.05$). LF thickness at all levels increased with age ($p<0.05$). No effect of gender was observed on LF thickness ($p>0.05$). LF thickness at all levels was significantly greater in patients with degeneration of Pfirrmann grades IV-V than in those with degeneration of grades I–III ($p<0.05$). There was no association between lumbar disc herniation and LF thickness at the lumbar intervertebral levels ($p>0.05$).

Conclusion: In elderly patients, LF hypertrophy was correlated with age, LSCS, spinal level, and disc degeneration, and not with disc herniation and gender.

Key Words: Ligamentum Flavum; İntervertebral Disc Degeneration; Spinal Canal; Magnetic Resonance Imaging.

ARAŞTIRMA

BEL AĞRISI BULUNAN YAŞLI HASTALARDA LİGAMENTUM FLAVUM HİPERTROFİSİ: MRG ÇALIŞMASI

ÖZ

Giriş: Lumbar spinal kanal stenozu (LSKS) yaşlı hastalarda sık görülen spinal hastalıktır. Ligamentum flavum (LF) hipertofisi bu hastalığın gelişimine katkıda bulunur. Bu manyetik rezonans görüntülemede LF kalınlığı ile yaş, cinsiyet, LSKS, disk dejenerasyonu ve disk herniasyonu arasındaki ilişki incelenmiştir.

Gereç ve Yöntem: Bel ağrısı şikayeti bulunan 340 hasta değerlendirildi (ortalama yaş: 57.8±11.2 yıl). LF kalınlığı, facet eklem düzeyindeki aksiyal T1-ağırlıklı manyetik rezonan görüntüler kullanılarak L2-3, L3-4, L4-5 ve L5-S1 düzeylerinden ölçüldü. Spinal stenoz varlığı, disk dejenerasyonu ve disk herniasyonu hastalarda değerlendirildi.

Bulgular: LF kalınlığı LSKS bulunan grupta L2-3, L3-4 ve L4-5 düzeylerinde belirgin büyüktü ($p < 0.05$). Tüm düzeylerde LF kalınlığı yaş ile artmaktaydı ($p<0.05$). LF kalınlığına cinsiyetin etkisi saptanmadı ($p>0.05$). LF tüm düzeylerde Pfirrmann grade I-III dejenerasyonu bulunanlardan, grade IV-V dejenerasyonu bulunan hastalarda belirgin kalındı ($p<0.05$). Lumbar intervertebral düzeylerde LF kalınlığı ile disk herniasyonu arasında ilişki saptanmadı ($p>0.05$).

Sonuç: Yaşlı hastalarda LF kalınlığı yaş, LSKS, spinal düzey ve disk dejenerasyonu ile koreledir ancak disk herniasyonu ve cinsiyet ile korele değildir.

Anahtar Sözcükler: Ligamentum Flavum; İntervertebral Disk Dejenerasyonu; Spinal Kanal; Manyetik Rezonans Görüntüleme.

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Introduction

Lumbar spinal canal stenosis (LSCS) is one of the most common spinal disorders in elderly patients (1-4). Ligamentum flavum (LF) hypertrophy is considered a major contributor to the development of LSCS. LF thickening can decrease the spinal canal diameter, thereby compressing the dural sac and nerve roots. This compression can cause symptoms even in the absence of osseous spurs, herniated nucleus pulposus, or a bulging annulus fibrosus (1,2,5,6). The only therapeutic maneuver for these patients is surgical removal of the hypertrophied ligament. Reducing its thickness might increase the segmental space available for the dural sac (5).

The vertebral column comprises separate functional vertebral units. Apart from the vertebral bone, each unit also contains facets joints, intervertebral discs, and ligaments (7). LF extends from the second cervical vertebra to the first sacral vertebra, covering the posterior and lateral walls of the spinal canal (1,2,5,8,9). The posterior ligamentous complex of the spinal column-where LF is prominently involved in constraining posterior flexion-plays an important role in the stabilization of segmental movements (7). As a connective tissue, LF affects and/or controls the intervertebral movements and is also involved in the maintenance of smooth surfaces of the posterior dural sac (1,6).

Histological studies have demonstrated that LF hypertrophy is mainly caused by fibrosis (4,9,10). Although factors such as aging, mechanical stress, and physical activity are involved in LF hypertrophy, the precise pathomechanisms underlying LF hypertrophy remain unknown (2,6,9-11).

We aimed to analyze the relationship of LF thickness, obtained using magnetic resonance (MR) imaging (MRI), with age, gender, spinal level, disc degeneration, and disc herniation. We hypothesized that LF would be positively correlated with the aforementioned variables.

Materials and Method

Patients

This was a retrospective study, and the need for informed consent was waived by our institutional review board. All patients who were admitted to our hospital with low back pain and underwent MRI evaluation between January 2014 and December 2014 were recruited. The exclusion criteria were any history of lumbar spinal surgery, lumbar and sacral mass lesion, discovertebral infection, lumbar vertebral fracture, current radiotherapy or spinal deformities such as spondylolisthesis and scoliosis. Three hundred and forty patients (mean age, 57.8±11.2 years) were included; among them, 205 (60.3%) were female and 135 (39.7%) were male.

Imaging Parameters

All MRI examinations were performed using a 1.5-T unit (Sigma; GE Medical System, Milwaukee, Wisconsin, USA), employing a phased-array coil. The imaging protocol included:

Sagittal T2-weighted fast spin echo (FSE): (TR: 2996 ms, TE:105,98 ms, matrix:30x30 cm , slice thickness:4 mm)

Sagittal T1-weighted FSE: (TR: 668 ms, TE: 7,93 ms, matrix:30x30 cm, slice thickness:4 mm)

Axial T1-weighted FSE: (TR: 500 ms, TE:8,97 ms, matrix:18x18 cm, slice thickness:4 mm)

Axial T2-weighted FSE: (TR: 4431 ms, TE:98,48 ms, matrix:19x19cm, slice thickness:4 mm) for all MRI examinations.

Image Analysis

A single radiologist retrospectively evaluated MR images of the patients using our Picture Archiving and Communication System (PACS). The thickness of LF were measured at 4 levels (L2-3, L3-4, L4-5, L5-S1). Also, intervertebral disc degeneration, anteroposterior diameter, and the area of the lumbar spinal canal and disc degeneration were evaluated at these levels for all patients. LF thickness at each intervertebral level (L2-3, L3-4, L4-5, and L5-S1) was obtained by measuring it at half the length of LF on axial T1-weighted MR images at the facet joint level, using the measuring tool of the PACS (Figure 1). If LF was asymmetrical, we used the thicker one.

The severity of the intervertebral disc degeneration was graded for the four different intervertebral levels (L2-3, L3-4, L4-5, and L5-S1). The evaluation was performed using T2-weighted midsagittal images, employing the five-grade classification introduced by Pfirrmann et al. (12) (Table 1). LF thicknesses were compared between degeneration grade I–III group and grade IV-V group.

The anteroposterior diameter of the spinal canal and the area of the canal for each intervertebral level were measured on the axial T2-weighted images at the midline between the posterior margin of the disc and the anterior border of the vertebral arch. The spinal canal area was obtained as the area of the projection of the canal onto the plane of the facet joint. LSCS was assumed if the anteroposterior diameter of the spinal canal was less than 11.5 mm or the area of the spinal canal was less than 1.5 cm^2 (13).



Figure 1— Measurement of the ligamentum flavum thickness on axial T1- weighted MR images at the facet joint level.

To assess the reliability of the measurements, the same radiologist performed the measurements twice, with an interval of 3 weeks, in 100 lumbar spines randomly selected from a 340-spine collection.

Statistical Analysis

Statistical analyses were evaluated using the SPSS (v15.0; SPSS Inc., Chicago, IL) program. We tested the relationship between LF thickness and the age of the patients with Student's t-test. The relationship between LF thickness and the spinal level was evaluated using Pearson's correlation test. The independent-samples t-test was used for the relationships between LF thickness and gender, LSCS, disc degeneration, and disc herniation. $p < 0.05$ was considered statistically significant. The intra-class correlation coefficient (ICC) was used to estimate the intra-observer reliability for LF thickness evaluation.

Results

LF thickness were greater in the LSCS group at levels of L2-3, L3-4, and L4-5, but not at L5-S1, compared with the group without LSCS ($p<0.05$) (Table 2).

The thickness of LF, starting from the level of L2-3 ,up to L4-5 tended to increase ($p<0.05$). LF thickness in study group was 3.49±0.56 mm, 3.86±0.63 mm, 4.15±0.72 mm, and 3.07±0.5 mm for the L2-3, L3-4, L4-5, and L5-S1 levels, respectively. It was the greatest at L4-5.

LF thickness increased by age group ($p<0.05$) (Table 3). No effect of gender on LF thickness was observed ($p>0.05$).

Table 2— Mean Thickness of the LF in with and without Lumbar Spinal Canal Stenosis (LSCS) Group [mean thickness of the LF (mm) ±sd]

Lumbar Level	Group With LSCS	Group Without LSCS	p
L2-3	3.37±0.66	3.15±0.48	<0.05
L3-4	3.77±0.63	3.58±0.52	<0.05
L4-5	4.23±0.78	3.90±0.54	<0.05
L5-S1	3.02±0.48	2.95±0.45	>0.05

Table 1— Classification of Disc Degeneration

Grade	Signal Intensity of The Nucleus Pulposus and Structure	Distinction of Nucleus and Anulus	Height of Intervertebral Disc
I	Homogenous, brigh white; hyperintense to isointense to CSF	Clear	Normal
II	Inhomogeneous with or without horizontal bands; hyperintense to isointense to CSF	Clear	Normal
III	Inhomogeneous, gray; intermediate to CSF	Unclear	Normal to slightly decreased
IV	Inhomogeneous ,gray to black ; hypointense to CSF	Lost	Normal to moderately decreased
V	Inhomogeneous, black; hypointense to CSF	Lost	Collapsed disc space

CSF: Cerebrospinal fluid

Table 3— Mean Thickness of the LF at Each Spinal Level in Patient with Low Back or Leg Pain Distributed by Age [mean thickness of LF (mm) ±sd]

Age (years)	n	L2-3	L3-4	L4-5	L5-S1	p
40-49	95	2.78±0.29	3.25±0.37	3.58±0.37	2.69±0.36	<0.05
50-59	88	3.14±042	3.58±0.42	3.91±0.53	2.91±0.36	<0.05
60-69	99	3.28±0.33	3.66±0.42	4.04±0.48	3.06±0.41	<0.05
70-79	46	3.76±0.51	4.26±0.60	4.70±0.84	3.34±0.54	<0.05
80 and over	12	4.49±0.68	4.61±0.41	4.73±0.21	3.46±0.30	<0.05

LF thickness in patients with degeneration of grades IV-V was significantly greater than that in degeneration of grades I–III ($p<0.05$) (Table 4). At L2-3, L3-4, L4-5, and L5-S1, no significant differences were found between LF thicknesses in the individuals with and without lumbar disc herniations ($p>0.05$).

The ICC for intra-observer reliability was 0.89 for LF thickness.

Discussion

The main finding of the present study was the significantly higher LF thickness among subjects with LSCS. We also observed a positive correlation between LF thickness and age, spinal level, and disc degeneration among elderly patients. Overall, LF thickness did not depend on gender or disc herniation.

The pressure exerted on the nerves by the adjacent tissues such as the intervertebral disc, LF, or facet joint is considered the major cause of low back pain or leg pain in elderly patients (6,8,11,14). LF hypertrophy was first reported in 1913 as a cause of stenosis leading to the low back pain (15). Computed tomography and MRI study evaluating LF thickness have indicated that LF is one of the significant factors responsible for compression (3,5,10,16,17).

LF, a key spinal ligament, is also called the yellow ligament because it is rich in yellow elastin. The normal LF is a well-defined elastic structure composed of 80% of elastic fibers and 20% of collagen fibers (3,6,9). The increased collagen-to-elastin ratio has also been considered a sign of developing LSCS in elderly patients (4,10).

Aging affects all the structures of the spine (18). We observed that LF thickness at all the lumbar levels increased with age. This observation was in agreement with the previous research suggesting that LF thickness is age dependent (1,5,10,17,19,20). Abbas et al. (5) have reported that significant changes in LF thickness after the age of 60 occur only at L3-4. In our study, we observed a significant increase in LF thickness at all levels after the age of 70. In addition, in agreement with the previous findings, we found no association between gender and LF thickness (1,5,19).

LF thickness increases craniocaudally except for L5-S1 (5). We found significant differences between LF thicknesses at each level. LF at L5-S1 was thinner than at the other levels. It was thickest at the level L4-5 and thicker at L4-5 and L3-4 than at L2-3 and L5-S1. Our results for the spinal level were in agreement with those of the previous reports (1,2,5,19).

Disc degeneration and LF thickening are very common conditions in the aging population (2). Degenerated discs provide to release inflammatory cytokines, which contribute

Table 4— Mean Thickness of the LF in Grades IV to V and Grades I to III Disc Degeneration [mean thickness of the LF (mm) ±sd]

Lumbar Level	Grade IV-V Disc Degeneration	Grade I-III Disc Degeneration	p
L2-3	3.25±0.56	2.90±0.27	<0.05
L3-4	3.68±0.57	3.27±0.41	<0.05
L4-5	4.04±0.64	3.57±0.41	<0.05
L5-S1	3.01±0.45	2.56±0.32	<0.05



to LF hypertrophy (14). Sakamaki et al. (2) have found no correlation between LF thickness and decrease in the disc height in elderly patients. In similarity with the findings of Altınkaya et al. (1), we found that LF at all the levels was significantly thicker in patients with degeneration of grades IV-V than in those with degeneration of grades I–III.

Lumbar disc degeneration, a commonly encountered reason of lower back pain, is mostly caused by the herniation of the spinal discs (20). Degenerative LSCS is described as a narrowing in the spinal canal and/or intervertebral neural foramina. It can occur as a consequence of progressive hypertrophy in surrounding ligamentous and osseocartilaginous elements (21). LSCS represents a significant cause of low back pain and/or leg pain and paresis (1,2,21). In our study, we found that LF was significantly thicker in the subjects with LSCS than in those without this disorder, at the levels of L2-3, L3-4, and L4-5. At the L5-S1 level, no significant difference was seen between these two groups. These results concur with the findings of the previous studies (1,5). However, our results do not support the findings of Abbas et al. (5). The study of Abbas et al. has suggested that this phenomenon is caused by the relative hypermobility of the L3-4 and L4-5 segments in comparison with the L5-S1 segment (which is stabilized by a large transverse process of the L5 vertebra and the iliolumbar ligaments). Tomkins-Lane et al. (22) have detected lumbar stenosis predominantly at the level L4-5, and at the level L3-4 in elderly patients. Our results suggest that the L4-5 and L3-4 levels are more susceptible to LF thickening.

In our study contrary to the findings by Altinkaya et al. (1), we found no correlation between lumbar disc herniation and LF thickness for any of the lumbar levels. Studies have found that LF in patients with LSCS is significantly thicker than in those with lumbar disc herniation (3,9,11,23). Spinal canal stenosis is a dynamic phenomenon that becomes apparent during spinal loading. Hansson et al. (24) have reported that in axially loaded spines, LF led to greater narrowing of the lumbar spinal canal than the disc herniation. Nguyen et al. (25) reported that by using upright MRI, LF was statically larger along all disc space levels in the patients with low back pain. For that reason, prospective studies investigating the effect of disc herniation on LF thickness are needed.

A limitation of the present study is its retrospective design. The subjects of this study presented with low back and/or leg pain. In addition, we had no data on subjects without low back or leg pain (potential control group). Our study focused on evaluating degenerative changes using transversal examination. Thus, our results might not reflect the actual nature and course of LF hypertrophy fully. The study would have benefitted from the inclusion of a control group. The impact of this report would be increased by considering the level of pain, body mass index, MRI findings, and the level of physical activity for both the study group and the control group. Then, the necessary patient–control comparisons could have been performed. Additional studies are warranted to address these limitations.

In conclusion, LF is an important anatomical structure; its thickening can cause LSCS, resulting in low back pain or leg pain. We found that LF hypertrophy was associated with age, spinal level, disc degeneration, and LSCS in elderly patients. Gender and disc herniation were not correlated with LF thickness.

The authors declare that they have no conflict of interest.

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RESEARCH

INVESTIGATION OF DEPRESSION AND COGNITIVE FUNCTIONS IN THE ELDERLY IN KARS

ABSTRACT

Introduction: This study was conducted for screening of depressive symptoms and cognitive functions to the elderly registered family health centres in Kars.

Materials and Method: This was a cross-sectional type study conducted in Kars to the elderly recorded by six family health centres. In the study; a questionnaire form, the Geriatric Depression Scale and Standardized Mini-Mental Test (for illiterate or literate) were used. Research data were evaluated using Mann-Whitney U test, Kruskal-Wallis test and Spearman Correlation analysis.

Results: According to the average points of the elderly people; they are between 72.06±6.65 years old, their depression points 13.43±6.86 and their SMMT/E-SMMT points are 20.48±8.05. 50.4 % of them were found risky in terms of depression and 57.7% of them were found risky in terms of cognitive status. There has been found a positive relation between their ages and their depression (r=.059; p<0.001), a negative relation between their ages and cognitive status (r=.-083; p<0.001) and also there has been found a negative relation between their depression levels and cognitive status (r=.-298; p<0.001). There has been determined a meaningful relation between the elderly individuals' depression and cognitive status according to marital status, educational status, job, income, the palace where they live mostly, frequency of contact with their family, being a smoker or nonsmoker, sleep disorder, the age that the perceive, perceiving health, health problem, frequency of using medicine and restriction due to a health problem.

Conclusion: The destruction which the elderly people witress in terms of depression and cognitive status in Kars, aged ≥65, also stands as an important problem.

Key Words: Aging; Cognitive Function; Depression.

ARAŞTIRMA

KARS'TA YAŞLI BİREYLERDE DEPRESYON VE BİLİŞSEL FONKSİYONLARIN ARAŞTIRILMASI

ÖZ

Giriş: Bu çalışmada Kars ilinde halk sağlığı merkezlerine kayıtlı yaşlı bireylerde depresyon ve bilişsel fonksiyonların taranması amaçlanmaktadır.

Gereç ve Yöntem: Kesitsel tipteki bu çalışma, Kars'ta altı aile sağlığı merkezine kayıtlı yaşlılarla yapılmıştır. Bu çalışmada anket formu, Geriatrik Depresyon Ölçeği ve Standardize Mini Mental Test (eğitimsizler veya eğitimliler için) kullanılmıştır. Araştırma verileri Mann-Whitney U testi, Kruskal–Wallis testi ve Spearman Korelasyon analizi ile değerlendirilmiştir.

Bulgular: Yaşlıların ortalama puanlarına bakıldığında; 72,06±6,65 yaşlarında, depresyon puanının 13,43±6,86, mini mental test puanının 20,48±8,05 olduğu görülmektedir. Yaşlıların %50,4'ü depresyon, %57,7'si bilişsel durum açısından riskli bulunmuştur. Yaşlıların yaşlarıyla depresyon düzeyleri (r=0,059; p<0,001) arasında pozitif ilişki bulunurken yaşlarıyla bilişsel durumları (r=-0,083; p<0,001) arasında negatif; depresyon düzeyleri ve bilişsel durumları arasında negatif bir ilişki belirlenmiştir (r=-0,298; p<0,001). Medeni durum, eğitim durumu, mesleği, gelir durumu, en uzun yaşadıkları yer, ailesiyle görüşme sıklığı, sigara içme durumu, sigara kullanımı, uyku sorunu, kendisini algıladığı yaş, sağlığı algılama, sağlık sorunu, ilaç kullanımı, sağlık sorununa bağlı hareket kısıtlaması ile yaşlıların depresyon ve bilişsel durumları arasında anlamlı ilişkiler saptanmıştır.

Sonuç: Kars'ta 65 yaş ve üzeri bireylerde depresyon ve bilişsel alanda yaşanan yıkım önemli bir sorun olarak durmaktadır.

Anahtar Sözcükler: Yaşlılık; Bilişsel Fonksiyon; Depresyon.

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INTRODUCTION

An increase in the ageing population is a global phenomenon. The expected average life span has increased worldwide, including in Turkey. According to the World Health Organization, Turkey is among the top three countries with the highest rate of increase in the elderly population (1). Because this population is increasing faster than other age groups, their needs and problems have also proportionally increased. One of the most important areas is mental health with increases expected particularly in the incidence of depressive disorders and neurodegenerative conditions, such as Alzheimer's disease (2).

Depression is one of the common psychiatric disorders affecting those aged ≥65 years. The prevalence of depression in the elderly varies from 1% to 60%, depending on specifications of the selected group, their surroundings, purpose of the study and the study methods and measurement instruments used (3). Factors increase an individual's risk of depression include genetic predisposition, being female, being unmarried, neurotic personality characteristics, a history of depression, a lower education and income level and lack of treatment and medication. Furthermore, the loss of independence, chronic illness, insufficient social support, living alone, a decline in cognitive functions and daily activities, retirement, loss of a loved one and unfavourable living conditions increase the risk of depression. Adverse life events and chronic stress are additional precipitating factors in depression (1,2). In the elderly, depression may result in autonomy loss, the quality of life may deteriorate, physical illness may accelerate, suicide and deaths resulting from physical illnesses may increase and the use and costs of health care may rise (3). Considering this, the National Institute of Mental Health has defined depression in those aged ≥65 years as an important community health problem (4).

Depression in the elderly is considered to be the result of ageing or inability to adapt to changed life circumstances. Unless cognitive ability is affected or suicide occurs, depression is often left to its natural course without being diagnosed or treated. Early diagnosis and treatment of depression in the elderly should improve their quality of life and independence levels in performing activities of daily living, and these measures can help prevent early death (3).

Cognitive deficits tend to increase with age. Changes may occur in intelligence and problem-solving abilities, learning and memory, language, space cognition, carefulness, agility and executive functions. Studies on these changes have shown differences related to the person's environment. Studies in Turkey have found that the prevalence of cognitive deficits in the elderly is between 20.5% and 57.1% (4,5). Although this ratio is lower for the elderly living elsewhere, this population, in general, experiences cognitive problems on different levels (5,6).

Cognitive difficulties and depression may mask each other or may actually be the forewarning of each other. Certain studies have stated that depression and cognitive issues affect each other on different levels (7,8). Depression may sometimes be an early indication of dementia in the elderly or it may be a mixing variant in evaluation of cognitive functions. Among patients with dementia, 20% have major depression, and higher percentages have subthreshold depression or depressive indications (9). The frequency of depression indications in patients with vascular dementia is 31% and that in patients with Alzheimer's disease is 20% (10). Our present knowledge shows that an important component of depression in the elderly, particularly that occurring for the first time in later stages of life, is related to the precursors of dementia; it has also been suggested that a late onset of depression indicates the early stages of Alzheimer's disease (9,10). In recent years, the frequency of depression in patients with dementia, and their clinical appearance specifications and results, have become an area of study. Patients with late-onset depression, which results in dementia, and individuals with both depression and dementia have prompted researchers to consider that these two circumstances might be related to a common functional or structural pathology (9). Shahnavaz et al. (11) explained the relationship between depressive symptoms and cognitive decline by stating that depressive symptoms may cause cognitive decline via hypercortisolaemia or psychomotor slowing or vice versa. Depressive symptoms may be an early non-cognitive manifestation of dementia or a reaction to self-perceived cognitive decline, or they may affect the threshold for manifesting cognitive impairment (11). When distinct memory problems are seen in the elderly with depression, a differential diagnosis should be made among dementia, pseudodementia (or reversible dementia) and a comorbidity of both. These definitions indicate that depression presents with symptoms similar to those of dementia (12).

Until recently, the serious nature of depression and cognitive failure in the elderly had not been completely recognized and acknowledged within the Turkish health care system. Problems in the older population can be overlooked for many reasons, including a lack of knowledge about the symptoms of depression and cognitive problems, a persistent belief by fam-



ilies and others that these are normal issues in the ageing process and a lack of qualified medical personnel to properly care for the geriatric population in Turkey where the current medical protocol emphasizes treatment (based on a family medicine model that focuses only on recorded patients). Furthermore, a systematic evaluation of problems in the elderly does not exist in Turkey, and services for them are generally inadequate. Another important issue is that individuals with mental and cognitive problems do not go to health centres at early stages of depression or cognitive decline as they fear being stigmatized. This situation is particularly unfortunate for the homeless senior citizens who are disabled and in need of care.

The State Planning Organization of Turkey has proposed several areas of development with the 'Conditions of Elderly in Turkey and National Aging Action Plan,' which calls for developing effective strategies for the early diagnosis of Alzheimer's disease, elderly depression and similar problems; educating patients, medical staff and caregivers and conducting and encouraging multidisciplinary research (13). It is very important to prevent cognitive and depression problems in the elderly or at least be able to diagnose these at early stages. The goal is to ensure that the elderly remain cognitively functional (6). For this purpose, a short mental history of the elderly patients can be taken and their cognitive abilities can be evaluated using instruments that are simple and easy to read, such as the Geriatric Depression Scale (GDS), Standardised Mini Mental State Examination for illiterate (SMMT-E) or literate (SMMT). Depending on the results of a pre-evaluation, patients should be referred to the appropriate specialists for a more thorough evaluation. Considering these goals, this study aims to evaluate and determine the risk factors of depressive symptoms and cognitive functions of the elderly living in their own homes in Kars, Turkey.

Materials and Method

This was a descriptive cross-sectional study designed to survey depressive symptoms and cognitive functions to the elderly in Kars. There are 10 family health centres (FHCs) in Kars city centre, but because some of them did not participate, the study was completed with 738 of 4000 individuals whose visits were recorded at six FHCs. Individuals with a FHC record were informed by telephone, and data were gathered using face-to-face interviews. Individuals who did not want to join the study, who were not at home or had hearing or speaking problems, were not included in the study. The present study was approved by the ethics committees of the University of Kafkas Medical Faculty and and signed informed consents were taken from all participants. All patients were informed about the objectives and content of the study. An information form, GDS and SMMT-E/SMMT were used. Details of these instruments described below.

The information form consists 21 questions about study participants' demographic features and health habits and status.

The GDS that was developed by Yesevage et al. in 1983 and evaluated for its validity and reliability in Turkey by Ertan et al. in 1997 (14), includes 30 self-reported questions with the answers 'yes' or 'no' which study participants can easily mark. Within the scale, questions 3, 4, 5, 6, 8, 10, 11, 12, 13, 14, 16, 17, 18, 20, 22, 23, 24, 25, 26 and 28 include reverse expression. For scoring, every answer in favour of depression is 1 point and other answers are 0 points. The scoring is as follows: 0–10, 'no depression'; 11–13, 'probable depression'; ≥14, 'definite depression' (14). Cronbach's alpha of the scale in this study was 0.79.

In this study, SMMT-E for illiterate people was applied to individuals who have less than five years education, whilst SMMT for literate people was used for individuals who have five years and more than five years education to assess overall cognition. This test was developed for the first time by Folstein et al. in 1975. The validity and reliability of SMMT for the diagnosis of mild dementia among the Turkish population has been shown by Güngen et al. SMMT-E scale was used for illiterate population by revised Ertan et al. The SMMT-E/SMMT consists of five parts: tendency, recording memory, attention, calculation and remembering and language. A total of 30 points is possible in the SMMT-E/SMMT, and a score of 0–9 considered as severe cognitive impairment, 10–19 as medium cognitive impairment, 20–23 as mild cognitive impairment and 24–30 as within normal limits (15,16). Cronbach's alpha of the scale in this study was 0.82.

Statistical Analysis

Statistical analysis was performed using the SPSS 20.0 (Statistical Package for Social Science, Chicago, IL, USA). Data were descriptively expressed as a mean±standard deviation, frequency and percentage. Normal distribution was evaluated using the by Shapiro-Wilk test and histograms. Because of data show a non-normal distribution MannWhitney-U test, Kruskal-Wallis test and Spearman correlation analysis have been used for evaluation. As the

Table 1— GDS and SMMT-E/SMMT Scores of the Participants

Scores	n (%)	X (±sd)
GDS		
≥10 scores (no depression)	270 (36.6)	
11-13 scores (probable depression)	96 (13.0)	13.43 (6.86)
≥14 scores (definite depression)	372 (50.4)	
SMMT-E/SMMT		
≤ 9 scores (severe cognitive impairment)	90 (12.2)	
10-19 scores (moderate cognitive impairment)	192 (26.0)	20.48 (8.05)
20-23 scores (mild cognitive impairment)	144 (19.5)	
24-30 scores (normal range)	312 (42.3)	

result of Kruskal-Wallis test, the groups have been compared pairwise with Mann-Whitney U test in order to determine the difference between the groups. A p value of < 0.05 was considered significant.

Results

Our results indicated that 13% study participants presented a risk of probable depression, 50.4% had definite depression and 57.7% were at a risk of cognitive decline (12.2% were severe) (Table 1). Identifying features of the study participants are shown in Tables 2 and 3.

When it is looked at GDS scores; female, 85 and elderly group, singles in compared to marrieds/widows, widows in compared to marrieds, the educational levels out of high school compared to the groups which have higher education level, who have an moderate monthly income and the poor compared to good, the ones who don't have social security compared to those, the ones who don't have social security compared to those, those who live mostly in rural areas, who have sleeping problems, who perceive themselves young compared to those who don't have an idea and perceive themselves young, those who have a bad health perception, those who have a disease, those who use a drug, those who had a surgical history and have a movement limitation have been found meaningfully higher (Table 2,3).

When it is looked at SMMT-E/SMMT scores; female, singles compared to married/widowed, widows compared to married one, illiterate ones compared to those who have an education level (except university), literate ones', secondary school or high school graduated ones' compared to university graduated ones, the ones' who don't have social security compared to those, who have an moderate monthly income compared to the worst, those who live mostly in rural areas, those who don't have a communication with their family, those who smoke cigarette, who have sleeping problems, who perceive themselves as young, those who have a bad health perception, those who have a disease, those who use a drug, who don't have a surgical history and in those who have a a movement limitation have been found meaningfully lower, but also it has been found higher in 65 to 74 age group compared to other ages (Table 2 and 3).

There was a weak negative correlation between the SMMT-E/SMMT score and the GDS score (r=-0.298; p<0.001). As the GDS score of participants increased, their SMMT-E/SMMT score decreased. There were a weak negative correlation between age of participants and the SMMT-E/SMMT score (r=-0.083; p<0.001) and a weak positive correlation between age of participants and the GDS score (r=0.059; p<0.001). As the age of participants increased, the GDS scores increased and SMMT-E/SMMT decreased considerably (Table 4).

Discussion

For this study, we intended to survey individuals aged ≥65 years who live in Kars. However, one constraint of our study was our inability to reach the entire group. Many were not at home because they had to be moved because of issues pertaining to their care owing to the cold climate. In addition, depression level and cognitive impairment also affect the daily activities of elderly people, however because of being unable to use a screening scale which aims to evaluation of daily life activities, is a limitation for our study. Nonetheless, we believed that it is important to conduct this study on those aged ≥65 years of age in a city where health services and social activities for the elderly are limited.

We found that 50.4% elderly in our study could be categorized as having definite depression. More than half of the individuals had depressive symptoms. Our results are consis-

Table 2— Comparasion of Scale Scores According to Participants' Demographic Characteristics

Characteristics	n (%)	GDS X (±sd)	SMMT-E/SMMT X (±sd)
Sex			
Female	462 (62.6)	22.80 (8.65)	21.32 (8.61)
Male	278 (37.4)	20.64 (4.73)	23.28 (4.71)
	p<0.001*	p<0.001*	
Age			
65-74	510 (69.1)	13.15 (6.49)	21.25 (8.31)
75-84	180 (24.4)	13.33 (7.83)	20.13 (6.80)
85 and ↑	48 (6.5)	16.87 (6.03)	13.62 (5.95)
	p=0.02**	p<0.001**	
Marital status			
Single	12 (1.7)	28.00 (0.00)	13.00 (0.00)
Married	480 (65.0)	11.90 (6.97)	20.96 (8.26)
Widowed	246 (33.3)	13.43 (6.86)	19.76 (7.59)
	p<0.001**	p=0.011**	
Educational status			
Illiterate	264 (35.8)	16.63 (5.62)	17.77 (7.38)
Literate	228 (30.9)	13.05 (6.53)	21.36 (8.90)
Primary education	180 (24.4)	11.23 (6.58)	23.53 (6.20)
High school	36 (4.9)	6.66 (3.13)	21.66 (10.46)
University graduate	30 (4.1)	9.60 (10.08)	18.00 (4.81)
	p<0.001**	p<0.001**	
Social security status			
Yes	654 (88.6)	13.20 (7.00)	20.84 (7.61)
No	84 (11.4)	15.28 (5.31)	17.71(10.49)
	p=0.006*	p = 0.06*	
Monthly income			
Good	42 (5.7)	8.42 (7.94)	19.57 (7.19)
Moderate	474 (64.2)	13.40 (6.87)	20.11 (8.03)
Poor	222 (30.1)	14.45 (6.20)	21.45 (8.19)
	p<0.001**	p = 0.036**	
Place most of life is spent			
Town center	444 (60.2)	12.68 (6.84)	21.89 (7.42)
Rural areas	294 (39.8)	14.57 (6.75)	18.36 (8.50)
	p<0.001*	p<0.001*	
Contacts with family members			
No	54 (7.3)	15.33 (8.53)	15.11 (9.73)
Yes	684 (92.7)	13.28 (6.70)	20.91 (7.75)
	p=0.11*	p<0.001*	

*Mann-Whitney Utest, **Kruskal–Wallis test

tent with those of other studies conducted in the inner and eastern parts of Turkey (4,6). Secondly, SMMT-E/SMMT mean point of elderly people is 20.48(±8.05) and 57.7% of them (12.2% serious, 26% moderate and 19.5% mild) have cognitive problems (Table 1). These results are similar to the study conducted by Karatay et al. (6). Diker et al. (17) have been found serious cognitive problems as 6.9% and moderate cognitive problems as 25.7% according to the SMMT-E/SMMT in elderly people over age 65. According to these results it can be easily seen that the elderly people in Kars

Table 4— Comparasion of Scale Scores According to Participants' Healthy Living and Health Characteristics

Characteristics	n (%)	GDS X (±sd)	SMMT-E/SMMT X (±sd)
Smoking status (daily)			
I do not smoke	654 (88.6)	13.44 (7.00)	20.10 (7.98)
I'm smoking	84 (11.4)	13.42 (5.75)	23.50 (7.95)
	p=0.746*	p<0.001*	
Sleep problems			
Yes	324 (43.9)	16.85 (6.26)	18.20 (7.67)
No	414 (56.1)	10.79 (6.09)	22.27 (7.89)
	p<0.001*	p<0.001*	
Self-detection status			
Young	516 (69.9)	14.41 (6.68)	19.83 (8.18)
Elderly	192 (26.0)	10.34 (6.13)	22.25 (8.04)
Not sure	30 (4.1)	16.40 (8.20)	20.40 (1.77)
	p<0.001**	p<0.001**	
Health perception			
Good	174 (23.6)	8.96 (5.48)	23.37 (5.62)
Moderate	318 (43.1)	12.94 (6.29)	20.18 (8.60)
Bad	246 (33.3)	17.27 (6.34)	18.82 (8.25)
	p<0.001**	p<0.001**	
The presence of disease			
Yes	594 (80.5)	13.95 (6.71)	19.80 (8.40)
No	144 (19.5)	11.29 (7.08)	23.29 (5.58)
	p<0.001*	p<0.001*	
The drug that is consistently used			
Yes	558 (75.6)	14.04 (6.55)	19.97 (8.25)
No	180 (24.4)	11.56 (7.46)	22.06 (7.19)
	p<0.001*	p<0.001*	
Surgical history			
Yes	390 (52.8)	13.92 (6.82)	21.90 (7.79)
No	348 (47.2)	12.89 (6.88)	18.89 (8.04)
	p=0.018*	p<0.001*	
Limitation of movement			
Yes	458 (61.8)	15.51 (6.76)	19.18 (8.22)
No	282 (38.2)	10.08 (5.68)	22.59 (7.30)
	p<0.001*	p<0.001*	

* Mann-Whitney U test, ** Kruskal–Wallis test

have more depressive symptoms and cognitive problems. The literacy rate in Kars population is low. The low rate of literacy, having a lower intellectual capacity may be an increasing factor for depression and cognitive problems risk. Also, Kars is a city located in the eastern part of Turkey, where the elderly spend most of their time at home owing to the cold climate, with limited socio-cultural resources and traditional structure. Because the eastern or suburban parts of Turkey have a more traditional social structure, children of older family members generally take care of their own relatives. Unfortunately, this means that the caregiver in these situations limits the productivity of the person being cared for. Although this may at first seem ideal, it eventually causes them to become more dependent on others, which may trigger depression and cognitive problems (6).

Although the SMMT-E/SMMT scores of the illiterate study participants were lower, the SMMT-E/SMMT score considerably increased with higher education level. In the



study by Ilhan et al. (4), the risk of cognitive impairment in those who were not elementary school graduates was 6.80-fold greater than that in those who were. Again, as education level increased, the GDS scores decreased considerably (Table 2). This result is similar to the findings in other studies (3,6). It is clear that the impact of education level on lifestyle affects a person's mental state in a positive way. Older members of society with a higher level of education have more opportunities to access information and inform themselves by reading or researching. They may also be more able to deal with stress and to fight depression.

Sleep problems are common in the elderly, yet many studies on this topic have produced different results. Difficulties with sleep can trigger depression when sleep-deprived elderly try to catch up and sleep during the day (18). Therefore, along with mental problems, sleep issues also need to be evaluated in the older population. Although we were unable to complete a thorough search of information on sleep problems in the elderly, individuals with sleep problems had higher GDS scores and lower SMMT-E/SMMT scores (Table 3). According to the study which has been made by Niu et al. (19) it has been seen that in elderly people who sleep less than five hours at night time have more cognitive decline.

We observed low GDS scores and high SMMT-E/SMMT scores for study participants who felt elderly and had a good perception of their health (Table 3). In their evaluation of the GDS and SMMT-E/SMMT, Arnadottir et al. (20) reported that health perception affects depression but does not affect the cognitive state.

In contrast, we observed high GDS scores and low SMMT-E/SMMT scores in individuals with illness (Table 3). This result is similar to the results of other studies which have shown that the process of ageing will often bring an increase in chronic health problems and dependency on others to help with daily activities and thus an increase in the risk for depression (3,6). Although most of the patients in this study had physical illnesses, these illnesses might cause depression related to dependency on others, adaptation to a treatment and change in life-style. Ilhan et al. (4) reported that the depressive indication risk increases 3.75 times in the elderly subjects with physical illnesses.

Regarding medications, we did not question the dosage, doctor's recommendations or which illness the medication was used for, but the GDS score was high and the SMMT-E/SMMT score was low in patients who regularly took medications (Table 3). Other studies have shown different results. Karatay et al. (6) have indicated that medication use does not affect the SMMT-E/SMMT score, and Pantzar et al. (21) found that it does not affect depression and cognitive problems. Vascular problems in the elderly are a primary reason for required regular drug use (6,21). The relationship between vascular problems and cognitive state was featured in a review conducted by Byers and Yaffe (22), and further investigation is needed to understand the relationship between regular drug use and depression and cognitive problems in the elderly.

We observed high GDS scores and low SMMT-E/SMMT scores in individuals with decreased mobility (Table 3). While problems with mobility increase depression and cognitive problems in the elderly, it can also be the result of cognitive problems. Studies conducted on this subject have reported that increasing physical and social activities are effective in decreasing depression and cognitive problems (23,24).

We observed that as age increased, the GDS scores were meaningfully higher and the SMMT-E/SMMT scores were meaningfully lower (Table 1). Ilhan et al. (4) showed that the risk for cognitive impairment in people over 75 years of age is 6.3 times higher than that in those under 75 years of age. In studies of Karatay et al. (6), it has been stated that cognitive problems increases by aging and in people over 85 years of age have 14 times more disease risk than that in those aged 65 to 69. As seen in the study mentioned above cognitive problems increases by getting older and older. However, Table 4 showed that there was a weak negative correlation between age of participants and the SMMT-E/SMMT score. This result between age and cognitive conditions in elderly people shows a similarity with other studies made in our country (17,25). In our study the most of the elderly people are aged from 65 to 74 (n=510) and as this period's cognitive function has a better grade, may supply this relation to be weak.

Table 4 also showed a weak correlation between depressive symptoms/depression and cognitive problems in the elderly (6). Shahnavaz et al. (11) found that elderly subjects with impaired cognitive functioning exhibited more depressive symptoms at a ratio of 6.1%. Ilhan et al. (4) reported that the

Table 4— Correlations Between Age, GDS and SMMT-E/SMMT

	Age	GDS	SMMT-E/SMMT
Age		.059**	-.083**
GDS	.059**		-.298**
SMMT-E/SMMT	-.083**	-.298**	

**p<0.001 according to Spearman Correlation analysis

risk of depression in the elderly with cognitive impairment was 3.01 times more likely than that in those without cognitive impairment. Similarly Diker et al. (17) showed that increase in severity of cognitive impairment causes to increase in depression level. However, in our study a weak correlation has been found. This condition makes us to think that depression and cognitive problems may affect each other, may develop independently from each other and diagnosing it in early period would be important in terms of prevention and rehabilitation. This may be owing to our inability to access all subjects in the sampling group.

Although we have made great progress in the diagnosis and treatment of chronic illnesses in the elderly, the increase in longevity accelerates the urgency for accurate data to enable us to expand the health services that are greatly needed. For community members of Kars, Turkey, who are aged ≥65 years, the decline in mental health status and cognitive abilities are important problems. In providing adequate health care to the elderly in our society, an all-encompassing approach needs to be taken. Mental health is equally important as physical health and should not be ignored. The aged should have regular physical and mental health check-ups. They should also be screened for cognitive changes and depressive symptoms that often occur in the geriatric population.

The important role of nurses is of utmost importance in screening patients for the depressive symptoms and cognitive problems of the elderly. They are the key health professionals responsible for preserving and enhancing community health, and this responsibility also extends to the early diagnosis and prevention of mental problems. Their task is to assess the general health of the patients and healthy individuals and conduct risk factor analysis. More studies need to be conducted on both the general and mental health status of the elderly. Results of these may help pave the way for improvements in mental health services for all community members, including the elderly.

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RESEARCH

PERCEPTIONS OF SECOND YEAR MEDICAL SCHOOL STUDENTS REGARDING AGEING AND GERIATRIC EDUCATION: A QUALITATIVE STUDY

ABSTRACT

Introduction: Existing literature on the geriatric-related attitudes of medical students reveals inconsistent results in terms of feelings for the elderly. This study aims to determine the perceptions of medical students regarding ageing and geriatric education.

Materials and Method: A qualitative study was conducted with 160 second-year medical students who visited a nursing home and responded to three open-ended questions about this experience. The responses were qualitatively analysed using the constant comparative method for themes.

Results: Second year medical students indicated both positive and negative impressions of ageing. Although they generally believed that ageing brings experience and maturity, happy ageing was seen as being dependent on individual characteristics and personality factors that affect the emotional aspects of ageing and, therefore, quality of life. The students indicated recognition that ageing is related to inevitable physiological changes and a belief that most illnesses in the elderly are untreatable because of the natural decline in health related to ageing. Students indicated a sense of inadequacy in communicating with the elderly and emphasised the importance of introducing geriatric psychiatry lessons into the curriculum to improve their understanding of the elderly.

Conclusion: This study provides a better understanding of the opinions of future doctors about ageing and of beliefs that should be addressed to help in the making of doctors with more positive attitudes toward older people.

Key Words: Aging; Attitude; Geriatrics; Education; Medical; Qualitative Research.

ARAŞTIRMA

TIP FAKÜLTESİ İKİNCİ SINIF ÖĞRENCİLERİNİN YAŞLANMA VE YAŞLILIK EĞİTİMİ HAKKINDAKİ GÖRÜŞLERİ: NİTELİKSEL BİR ÇALIŞMA

ÖZ

Giriş: Literatürde tıp öğrencilerinin yaşlılık ile ilgili düşünceleri hakkında tutarsız sonuçlar bildirilmektedir. Bu çalışmanın amacı tıp öğrencilerinin yaşlanma ve yaşlılık eğitimi hakkındaki düşüncelerini saptamaktır.

Gereç ve Yöntem: Bu çalışma 160 ikinci sınıf tıp öğrencisi ile niteleyici olarak yapılmıştır. Bir huzurevini ziyaret eden öğrencilerden bu tecrübelerini değerlendiren üç açık uçlu soruya yazılı yanıt vermeleri istenmiştir. Yanıtlar sürekli karşılaştırma yöntemi kullanılarak niteliksel olarak analiz edilmiştir.

Bulgular: Tıp fakültesi ikinci sınıf öğrencileri yaşlanma hakkında hem olumlu, hem de olumsuz izlenimler sergilemiştir. Genel olarak yaşlanmanın beraberinde tecrübe ve olgunluk getirdiğini düşünmektedirler. Buna rağmen, mutlu bir yaşlanmanın bireysel özelliklere ve kişisel etkenlere bağlı olduğu ve bunların yaşlıların duygusal hayatlarını, dolayısıyla yaşam kalitesini etkilediğini belirtmişlerdir. Öğrencilere göre yaşlanma önlenemez fizyolojik değişiklikler ile sonuçlanmakta ve yaşlanmanın doğal bir sonucu olarak ortaya çıkan hastalıkların çoğu tedavi edilememektedir. Öğrenciler yaşlılar ile iletişim konusunda kendilerini yetersiz hissettiklerini bildirmiş ve yaşlıları daha iyi anlayabilmeleri için eğitim programına geriatrik psikiyatri derslerinin konmasının önemine dikkat çekmişlerdir.

Sonuç: Bu çalışma hekim adaylarının yaşlanma hakkındaki düşünceleri ve gelecekte yaşlılara karşı daha olumlu tutumlar sergileyen hekimler yetiştirmek için ele alınması gereken inanışları daha iyi anlamamızı sağlamıştır.

Anahtar Sözcükler: Yaşlanma; Tutum; Geriatri; Tıp Eğitimi; Niteleyici Çalışma.

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Introduction

The elderly population in Turkey is increasing faster than that of the other age groups and this demographic transition is expected to result in a higher life expectancy at birth rates leading to an increase in the size of the elderly population. The elderly (65 years and over) represented 4.2% of Turkey's population in 1985 and 5.6% in 2000; they are expected to account for 10.2% of the country's population by 2023. Turkey will thus take its place among the countries with a population commonly characterised as 'older old'. Similarly, life expectancy at birth, currently standing at 70 years, is projected to be 78 years by 2023 (1).

A study of elderly people in Turkey revealed that approximately 90% of them suffer from one or more chronic health problems (2). This results in an increase in the demand on caregiving capacities on the health care staff thereby posing a major public health challenge (3). Regardless of their speciality, medical doctors will face problems associated with the health and social needs of elderly patients. Awareness of the need for geriatrics to be integrated within the medical curriculum has increased substantially although there is a lack of proficient faculty to teach this subject. Some medical schools teach geriatrics, but general knowledge in this area is relatively low among Turkish health care professionals (4). Additionally, the number of services and professionals targeting the elderly population is insufficient and coordination of care for the elderly is lacking (5). Although Turkey's Ministry of Health has launched a 'National Action Plan' on the status of the elderly and ageing in Turkey, the concept of 'elderly health' is inadequately integrated within society, resulting in disorganised health care services for elderly people (6).

Learning cannot be separated from its context and is highly dependent on the environment in which topics are learnt. The attitudes, demeanour and behaviours that an individual exhibits towards certain persons determine the dimension of the relationship and the quality of attention given to these persons. Accordingly, attitudes and intrinsic motivations related to students' perceptions can significantly affect their success in caregiving (7,8).

Studies have shown that the myths and prejudices held by some students with regard to ageing have a negative consequence on their educational activities and on the quality of care that they give to elderly patients (9,10). Negative feelings about the elderly have previously been reported among Turkish nursing students, although Turkish medical students' extra-curricular experience about elderly people is expected to positively reflect on their general attitude towards the elderly (4).

There is an enormous need for well-trained doctors in the health care system in the future since they will encounter more elderly patients in their daily practice in future than that of what they encounter today. Therefore, in the future, the huge need for doctors with the necessary training in geriatric health care presents a major medical and socioeconomic challenge. There are various recommended curricula on medical education in geriatrics. However, further research on education in geriatrics is necessary because the existing literature on medical students' attitudes in relation to geriatric patients reveals inconsistent results (11,12). Multiple studies have revealed that geriatric education can improve medical students' attitudes towards the elderly and medical instructors recommend home care visits for this purpose (13,14). The opinions of health workers about elderly people affect their attitudes towards and the quality of treatment that they deliver to elderly patients.

The objective of this study is to determine the opinions of second year medical students about ageing and elderly people and what they consider important in geriatrics training. For this purpose, we have evaluated the students' written reflections on the experience of visiting elderly patients in a nursing home; such reflection on a learning event promotes critical thinking and can improve professionalism (15,16).

Materials and Method

The Institutional Review Board at (University name) University (12.02.2015) approved this study and the medical students participating in this study provided verbal informed consent.

Context

As part of a geriatric training module, second-year students at (University name) University's medical school participated in a programme that combines lectures and clinical scenarios in a problem-based learning format. Students receive information on the demographics of ageing and the impact of ageing on various bodily systems with the purpose of developing their competence in geriatrics.

During the module, students visit a nursing home in small groups to learn geriatric assessment skills and improve their knowledge and attitudes regarding the elderly. The nursing home accepts persons 60 years and older who have proven material and social deprivation, can meet their needs (ea-

ting, drinking and toilets, etc.) independently, are without a serious illness or disability and have intact mental and spiritual health in accordance with the Elderly Care Nursing Homes and Rehabilitation Centers Regulation 2001. As part of this educational experience, students are expected to assess the residents and to complete the Rapid Estimate of Adult Literacy in Medicine–Short Form (REALM-R) and the Memory Impairment Screen (MIS) which has demonstrated excellent psychometric properties in primary care and community samples (17). As there are no validated Turkish versions of these scales, the authors performed the necessary steps and translated them into Turkish (18). The interview takes, on an average, 15 minutes to complete. After this, each student is expected to write a report and discuss the experience.

Data Analysis

In this study, qualitative research methods are used to assess the perceptions of medical students who completed the geriatric training module between February and April 2015. The researchers developed three open-ended questions and the students answered these questions. The questions were as follows: (1) 'What is ageing in your opinion?' (2) 'What feelings did the meeting with the elderly evoke?' (3) 'What do you think should be included in geriatrics education?'

The responses were assessed qualitatively using the constant comparative method (19,20). Themes were identified by two authors (TE and MK) who independently read the first five papers, identifying recurring themes by coding the responses. The authors then met to compare their coded responses and reached a consensus regarding the conceptual differences. Subsequently, TE coded the remaining papers and MK independently coded one-third of them to ensure continued consensus. Disagreement was rare and was resolved through a discussion. Finally, the authors grouped the themes into discrete domains using a consensus approach.

Results

The participating medical students (n=160) had a mean age of 22±2 and 55% were female. The nursing home residents visited (n=154) had a mean age of 75.7±8 and 65.6% were male. The percent of residents without a diagnosed illness was 22.7; all others had at least one illness to report. Whereas 31.2% did not use any medication, 47.4% used one to three medications and 9.2% were taking more than seven medications. Scores on the REALM-R ranged from 0 to 8, with a mean and standard deviation of 2.8 and 4.1, respectively. The mean overall score was 3.9 (sd=2.3). Fewer than 20% of the elderly adults had good health literacy, as indicated by an overall REALM-R score of 6 or more. Although 7% of study participants obtained a score of 8, approximately 40% obtained a score of 0. The mean (±sd) MIS baseline score was 4.8 showing mild cognitive impairment with a cut-off point of 5. There were 14 patients who scored 0 points, 8 patients who scored 1 point, and 26 patients who scored 2 points on the MIS.

The themes that emerged from the open-ended questions are reported below.

Perceptions About Ageing

When asked what ageing meant to them, the students most commonly expressed three themes: experience and maturity that come with age, physiological changes related to ageing and requiring care and unhappiness resulting from loneliness and isolation.

First, the theme of experience and maturity was noted by 72.5% of the medical students. Following are typical examples of their observations.

'Ageing is not only an increase in your age. Your life experience and memories are increasing too. It is a stage where you can decide according to the lessons and emotional experiences you have had previously'.

'It was very informative to listen to elderly people's stories from earlier periods of their lives. I felt that happiness in one's older years is related to one's attitudes and behaviour when one was younger. It's definitely related to one's personality'.

'I saw that the more you know and see, the more you regret things that you have not done right in your previous years and that lets you feel unhappy'.

The second main theme highlighted the inevitable physiological changes related to ageing, including functional loss, illness and care requirements, mentioned by 60.6%. Deterioration and limitation of bodily functions were recognised as a function of ageing and increased disease. This category was often mentioned in connection with adults becoming like children again.

'Ageing is being a child again. Tired of living, elderly persons behave like a child sometimes'.

'Actually, your soul is mature, but your behaviour is childish. You are more fragile, touchy and gentle'.

'Ageing results in a loss of physical strength and in having multiple diseases. While you were able to maintain yourself previously, now you need help from others and become dependent'.



'Ageing means that you have lost your strength and are not able to care for yourself. In a sense, it means becoming a child again, but the difference is that you have no parents to care for you'.

The last common theme revealed students' perception that ageing is related to unhappiness resulting from loneliness and social isolation (52.5%). Here, they stressed the emotions related to the experience of feeling abandoned.

'Ageing is a period where you have lost your loved ones and the support of your parents'.

'They {the elderly} have lived and seen a lot of things, but now they gaze towards the door awaiting someone they know'.

'They do not have many things to enjoy; they feel lonely and the fear of death is intense'.

'The most difficult thing for elderly people is to be left alone and to be dependent on others. They feel sad and need someone they can talk to'.

Feelings Evoked

Students' responses regarding the feelings evoked by their nursing home visit varied widely. Many of them (64.4%) expressed empathy with the elderly people's grief over the absence of family and friends.

'I felt sad when talking to them. I believe ageing is more depriving if your family leaves you alone. I could not help feeling angry inside towards the children who left them here'.

'People must have lost feelings of love and respect for the elderly. Everyone wants to get rid of them. I don't understand how one can leave his own parents'.

Some students reported statements of self-reflection and their own imagination of aging, like the individual who stated, 'It's really not easy to be old. They are surrounded by fear of death and reminiscence. This will happen to all of us'. Students also described their attitudes towards their own parents and indicated a desire to support them in their older age. One student indicated, 'They reminded me of my own parents. This is the unavoidable end, but nevertheless it makes you anxious. If we take the responsibility of caring for them, someone will care for us tomorrow'.

Educational Needs

The students discussed several aspects of education needed to equip doctors to evaluate and manage the elderly in a medical practice. Most students (93.1%) expressed a sense that they lacked skill in communicating with the elderly.

'I believe that to understand them, you have to be able to communicate with the elderly. Therefore, training should include techniques for communication skills with the elderly'.

'Communication with the illiterate elderly is more difficult. Training should address this issue'.

Students also commented on the need for skills of empathy to help them better understand the elderly overall as human beings.

'Talking with them and listening to their stories is okay. But when I asked {the elderly person with whom I was working} to take the test, she was not able to complete it because of her visual impairment. Then I read the items, but she couldn't hear me well. I recognised that she kept on talking regardless of what I was saying'.

'Training should focus on increasing our ability to understand the elderly and should encompass what to expect when you meet them in the examination room'.

Some students mentioned the complexity of multisystem illness and polypharmacy in the elderly.

'We must be able to manage multiple diseases in one patient. The person I interviewed had four different diagnoses and used eight different drugs. He didn't even remember their {the drugs'} names. I was astonished about the things I have to learn in order to manage an elderly patient'.

The students came to appreciate the importance of assessing the psychological status of the elderly and hence many of them viewed training in geriatric psychiatry as crucial. They concluded that mental health in the elderly is an important contributor to quality of life.

'I think that psychological status is a major factor in determining the mental state of the elderly. When you have peace mentally, there is nothing that can disturb you or give you sorrow. They {medical faculty} should introduce lessons about psychology of the elderly in our training'.

Discussion

This research provides information on medical students' perspectives about elderly people. To our knowledge, this is the first qualitative study to evaluate medical students' perceptions of ageing and of the geriatric education provided within a medical curriculum from Turkey.

The most prominent theme that emerged regarding students' perceptions of ageing was that age brings experience and maturity, which can lead to happiness or unhappiness. The students recognised that personality and attitudes are important factors affecting the emotional aspects of ageing and, therefore, people's quality of life. Mementos of life history helped students to realise that elderly individuals' past experience and personality factors affect their psychosocial status and have a major effect on their perception of diseases.

The students also recognised that the population of nursing home residents resembles the general population in many ways and those generalisations that treat the elderly as a homogeneous patient group are not appropriate. Medical students' awareness of the diverse health care needs of the elderly led to a loss of confidence in the adequacy of their knowledge and helped them to define areas where they need further learning in geriatric assessment and treatment [of elderly patients].

As we have expected, most of the students reported positive attitudes and feelings towards the elderly. One possible reason for this positive attitude among our students is the observation that respect for older persons is a notable tradition. Turkish culture respects elderly people and values the bonds between family members highly. Our students live in a society with cultural and social patterns that encourage protection of the elderly. Elderly family members generally receive economic and social support from their own children and are seen as a source of wisdom, spiritual guidance and love. In most cases, they continue to receive care from family members, irrespective of any illness and/or disability (21).

Another possible reason is that many of the present elderly are active within their family environment, such as looking after their grandchildren, and helping in the kitchen, which is typical among families across Asia. Many of our students may have witnessed the active role of older adults within their family (22).

In contrast to the predominantly positive views, some of our students had negative preconceptions and ideas about caring for the elderly. These sentiments derived largely from the belief that elderly patients' conditions are related to age and are thus untreatable because of the natural inevitability of decline in health due to ageing. It is plausible that attitudes toward ill older adults (patients) may differ from attitudes toward healthy older adults. The majority of our elderly subjects presented at least one illness and therefore, they may be included in a subgroup within the older adult population who by definition are ill or unwell.

In addition, medical students' negative attitudes were often related to training gaps such as in preparing medical students for the treatment of older people in generally (for example pharmacological therapy in older people, physiology in older people, pathophysiology in older people, non-pharmacological therapies in older people), in concord with other studies (23,24).

Our students take part in training where information about common geriatric diagnoses and treatment in the older patient population are provided. A review on medical students' attitudes after interventions found that teaching medical students about the care of older patients did not appear to result in positive attitude change. The findings of this review suggested that the inclusion of an empathy-building component in a geriatrics-based intervention may have better chances to obtain a positive attitude change (24). Many students viewed the experience of visiting the nursing home as one that stimulated their empathy for the elderly and increased their sensitivity to the needs of these individuals, which is a common finding reported in the literature (24).

Nearly all of our students perceived a deficit in communication skills. The areas of inadequacy in communicating were most frequently associated with the illiterate, though an overall deficiency in terms of attitude and skills while approaching the normal and healthy elderly was witnessed by the students. Moreover, students suggested a causal link between psychological well-being and quality of life among the elderly population. For this reason, many students emphasised the importance of introducing psychiatry lessons into the curriculum for the purpose of enhancing students' ability to understand elderly people's thinking.

Beliefs about elderly people may include prejudicial opinions that negatively affect the quality of care provided. Therefore, such beliefs should be addressed as part of an effort to graduate doctors with more positive attitudes. One way to ensure this result could be to develop and strengthen the lessons on geriatrics and gerontology in the curriculum of the medical educational programmes pertaining to all health professions. Integrating different aspects of healthy ageing into the medical curriculum could also yield benefits (25).

Our study has several limitations. Firstly, the scales used in this study were translated into Turkish by the authors of this study, but no validation study was performed. Although we used the back-translation method which has been considered the preferred method of obtaining a culturally equivalent instrument and conducted a pretesting of the scales with medical students, instrument validation was not assessed. Secondly, these results reflect the experience of a group of students at a single institution and may differ from those of students at other medical schools. Thirdly, the nursing home visit may have affected their perceptions; interviewing the students both before and after their visit would have enabled us to know more about the positive difference in their attitude towards the elderly brought about by the visit. Despite these limitations, the qualitative nature of this study captured a wide range of student perceptions about ageing and the elderly



in the context of their experiences. Significant themes that resonated with many of the respondents were identified. We feel that our approach to needs assessment has identified areas where increased knowledge and skills could help to change trainees' attitudes towards caring for the elderly.

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Disclosure Statement

The authors declare no conflict of interest.

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Case Report

SPLIT CORD MALFORMATION: BECOMING FIRST SYMPTOMATIC IN AN ELDERLY PATIENT AS A NECK PAIN AND SCOLIOSIS

Abstract

Split cord malformation represents a closed neural tube defect in which the spinal cord splits into two parts. The majority of cases symptoms onset during childhood Although it can occur at any level, malformation is more commonly detected in lower thoracic and upper lumbar regions. The case reported herein is unique; in contrast to other split cord malformation patients our case was diagnosed in adulthood, with the condition manifesting at the level of the cervical vertebrae, and with no neurological deficit and concomitant neurocutaneous symptoms|; but the vertebral anomalies such as scoliosis, hemivertebra and vertebral fusion existing all together. We emphasize the need to consider split cord malformation in the differential diagnosis of elderly patients presenting with neck pain and scoliosis and also we mention that conservative treatment should be preferred in patients without progressive neurologic deficit.

Key Words: Spinal Cord/Abnormalities; Neck Pain, Scoliosis, Cervical Vertebrae; Aged; Congenital Abnormalities.

Olgu Sunumu

İLERİ YAŞTA BULGU VEREBİLEN, BOYUN AĞRISI VE SKOLYOZUN NADİR GÖRÜLEN BİR NEDENİ: SPLİT KORD MALFORMASYONU

Öz

Split kord malformasyonu, spinal kordun iki parça halinde bulunduğu kapalı bir nöral tüp defektidir. Olguların çoğu çocukluk çağında bulgu vermektedir. Herhangi bir vertebra seviyesinde görülebilirken en sık alt torasik ve üst lomber bölgede görülmektedir. Erişkin yaşta split kord malformasyonu tanısı alması, lezyonun nadir bir bölge olan servikal bölgede görülmesi, herhangi bir nörolojik defisit saptanmaması, nörokutanöz bir belirtecin eşlik etmemesi ve skolyoz, hemivertebra ve vertebra füzyonunun birlikte görülmesi nedeniyle nadir görülen bir olgu sunulacaktır. Fizik tedavi kliniğinde sıkça karşılaştığımız boyun ağrısı ve skolyozun nadir bir sebebi olarak split kord malformasyonu ayırıcı tanıda bulunmalı ve asemptomatik ilerleyici nörolojik defisiti olmayan hastalarda konservatif tedavi seçeneği düşünülmelidir.

Anahtar Sözcükler: Split Kord Malformasyonu; Boyun Ağrısı; Skolyoz; Servikal Vertebra; Yaşlı; Doğumsal Anomaliler.

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Introduction

Split cord malformation represents a closed neural tube defect in which the spinal cord splits into two parts. There are two types of split cord malformation. In the more-common Type 1 SCM, the spinal cord splits into two parts by bony and fibrocartilaginous structures, with each part surrounded by the dural sac. In Type 2 SCM, although not divided by the bony septum the spinal cord is split by the intradural septum, with both parts situated within a single dural sac (1,2). Neurologic deficit, neurocutanous symptoms and vertebral anomalies can frequently accompany to split cord malformation.

The case reported herein is unique; in contrast to other split cord malformation patients our case was diagnosed in adulthood, with the condition manifesting at the level of the cervical vertebrae, and with no neurological deficit and concomitant neurocutaneous symptoms but the vertebral anomalies such as scoliosis, hemivertebra and vertebral fusion existing all together in our case.

Case

A 65-year-old female presented with neck pain of 20-year duration. Pain severity increased intermittently. In the previous month, neck pain severity had increased, did not respond to medical treatment, and was radiating to the right arm with accompanying numbness and hypoesthesia. The pain was mechanical in origin and thus increased during neck movement. The patient also complained of fatigue and tiredness.

Right-sided scoliosis and an anteflexed posture were revealed by physical examination (Figure 1,2). A decrease in dorsal kyphosis, and lumbar lordosis, were detected, in addition to prominent abdominal obesity. There was tenderness in the cervical spinous processes upon palpation. Neck range of motion was restricted and painful; range of motion was also restricted in the right shoulder, which was painful during physical examination. During neurological examination, the muscle strength of the upper and lower extremities was rated as 5/5. The sensory examination was also intact. Deep tendon reflexes were globally normoactive. The Babinski test was negative.

Anteroposterior cervical radiography revealed osteophytes of the corpus end plates, fusion abnormalities in cervicothoracic region and degenerative changes were detected, in addition to irregularity in bony structures of the cervical region (Figure 3). In cervicothoracic magnetic resonance imaging (MRI), thoracic kyphosis and lumbar lordosis were decreased, with degenerative changes and hemivertebra and fusion in the corpus of the C6, C7, T1, and T2 vertebrae (Figure 4). Partial split cord malformation and dural sac ectasia were observed in the spinal cord, at the level of the C6 and C7 vertebrae (Figure 5). Bulging and slight spinal cord compression was pre-



Figure 1— Scoliosis and pili asymmetry are seen on the spine of the patient.

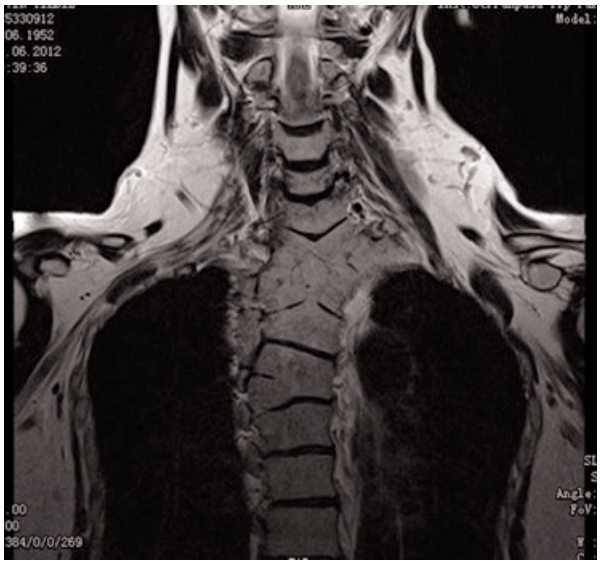


Figure 2— Rotoscoliosis on coronal plain radiography of the lomber spine.

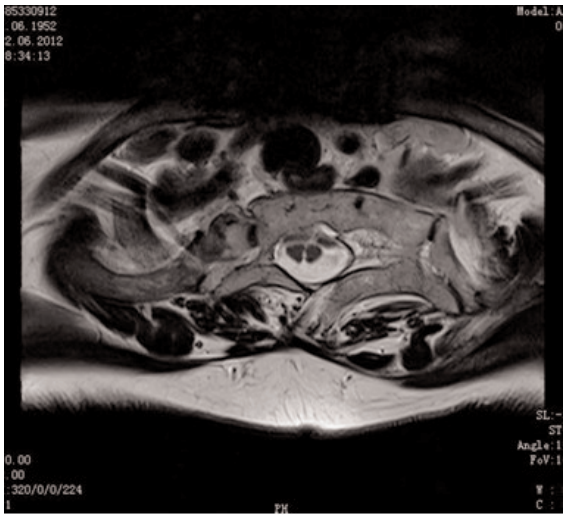


Figure 3— Coronal plain radiography of the cervical spine shows fusion abnormality on cervicothoracic junction.

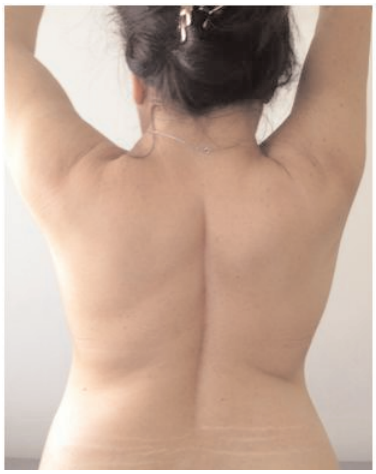


Figure 5— The axial T2-weighted magnetic resonance image shows split cord at the same level.

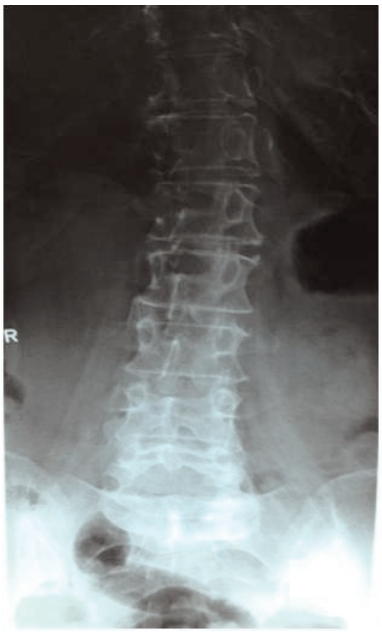


Figure 4— The coronal T2-weighted magnetic resonance image shows multiple fusion abnormalities on lower cervical and upper thoracic vertebrae.

sent at the level of the C3-4 and C5-6 vertebrae, respectively. Wide-based central protrusion and spinal cord compression was detected at the level of the C4-5 vertebrae.

Conservative treatment including non-steroidal anti-inflammatory drugs, physical therapy and cervical isometric exercise were started. Cervical collar was given and daily life activites were checked and regulated. After 3 weeks of evaluation, the neck pain of the patient was decreased significantly.

Discussion

Split cord malformation (SCM) represents a closed neural tube defect in which the spinal cord splits into two parts. In the more-common Type 1 SCM, the spinal cord splits into two parts by bony and fibrocartilaginous structures, with each part surrounded by the dural sac. In Type 2 SCM, although not divided by the bony septum the spinal cord is split by the intradural septum, with both parts situated within a single dural sac (1). According to recent reports, Type 1 and Type 2 SCM can also co-occur, although this is rare, at < 1% of all SCM cases (2). In our patient, partial split cord malformation was observed at the C6-7 level. Two spinal cord splits were detected in one dural sac, with the case classified as Type 2 SCM.

Spinal cord malformation is a congenital malformation accounting for 4% of all congenital spinal defects.

Although it can occur at any level, malformation is more commonly detected in lower thoracic and upper lumbar regions (3). Of all cases, 47% of malformations occur in the lumbar region, with 27% occurring in the thoracolumbar region, 23% in the thoracic region and 1.5% in both the sacral and cervical regions (4). In our patient the cervical region was affected, which is rarely reported.

Malformations can originate from the midline anterior septum of the corpus vertebrae, or from posterior vertebral structures; more commonly, it intersects the entire spinal canal.

Although in the majority of cases symptoms onset during childhood, several adult- onset cases have also been reported (5-11). Our patient was a 65-year-old female experiencing significant neck and back pain for 20 years; because her symptoms onset at approximately age 40, this case report is unique. In 1994, Kennedy reviewed 60 patients, of whom nine displayed symptoms when > 20 years of age; the mean age at diagnosis was 5 years. Due to recent advances in imaging techniques, the number of older-age case reports has increased.

In the majority of split cord malformation patients, symptoms are due to a tethered cord. Weakness in the lower extremities, back pain, urinary and fecal incontinence and scoliosis can accompany the condition (12-14). Abnormality in the neurological system such as an increase or inequality in deep tendon reflexes, can also occur. In our patient, aside from numbness and tingling radiating to the right arm, and a positive plantar reflex in the right foot, no neurological deficits were detected.

Right-sided scoliosis was also observed. Split cord malformation can occur in congenital scoliosis: the probability of co-occurrence of vertebral and spinal cord anomalies in congenital scoliosis is 40%, and includes spinal dysraphism (10%), diastematomyelia (5%), SCM, a tethered cord, Arnold-Chiari malformation, Sprengel's deformity, and Klippel-Feil Syndrome (12-14).

Several dermatological signs indicate spinal dysraphism, such as an increase in hair growth over the lesion, lipoma, and scar tissue. In our patient no cutaneous lesion was detected upon inspection.

Neuroenteric cysts, hemangioma, and meningocele are other commonly observed anomalies.

Club foot, atrophic thigh muscles and leg length discrepancies can also accompany spinal dysraphism. Dermatological involvement and vertebral anomalies are observed more frequently in Type 1 SCM. These vertebral anomalies include hemivertebra, butterfly vertebra and fusion of the laminas of neighboring vertebrae.

The majority of patients are diagnosed due to signs and symptoms of a tethered cord or scoliosis. Typically, a bone or fibrocartilaginous septum splits the spinal cord into two parts; hydromyelia is also frequently observed. However, in Type 2 SCM symptoms are usually mild, or patients may be asymptomatic. In our patient, MRI revealed hemivertebra and fusion in the corpus of the C6, C7, T1 and T2 vertebrae. Computerized tomography is the preferred method of diagnosis, achieving superior detection of bone pathology (including intraspinal deformity) compared with MRI myelography (5,7,9). In our patient, cervical radiography revealed abnormalities in bony structures, including congenital anomalies and extra cervical ribs. To achieve detailed evaluation of the pathology, whole spinal MRI was performed, with SCM subsequently diagnosed.

Conservative treatment should be preferred for asymptomatic patients without progressive neurologic deficits (6,7). Electrotherapy, and stretching and strengthening exercises, were recommended for 1 month for our patient, which represents a conservative treatment. Significant improvement in symptoms was subsequently observed, but restricted cervical range of motion was still present. The patient was discharged and advised to frequently attend follow-ups.

Surgery should be the treatment of choice in adults with split cord malformation only when neurologic deficits due to spinal stenosis or a tethered cord are present. There is no indication for prophylactic spur resection in asymptomatic adults. Prior to performing scoliosis surgery in children, spur resection and release of attachments to the spinal cord in the case of a tethered cord, should be performed. Post- operative neurological deficits will otherwise increase due to spinal cord traction (15).

Following spur resection, spur recurrence is rarely observed, with few cases reported in the literature (16). Meningeal residual polyvalent mesenchymal cells may remain in the spinal cord following simple extradural resection of a bony septum, reactivating and thus causing its recurrence.

The case reported herein is unique; in contrast to other split cord malformation patients our patient was diagnosed in adulthood, with the condition manifesting at the level of the cervical vertebrae, and with no neurological deficit, concomitant neurocutaneous symptoms. And also vertebral anomalies such as scoliosis, hemivertebra or vertebral fusion existing all together. We emphasize the need to consider split cord malformation in the differential diagnosis for elderly patients presenting with neck pain and scoliosis.

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