

Determination of the Relationships Between Anthropometric Characteristics and Level of Daily Activities, Nutritional Habits and Mouth-Teeth Findings of the Elderly

Yaşlıların Antropometrik Özellikleri ile Günlük Yaşam Aktivitesi Seviyesi, Beslenme Alışkanlıkları ve Ağız-Diş Sağlığı Arasındaki İlişkilerin Belirlenmesi

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ABSTRACT

Objective: The aim of this study is to determine the relationship between anthropometric characteristics and level of daily self care activities, nutritional habits and oral health status findings of the elderly.

Methods: The study was conducted at a nursing home and 84 residents aged ≥ 65 years without physiological and mental disorders participated. Demographic characteristics, nutritional habits, oral and dental health, basic and instrumental activities of daily living, muscle strength and anthropometric parameters were evaluated.

Results: The mean age of the participants was 80.5 ± 6.4 years and 69% of them were female. The mean scores of basic and instrumental activities of daily livings (BADLs and IADLs) scales of the elderly were determined as 74.5 ± 10.6 and 9.5 ± 3.0 , respectively. The percentage of elderly who had a risk of malnutrition was found to be 19.2% and 8.6% in male and female, respectively. Nearly 86% of them had tooth loss replaced with partial or complete dentures. It was found that there was negative correlation between age and BADLs and IADLs ($p < 0.01$). The correlation between the muscle strength and activities of daily living was found statistically significant.

Conclusion: There are considerable problems of malnutrition and loss of teeth in nursing home residents. Success rates have fallen in basic daily life activities, and instrumental daily living activities, which were correlated by the loss of muscle strength. This situation should be taken into consideration by the clinicians and the health care professionals.

Keywords: Elderly, rehabilitation, anthropometry, activities of daily living

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ÖZET

Amaç: Yaşlı bireylerin antropometrik özellikleri, günlük yaşam aktivite düzeyleri, beslenme alışkanlıkları ve ağız-diş sağlığı bulguları arasındaki ilişkileri saptamaktır.

Yöntemler: Bir huzurevinde yürütülen çalışmaya fizyolojik ve zihinsel problemi olmayan 65 yaş ve üstü 84 gönüllü alınmıştır. Demografik özellikleri, beslenme alışkanlıkları, ağız ve diş sağlığı bulguları, temel ve enstrümantal günlük yaşam aktiviteleri, kas kuvvetleri ve antropometrik parametreleri değerlendirilmiştir.

Bulgular: Katılımcıların yaş ortalaması 80,5±6,4 yıl olup %69'u kadındır. Yaşlı bireylerin temel ve enstrümantal günlük yaşam aktiviteleri ölçeklerinin ortalama puanları sırasıyla 74,5±10,6 ve 9,5±3,0 bulunmuştur. Malnütrisyon riski olan yaşlı bireylerin oranı sırasıyla erkeklerde ve kadınlarda %19,2 ve %8,6 bulunmuştur. Yaklaşık olarak %86'sında kısmi ya da tam diş protezi ile yerine konan diş kayıpları vardır. Yaş ile temel günlük yaşam aktiviteleri ve enstrümantal günlük yaşam aktiviteleri arasında negatif ilişki olduğu bulunmuştur ($p<0,01$). Kas kuvveti ile günlük yaşam aktiviteleri arasındaki ilişkinin ise istatistiksel olarak anlamlı olduğu saptanmıştır.

Sonuçlar: İleri yaşlardaki huzurevi sakinlerinde azımsanmayacak oranlarda malnütrisyon ve diş kayıpları saptanmıştır. Temel günlük yaşam aktivitelerinde ve enstrümantal günlük yaşam aktivitelerinde başarı oranlarının düştüğü ve kas kuvvetlerinde azalmanın da bu süreçte rol oynadığı dikkati çekmektedir. Bu durumun klinisyenler ve yaşlılara hizmet sunan sağlık profesyonelleri tarafından göz önüne alınması yararlı olacaktır.

Anahtar sözcükler: Yaşlı, rehabilitasyon, antropometri, günlük yaşam aktiviteleri

Introduction

One of the most significant phenomena of the 21st century has been aging population, that is to say the dramatic increase in the number and proportion of people aged 60 and above. In fact, the first quarter of the 21st century has often been called *The Age of Aging*. Even though the demographic transition was mostly viewed as a major concern of the more developed countries until recently, today it has also become a feature of many developing countries (1,2). The increase in elderly population brings about not only physiological, but also psychological and social problems. The basic and instrumental activities of daily livings (BADLs, IADLs) of elderly are restricted mainly because of the physiological decline such as decrease in mass and strength of muscle and musculoskeletal disorders like degenerative joint diseases and osteoporosis (3).

Another health problem which increases with aging is malnutrition (1). There are many factors associated with malnutrition in elderly, including demographic, physical and psychosocial factors, eating and oral problems, low functional capacity, living alone, dementia and depression (4). It causes not only deterioration in the quality of life and functional capacity but also increases the infection risk, length of hospital stay and poor healing. Moreover, it is a predictor of morbidity and mortality. Therefore, it is important to identify elderly individuals nutritionally at-risk or who are malnourished in early stages of aging. A number of tools have been developed for the nutritional assessment of the elderly people (5). The Mini-Nutritional Assessment (MNA) has been recently used to provide a single and rapid assessment of nutritional status in elderly. This test includes objective and subjective parameters and identifies the risk factors

of malnutrition which have effect on nutritional status of the elderly. Thus, it permits early nutritional intervention and determining preventive and treatment strategies (6,7).

One of the major criteria of healthy ageing is maintaining a natural, healthy, functional dentition throughout life, which provides social benefits such as esthetics and comfort and biological benefits such as the ability to chew, taste and speak. However, oral health of the elderly people is far from optimal. The treatment needs are high due to edentulism, missing teeth, caries, periodontal diseases and tooth wear resulting in impaired oral functions (8-10). Therefore, professionally assessed treatment needs are very high among this age group.

Considering all of the mentioned factors, determining anthropometric data of the elderly people will affect their body health and motivation positively for each of the facilities put into service for them. Additionally, it will help them live peacefully and comfortably by reducing the risks of accidents and increasing the life quality (11).

Healthy life style-related conditions, quality of life and so on change with age. Hence, what seems to be an extraordinary achievement for this century will be one of the great challenges for the next: ensuring the quality of life of an elderly population. To maximize the level of functional independence in elderly individuals and comprehensive assessment are mandatory. Treatment and care must be planned based on information obtained from the assessment. The aim of this study is, therefore, to determine the relationship between anthropometric characteristics and level of daily self care activities, nutritional habits and oral health status findings of the elderly.

Materials and Methods

The study was approved by the ethics committee of Hacettepe University. The study was conducted at a nursing home of the social security institution between June and October, 2010. Investigators interviewed the participants face to face in the meeting room (SŞÇ, ZT, NR, MÖ, OH, SŞ). Each interview and data recording took about 60 minutes. Informed written consents were taken from the participants in the study.

Eighty-four residents aged ≥ 65 years without psychological and mental disorders participated in the study. Demographic questionnaire form includes questions about age, sex, education status, occupation, marital status of the participants.

Height, weight, waist and buttocks circumference, midupper-arm circumference (MUAC) and calf circumference were evaluated as anthropometric measurement (12,13). The recommended waist circumference sex-specific cut-off points are 94 cm and 80 cm of men and women, respectively. Furthermore, 102 cm (men) and 88 cm (women) were determined as cut-off points for increased risk (14-16). Body Mass Index (BMI) of the elderly is categorized as 20-25=normal, 25-30=fatty, <20 =slim, and >30 =obese. Commander GripTrack was used to evaluate hand grip strength. Commander power track was used to evaluate wrist, elbow, and knee muscle strength. All these measurements were repeated three times and mean of the measurements were taken for reliable evaluations.

Basic and instrumental activities of daily livings scales were used for evaluation of elderly dependency level in activities of daily livings (ADLs). Basic activities of daily livings scale includes questions related to feeding, grooming, dressing, toileting, transferring, mobility, climbing up and down stairs. If elderly perform ADLs independently, he/she will take 10 points. If elderly perform ADLs with assistance, he/she will take 5 points. If elderly perform ADLs dependently, he/she will take 0 points. Increase in dependency decreases the points. Instrumental activities of daily livings scale includes questions related to telephone use, shopping, meal preparation, house cleaning, laundering and transportation. Increase in dependency decreases the points (17).

MNA was used to diagnose early malnutrition or malnutrition risk of the elderly (5). It was developed to be used for elderly living in their homes, hospitals and nursing homes (12,13,18). Using MNA for the elderly is also recommended by the European Society of Parenteral

and Enteral Nutrition (ESPEN) (13). The score of MNA is categorized as <17 malnourished, 17-23.5 at risk of malnutrition, and ≥ 24 no risk of malnutrition (12,19).

Finally, oral and dental health findings were recorded on oral and tooth examination tool. After the oral physical examination, teeth and oral health findings were evaluated.

The data were analyzed by using Statistical Package for Social Sciences (SPSS) for Windows 11.5 statistical program. According to the type of data, arithmetic mean, median, standard deviation, minimum and maximum values, percentages were used for descriptive purposes. For normal distribution of quantitative data, comparison of two independent groups and significance test of the difference between the two means were used. Relationship between qualitative variables was analyzed by using Spearman's rho correlation coefficients. Wilcoxon Signed Ranks test and Student's t-test for independent samples were used to compare the anthropometrics, muscle strength, values and total tooth loss.

Results

The mean age of the participants was 80.5 ± 6.4 years. The demographic characteristics of them were listed in Table 1.

Table 1. The demographic characteristics of the participants.

Characteristics	Number	%
Age groups		
65-74	15	17.9
75-84	50	59.5
> 85	19	22.6
Gender		
Male	26	31.0
Female	58	69.0
Education status		
Illiterate-literate	2	2.4
Primary school graduate	17	20.2
Middle school graduate	8	9.5
High school graduate	27	32.1
University graduate	30	35.7
Working status		
Housewife	23	27.4
Retired	61	72.6
Marital status		
Married	10	11.9
Single	74	89.1

Anthropometric Measurements

The anthropometric measurements of the elderly were given in Table 2. Most of the participants had BMI values between 25-29.9 kg/m² (46.2% of males and 50.0% of females). BMI values were below 22 kg/m² in 11.9% of the subjects and this percentage was higher in males than females (19.2% and 8.6%, respectively). Additionally, the percentages of waist circumferences > 102 cm for males and > 88 cm for females were found to be 46.2% and 96.6%, respectively.

Muscle Strength

Table 3 demonstrates the muscle strength of the participants. It was found that the mean values of right hand muscle strength, left wrist flexion, right wrist extension, right elbow flexion/extension, right knee flexion/extension

muscle strength scores were higher than the contrary sites. All muscle strength measurements of the male elderly were higher than those of females (p<0.005).

ADL, IADL

The mean scores of ADL and IADL scales of the elderly persons were 74.5±10.6 and 9.5±3.0, respectively.

Mini Nutritional Assessment

The MNA of the participants according to age groups was given in Table 4. There was no malnourished elderly according to MNA. The percentage of the elderly having the risk of malnutrition was found to be higher in males than females (p=0.306). The age groups with the higher risk of malnutrition were >85 years in males and 65-84 years in females.

Table 2. Anthropometric measurements of the elderly.

Anthropometric Measurements	Male (n: 26)	Female (n: 58)
Weight-kg	75.4 ± 14.06 (47.00-99.60)	69.0 ± 10.28 (46.00-97.00)
Height-cm	163.7 ± 8.23 (153.4-180.0)	150.2 ± 7.41 (126.0-169.0)
Body Mass Index-kg/m ²	25.96±3.94 (17.06-33.06)	26.95±3.65 (18.87-36.92)
Mid Upper Arm Circumference -cm	29.1±3.36 (24.00-38.00)	30.3±3.59 (22.00-41.50)
Calf Circumference cm	33.9±3.78 (27.00-41.50)	35.5±3.92 (27.00-47.00)
Waist Circumference -cm	102.1±10.94 (80.00-121.00)	103.0±9.99 (78.50-135.00)
Hip Circumference -cm	39.1±3.79 (32.00-47.80)	38.7±2.75 (32.60-45.60)
W/H Ratio	2.62±0.26 (2.06-3.21)	2.67±0.25 (2.24-3.81)

() Values in bracket means minimum and maximum values

Table 3. The muscle strength of the participants.

Muscle Strength	Mean Score±SD Median (min-max) (right)	Mean Score±SD Median (min-max) (left)	p value
Hand grip	37.00±17.95 33.83 (14.67-117.33)	34.94±17.20 33.33 (8.00-99.33)	,002*
Wrist flexion	100.76±30.36 96.66 (33.33-223.33)	106.60±31.15 106.66 (36.67-196.67)	,037*
Wrist extension	66.71±32.08	63.95±27.56	,247**
Elbow flexion	122.31±48.15 117.50 (13.33-255.00)	113.13±39.09 101.66 (46.67-241.67)	,019*
Elbow extension	95.89±37.23 91.66 (0.00-230.00)	91.55±31.66 84.16 (31.67-185.00)	,036*
Knee flexion	130.21±44.22 126.66 (38.33-250.00)	128.69±47.46 116.66 (50.00-365.00)	,029*
Knee extension	98.40±30.81	90.83±31.11	,000**

* Wilcoxon Signed Ranks Test, ** T-test

Table 4. The mini nutritional assessment of the participants.

Age Groups	MNA status					
	Well-nourished ≥ 23.5		At risk of malnutrition 17-23.5		Malnutrition < 17	
	n	%	n	%	n	%
Male						
65-74	3	14.3	-	-	-	-
75-84	14	66.7	1	20.0	-	-
>85	4	19.0	4	80.0	-	-
Total	21	80.8	5	19.2		
Female						
65-74	10	18.9	2	40.0	-	-
75-84	33	62.3	2	40.0	-	-
>85	10	18.9	1	20.0	-	-
Total	53	91.4	5	8.6		
Total	74	88.1	10	11.9	-	-

Table 5. The correlations between activities of daily living scores and age, anthropometric measurements, muscle strength, number of total tooth loss of the participants.

	ADL scale r_s	IADL scale r_s
Age	-0.298*	-0.432*
Anthropometric Measurements		
Weight-kg	0.059	0.056
Height-cm	0.096	0.028
Mid Upper Arm Circumference -cm	0.133	0.150
Calf Circumference-cm	0.060	0.111
Waist Circumference -cm	-0.078	-0.077
Hip Circumference -cm	-0.013	-0.028
W/H Ratio	-0.097	-0.092
Muscle Strength		
Right hand	0.472*	0.374*
Left hand	0.433*	0.296*
Right wrist flexion	0.147	0.012
Left wrist flexion	0.220**	-0.052
Right wrist extension	0.439*	0.380*
Left wrist extension	0.472*	0.322*
Right elbow flexion	0.352*	0.266**
Left elbow flexion	0.286**	0.239**
Right elbow extension	0.438*	0.416*
Left elbow extension	0.404*	0.350*
Right knee flexion	0.410*	0.375*
Left knee flexion	0.266**	0.245**
Right knee extension	0.277**	0.166
Left knee extension	0.389*	0.239**
Total Tooth Loss	0.169	0.159

* $p < 0.01$, ** $p < 0.05$

Oral and Dental Findings

Two (2.4%) of the subjects had never brushed their teeth while one (1.2%) rarely brushed his/her teeth. Twenty-four (28.9%) of the elderly brushed their teeth once, and fifty-six (67.5%) twice or more a day. Only seven (8.3%) of them had flossing and interdental brushing habits. Forty-seven (53.6%) of the subjects visited a dentist only when they had a problem. Twelve (14.6%) of them visited a dentist for yearly control checkups. Unexpectedly, twenty-three (27.4%) of them answered that it was more than ten years they had last visited a dentist. Seventy-two (85.7%) of the elderly had tooth loss replaced with partial or complete dentures. Forty-five (53.6%) had mandibular and fifty-five (65.5%) maxillary complete tooth loss. Seventy-two (85.7%) of the subjects had maxillary and seventy-one (84.5%) had mandibular removable dentures.

The correlations between activities of daily living scores and age, anthropometric measurements and number of total tooth loss of the participants were given in Table 5. It was found that there was negative correlation between age and ADLs and IADLs ($p < 0.01$). The correlation between right/left hand, left wrist flexion, right/left wrist extension, right/left elbow flexion/extension, right/left knee flexion/extension muscle strength and ADLs was found statistically significant. The correlations between right/left hand, right/left wrist extension, right/left elbow flexion/extension, right/left knee flexion, left knee extension muscle strength and IADLs were found statistically significant.

Discussion

Functional impairment and chronic diseases lead to restriction and loss in several vital activities which cause increased disability with aging. The best way to assess the disability degree of the elderly is through evaluating the competence in performing daily activities of the elderly, who live alone or need assistance. In a study conducted among 1300 elderly people, it was found that 96.4% of them were independent in feeding, 96.3% in toileting, 96.2% in dressing, 94.4% in transfer indoor and 90.8% in bathing whereas they were dependent in some instrumental activities such as bill payment, bank withdrawals (26.8%), cleaning (26.2%), laundry (25.3%), cooking (24.3%) and shopping (23.7%) (20). In another study, it has been reported that while male elderly frequently had difficulties in running (50%), lifting (30.6%), standing (27.1%) and sitting (24.7%); female elderly had difficulties in running (67%), lifting (36.3%) and standing (33.1%) (21).

According to Mengi et al. (22) there is a 15% of muscle strength loss every decade in adults aged 50 and over.

Muscle mass also decreases by 25-45% with increasing age. They found that hand grip and pinch strength in younger adults were significantly higher than the adults aged ≥ 65 years. In this study, it was also emphasized that faster decline in hand grip strength occurs after the age of 60. In a recent study, 17.2% and 26.2% of the elderly men and women, respectively, were classified as having low muscle mass. There was a significant association with age and the change from normal to middle to low muscle mass in both male and female. The prevalence of IADL disability also increased significantly as muscle mass decreased. Low muscle mass was significantly associated with IADL disability in men and women. Furthermore, middle muscle mass was significantly associated with IADL disability in women. This study revealed that low muscle mass, defined as a value 2 SD below the mean of young adults, had a significant association with IADL disability. Interventions to prevent age-related losses in muscle mass may be an effective strategy to prevent IADL disability among the elderly (23). In another study, a statistically significant difference between male and female elderly was found in the levels of activities of daily living. It has been reported that men are usually more independent than females in activities such as traveling by bus, walking a certain distance and shopping (24). Hand muscle strength by using dynamometer was measured in the individuals aged between 20 and 94 in a study conducted by Mathiowetz et al. A strong correlation was determined between age and hand muscle strength in this study and additionally, it was shown that hand muscle strength was higher in males than females as well as in right-handed than left-handed individuals (25). Relationship between hand grip, age and gender was tested in the study conducted by Werle et al. Results showed that grip increased with age; reached to the top in males aged between 34 and 39 and in females aged between 40 and 44; decreased with aging. However, hand muscle strength was higher in males (26).

After assessment of the muscle strength of our study population, it was found that right/left hand, right/left wrist, elbow, knee extension and flexion muscle strength scores of the male elderly persons were higher than those of females. In addition, the correlation between muscle strength and ADLs/IADLs was found statistically significant.

In our study, it was found that basic ADLs and IADLs scores of the elderly people aged 85 and over were lower. Due to increase in alterations of musculoskeletal system, degenerative joint diseases, osteoarthritis, osteoporosis, chronic diseases, visual disorders and the use of multi-drug in old age compared to other age groups, restrictions in activities of the elderly are seen more. Decrease in basic ADLs and IADLs of the elderly people is an expected result of this study.

Malnutrition is a common problem in elderly. Early stage symptoms of malnutrition are not specific, improve slowly and are confused with the symptoms of aging. Older people should be screened periodically for malnutrition or being at risk for malnutrition. Early screening and preventive intervention are important.

Anthropometric measurements are one of the parameters to assess nutritional status. Body weight, BMI, MUAC, waist circumference are used widely in elderly to evaluate nutritional status. In this study, body weight was found 75.4 ± 14.1 kg in males, 69.0 ± 10.3 kg in females. Involuntary weight loss or gain is accepted as a sign of malnutrition in elderly. Therefore, body weight measurements are followed periodically (27). BMI was found to be 25.96 ± 3.94 kg/m² in males and 26.95 ± 3.65 kg/m² in females. BMI between 22-26 kg/m² are recommended for elderly. In this study, most of males and females were found to be between 25-29.9 kg/m² BMI (46.2% and 50.0%, respectively). It was found that 19.1% of the elderly were overweight (BMI above 30 kg/m²). In older people, BMI lower than 22 kg/m² is accepted as risk threshold. It was found that 19.2% of males and 8.6% of females had <22 kg/m² of BMI. Lower BMI is correlated with the decrease in functional capacity and increase in mortality (28,29).

In these elderly, MNA score was found 17-23 and they had a risk of malnutrition. Also, it was found that there was a positive linear correlation between total MNA score and BMI (Sperman rho=0.335, p=0.002).

It is well known that with aging, fat free mass is decreasing while fat mass is increasing in body. The percentages of waist circumference above ≥ 102 cm in males and ≥ 88 cm females were 46.2% and 96.6%, respectively. Values above these cut-off points of waist circumference are accepted as a predictor of abdominal obesity and it is related with diseases such as diabetes, cardiovascular disease and cancer.

Also, there was no malnourished elderly in this study according to MNA score. Risk of malnutrition was found to be low (11.9%). This institution is a governmental one and has a dietitian, which may have effected these findings. In addition, the median values of ADLs and IADLs were found higher in well-nourished group, and anthropometric measurements of the well-nourished elderly were higher than those of the elderly having the risk of malnutrition except for height. Along with a sufficient and balanced nutrition, the provision of physical activity is important to protect and improve health as it sustains bone strength and provides muscle development.

In a study carried out in 2001 among elderly people aged 65 and over, it was reported that one out of five individuals with natural teeth had problems eating carrots, apples, beefsteaks and dried fruits (8). These foodstuffs cannot be consumed by full edentulous individuals with complete dentures; and that vegetable and fruit consumption is relatively lower in edentulous adults than among those who had preserved their natural teeth. Moreover, as the number of natural teeth increases, so does the chewing function perceived by the individual. Similarly, in 2001, another study carried out by Tosello et al. stated that the risk of developing gastrointestinal pathologies was significantly higher among patients with chewing dysfunction than among those who had natural teeth (30). Researchers concluded that chewing dysfunction leads to consumption of semi-soft or soft foodstuffs or in other words low-fiber content food. However, results of studies conducted during the past two decades underline the importance of consuming fiber-rich products to prevent gastrointestinal disorders. Therefore, when tooth loss is inevitable, physical and psychological needs of the patient are met by well-functioning dentures, which also contribute to the maintenance of general health.

Conclusion

Comprehensive Geriatric Assessment should be multidimensional and interdisciplinary. Diagnostic procedures should intend to determine not only medical but also their functional capabilities as well as their problems in elderly. Ageing itself does not influence life quality in a negative way. However, well-being of the aged population requires special precautions with all aspect of health and its determinant (31).

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