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ANTHROPOMETRIC MEASUREMENT AND EVALUATION OF DAILY LIVING ACTIVITY OF ELDERLY INDIVIDUALS ACCORDING TO MALNUTRITION STATUS

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Abstract

This study was carried to evaluate the anthropometric measurement and daily living activities of elderly individuals according to their malnutrition status. The study was conveyed with 76 older people aged 65 and over, who were not diagnosed with Dementia-Alzheimer's, who could be contacted, and who agreed to participate in the study, living in nursing homes in Karaman City Center. 'MNA (Mini Nutritional Assessment)' was applied to determine the malnutrition status of individuals. The researcher determined anthropometric measurements of individuals (body weight, body mass index (BMI), upper-middle arm circumference, calf circumference) and handgrip strength. The 'Katz Daily Living Activity Scale for the Elderly' was adopted to determine daily living activity in elderly individuals. Statistical analysis of the data was performed with the SPSS 22.0 program. Seventy-six elderly individuals, 50 (65.8%) males, and 26 (34.2%) females, with a mean age of 75.9 ± 7.91 years, participated in the study. According to MNA, when the nutritional status distribution of the elderly is evaluated, 17.1% of the individuals are malnourished (10% of males, 30.8% of females), 28.9% are at risk of

malnutrition (36% of males, 15.4 % of females) and 53.9% had a normal nutritional status (54% of males, 53.8% of females). The difference between the malnutrition status of the elderly individuals by gender was statistically significant ($p<0.05$). When nutritional status according to MNA and anthropometric measurements (body weight, BMI, handgrip strength, upper-middle arm circumference, calf circumference) were evaluated, there was a significant relationship. Anthropometric measurements were lower in the malnourished group. 69.2% of individuals with malnutrition and 31.8% of those at risk of malnutrition were severely dependent on daily living activities. The relationship between individuals' activities of daily living and MNA screening test results was statistically significant ($p<0.05$). The effect of anthropometric measurements and daily living activities on the development of malnutrition in the elderly should be considered and evaluated.

Key Words: Elderly, Malnutrition, Anthropometric measurements, The activity of daily living.

Özet

Bu çalışma, yaşlı bireylerin malnütrisyon durumuna göre antropometrik ölçüm ve günlük yaşam aktivitesinin değerlendirilmesi amacı ile yapılmıştır. Çalışma, Karaman İl Merkezine bağlı huzurevlerinde yaşayan, 65 yaş ve üzeri, Demans-Alzheimer tanısı olmayan, iletişim kurulabilen ve çalışmaya katılmayı kabul eden 76 yaşlı ile yürütülmüştür. Bireylerin malnütrisyon durumunu saptamak için 'MNA (Mini Nutrisyonel Değerlendirme)' kullanılmıştır. Bireylerin antropometrik ölçümleri (vücut ağırlığı, beden kütle indeksi (BKİ), üst orta kol çevresi, baldır çevresi) ile el kavrama gücü araştırmacı tarafından belirlenmiştir. Yaşlı bireylerde günlük yaşam aktivitesini saptamak için 'Yaşlılar için Katz Günlük Yaşam Aktivite Ölçeği' kullanılmıştır. Verilerin istatistiksel analizi SPSS 22.0 programı ile yapılmıştır. Çalışmaya, 50'si (%65,8) erkek, 26'sı (%34,2) kadın olmak üzere yaş ortalaması 75.9 ± 7,91 yıl olan 76 yaşlı birey katılmıştır. Yaşlıların MNA'ya göre beslenme durum dağılımları değerlendirildiğinde; bireylerin %17,1'i malnütrisyonlu (erkeklerin %10'u kadınların %30,8'i), %28,9'u malnütrisyon riski altında (erkeklerin %36'sı, kadınların %15,4'ü) ve %53,9'u normal nutrisyonel duruma (erkeklerin %54'ü, kadınların %53,8'i) sahip olduğu bulunmuştur. Yaşlı bireylerin cinsiyete göre malnütrisyon durumları arasındaki fark istatistiksel açıdan önemli bulunmuştur ($p<0.05$). MNA' ya göre nütrisyonel durum ile antropometrik ölçümler (vücut ağırlığı, BKİ, el kavrama gücü, üst

orta kol çevresi, baldır çevresi) değerlendirildiğinde, önemli bir ilişki saptanmıştır. Malnütrisyon olan grupta antropometrik ölçümler daha düşük bulunmuştur. Malnütrisyonlu bireylerin %69,2'si, malnütrisyon riski altında olanların %31,8'i günlük yaşam aktivitelerinde şiddetli bağımlı olarak saptanmıştır. Bireylerin günlük yaşam aktiviteleri ile MNA tarama testi sonuçları arasındaki ilişki istatistiksel olarak önemli düzeyde bulunmuştur ($p<0.05$). Yaşlılarda malnütrisyonun gelişmesinde antropometrik ölçümlerin ve günlük yaşam aktivitesinin etkisi göz önüne alınmalı ve değerlendirilmelidir.

Anahtar Kelimeler: Yaşlı, Malnütrisyon, Antropometrik ölçümler, Günlük yaşam aktivitesi.

1. Introduction

Aging is an inevitable process that continues from birth to death. It affects many structural and functions in the whole body (Kablan et al., 2020).

Elderly individuals are among the risky groups whose diet should be considered in society due to insufficient food consumption and nutritional issues (Keleş & Yavuz van Giersbergen, 2020). Although malnutrition is not a natural component of aging, elderly individuals are at risk of malnutrition due to physiological, psychological and social risk factors (Başıbüyük, 2017; Ekici et al., 2019). Nutrition in the aging process plays a vital role in the formation and development of diseases. The European Society for Clinical Nutrition and Metabolism (ESPEN) defines malnutrition as a condition resulting from inadequate nutrient intake or irregular diet, resulting in a change in body composition (lower lean mass and body cell mass), resulting in reduced physical and mental functions and deterioration in clinical disease outcomes. (Cederholm et al., 2017). Consensus on diagnostic criteria for malnutrition has recommended low muscle mass as part of the definition of malnutrition (Cederholm et al., 2019).

Bodyweight loss and Body Mass Index (BMI), one of the criteria for defining malnutrition, is used. However, it can be misleading in measuring muscle loss since BMI varies according to ethnicity and race. Individuals with the same BMI can have different lean mass ratios. Anthropometric measurements (calf and arm circumference), skinfold thickness, bioelectrical impedance analysis (BIA) measures are safer in the evaluation of malnutrition (Landi et al., 2019). It is recommended to use handgrip strength for the measurement of muscle strength. Low handgrip strength has been associated with decline, weakness, increase in hospital stay and mortality, and deterioration in the quality of life (Yalçın & Rakıcıoğlu, 2018).

The prevalence of malnutrition among the population over 65 years of age in Europe varies between 23% and 66% (Nascimento et al., 2019). Malnutrition is a common problem among the elderly living in nursing homes, and 47-62% of individuals are at risk of malnutrition (Kamo et al., 2017).

The consequences of malnutrition are multifaceted: it leads to loss of muscle mass and function, associated with adverse health outcomes such as mobility – disability, illness and infections, increased recovery time, poor quality of life, and mortality. It is a vicious cycle in which a decrease in muscle mass, strength, and/or function represents a cause or a consequence of metabolic dysfunction and disease development, especially in the elderly (Landi et al., 2019). This study was carried to evaluate the anthropometric measurement and daily living activities of elderly individuals according to their malnutrition status.

2. Material and Methods

2.1. Study design and participants

The study was conducted with 76 older people aged 65 and over, who were not diagnosed with Dementia-Alzheimer, who could be contacted and agreed to participate in the study, living in nursing homes in Karaman City Center between August 2019 and March 2020. "Ethics Committee Approval" with the number KA19/264 and dated 11.09.2019 was obtained by the Başkent University Clinical Research Ethics Committee for the study. After receiving the approval of the work ethics committee, the permission of the Ministry of Family, Labor and Social Services, Education and Publication Department, dated 04.11.2019 and numbered 10, was obtained to start the study. Individuals were informed about the study; they read and signed the voluntary consent form.

2.2. Data collection tool

The researcher applied the questionnaire form to the individuals participating in the study by face-to-face interview method. The questionnaire form includes the gender, age, marital status, education level, and length of stay in the nursing home. The handgrip strength of the elderly was measured with a hand dynamometer; body weights, heights, upper-middle arm circumference, and calf circumference measurements were made by the researcher with appropriate methods and recorded in the questionnaire form. Body Mass Index (BMI) values of

individuals were calculated. BMI was obtained by dividing the individual's body weight (kg) by the square of the height (BMI=kg/m2).

The "Mini Nutritional Assessment (MNA)" questionnaire was applied to determine the nutritional status of the elderly. The MNA is a simple, reliable questionnaire developed by geriatricians, consisting of 18 items, used to evaluate the nutritional status of individuals (Vellas et al., 1999). Development and validation studies have been performed in frail and healthy elderly individuals in France and the USA. The full MNA includes evaluation in four parts: anthropometric evaluation (BMI, weight loss, and arm and calf circumferences), overall evaluation (lifestyle, medication, activity, and presence of depression symptoms), brief dietary evaluation (number of meals, food, and fluid intake, and nutritional autonomy), subjective assessment (personal perception of health and nutrition). Each answer has a numerical value and contributes to the final score, which is 30 at most; 24 points are considered good nutritional status, between 17 and 23.5 points are considered malnutrition risk, and <17 points are considered malnutrition (Guigoz, 2006).

In this study, "Katz Daily Living Activities for Elderly Scale," which was validated and reliable in our country by Pehlivanoğlu et al. (Pehlivanoğlu et al., 2018), was adopted. The elderly was asked about their bathing, dressing, toilet needs, movement and feeding status, and urine and stool controls. There are two options for each function in the KATZ Daily Living Activity Scale, assisted or unassisted. Assisted functions score zero, while independently performed functions score one whole point. The score was calculated by taking points between 0-6 according to the answers given to the questions. Patients with a score of six were evaluated as "fully independent," patients with a score of 4 were considered "moderately dependent," and patients with a score of 2 or less were considered "severely dependent."

2.3. Statistical Analysis of the Data

Statistical analyses of the research were evaluated with the SPSS 22 program. The quantitative data investigated in the study were reviewed for compliance with the Normal Distribution principles with the Shapiro-Wilk test. Statistical analyzes of the regularly distributed parameters were performed with the Independent T-Test. Categorical and Ordinal data were analyzed with Pearson Chi-Square and Fisher's Exact Chi-Square tests. While the descriptive statistics for the categorical variables in the study were stated as "S" and percentage values, the said statistics were written as mean ± standard deviation for the quantitative variables. In all

analysis techniques, the error was evaluated at the 0.05 level. It is given at a 95% confidence interval.

3. Results and Discussion

Seventy-six elderly individuals, 50 (65.8%) males, and 26 (34.2%) females participated in the study. In Table 1, MNA screening test results of individuals by gender are given. The mean MNA score of the elderly was 22.6 ± 3.99 in men and 20.8 ± 6.52 in women, and the difference between the sexes was not statistically significant (p>0.05). When we look at the distribution of nutritional status of the elderly according to gender, malnutrition risk was found in 10% of males, 30.8% of females, 36% of males, 15.4% of females, and regular nutritional status in 54% of males and 53.8% of females and the difference between genders was statistically significant (p<0.05).

Table 1. Mean score and distribution of individuals according to MNA screening test results

Malnutrition Status	**Male**		**Female**		**Total**		
	S	**%**	**S**	**%**	**S**	**%**	**p**
Mean Score ($\bar{X} \pm SS$)	22.6 ± 3.99		20.8 ± 6.52		21.9 ± 5.03		0.144
Score Distribution							
Malnourished	5	10.0	8	30.8	13	17.1	
Risk of Malnutrition	18	36.0	4	15.4	22	28.9	0.034*
Normal Nutritional Status	27	54.0	14	53.8	41	54.0	

*p<0.05

The mean and standard deviation values of the MNA test results and anthropometric measurements of the individuals participating in the study are given in Table 2. While the bodyweight of the individuals in the malnourished group was 49.9 ± 8.71 kg, the bodyweight of the individuals under the risk of malnutrition was 66.3 ± 13.20 kg, and the individuals with a Normal Nutritional status were 76.2 ± 15.98 kg. According to the MNA groups, the difference between the body weights of the elderly was statistically significant (p<0.05).

Table 2. Statistical comparisons of MNA test results and Anthropometric measurements of individuals

	Malnourished			At Risk of Malnutrition			Normal Nutritional Status			
Anthropometric Measurements	**$\bar{X} \pm SS$**	**Min**	**Max**	**$\bar{X} \pm SS$**	**Min**	**Max**	**$\bar{X} \pm SS$**	**Min**	**Max**	**p**
Body weight (kg)	49.9 ± 8.71	35.5	70	66.3 ± 13.20	40.2	90	76.2 ± 15.98	48	126	0.000*
BMI (kg/m^2)	21.6 ± 4.86	16.6	36.2	28.1 ± 6.37	16.5	38.8	30.4 ± 6.18	21.8	47.4	0.000*
Handgrip (kg)	12.5 ± 6.62	5.2	26.9	19.2 ± 8.77	6.60	41.9	21.6 ± 9.55	6.55	44.3	0.000*
Upper middle arm circumference (cm)	20.8 ± 2.21	17	26	24.9 ± 3.59	18	31	28.4 ± 3.98	21	41	0.000*
Calf circumference (cm)	26.5 ± 3.41	21	32	31.4 ± 3.89	26	38	36.4 ± 4.96	28	52	0.000*

*p<0.05

While the mean BMI of the elderly was 21.6 ± 4.86 kg/m2 in the malnourished group, it was 28.1 ± 6.37 kg/m2 in the under-risk group and 30.4 ± 6.18 kg/m2 in the standard group. According to the malnutrition groups, the difference between the BMI values was statistically significant (p<0.05). This difference is since the BMI values of the malnourished individuals are lower than the BMI values of the other two groups (p<0.05). BMI values of individuals at risk of malnutrition and those with normal nutritional status are similar.

The handgrip strength values of the individuals were determined as 12.5 ± 6.62 kg, with the lowest mean value in the malnourished group. The handgrip strength measurement values of individuals at risk of malnutrition were determined as 19.2 ± 8.77 kg and 21.6 ± 9.55 kg for those in the standard group. The mean handgrip strength of the individuals with malnutrition was statistically significantly lower than the handgrip strength values of the individuals in the other two groups (p<0.05).

Upper middle arm circumference measurements of malnourished individuals were observed as 20.8 ± 2.21 cm, while those at risk of malnutrition were 24.9 ± 3.59 cm, and those in the standard group were 28.4 ± 3.98 cm. Upper middle arm circumference measurements of the individuals in the malnutrition group showed a statistically significant difference compared to the standard group (p<0.05).

While the calf circumference of the elderly individuals with malnutrition was determined as 26.5 ± 3.41 cm, it was defined as 31.4 ± 3.89 cm for those at risk of malnutrition and 36.4 ± 4.96 cm standard nutritional group. In the study, the calf circumference of the individuals with malnutrition was statistically significantly lower than the individuals in the standard nutritional group. In contrast, the calf circumferences of the individuals at risk of malnutrition were at risk and typical. The difference between all groups in terms of calf circumference values was significant ($p<0.05$).

69.2% of individuals with malnutrition and 31.8% of those at risk of malnutrition were severely dependent on daily living activities. 85.4% of the individuals in the standard nutritional group can continue their daily living activities entirely independently. The relationship between individuals' activities of daily living and MNA screening test results is statistically significant ($p<0.05$).

Table 3. Distribution of daily living activities according to MNA screening test results of individuals

Malnutrition Status	**Malnourished**		**At Risk of Malnutrition**		**Normal Nutritional Status**		**Total**		
	S	**%**	**S**	**%**	**S**	**%**	**S**	**%**	**p**
Daily Living Activity									
Severe addict	9	69.2	7	31.8	1	2.4	17	22.4	
Medium dependent	1	7.7	5	22.7	5	12.2	11	14.5	0.000*
Fully Independent	3	23.1	10	45.5	35	85.4	48	63.2	

*p<0.05

Elderly individuals, factors affecting food consumption (loss of appetite, decreased food safety, difficulties in chewing and swallowing, problems in food preparation and cooking, difficulty in consumption, dehydration), gastrointestinal symptoms (nausea, diarrhea, early satiety), and malnutrition in terms of digestion and absorption of nutrients are at risk (Kocaman, 2019). While 17.1% of the elderly individuals in this study were malnourished, 28.9% were at risk of malnutrition (Table 1). In the study of Kaiser et al. (Kaiser et al., 2010) on elderly individuals, it was concluded that 5.8% of the elderly living in the community, 13.8% of the elderly living in nursing homes, and 38.7% of the elderly hospitalized were malnourished. In the study conducted by Kefeli (2020) with 138 people living in a nursing home, when the MNA evaluation

of the elderly individuals was estimated, the risk of malnutrition was found in 26.1% of the individuals and malnutrition in 8%. In the study conducted with the elderly living in three private nursing homes located on the Anatolian Side of Istanbul, it was determined that 63% of the individuals were at risk in terms of malnutrition, and 9.6% were malnutrition (Ekici et al., 2019). It is believed that the wide range of malnutrition rates in studies conducted in nursing homes is due to the differences in the number and characteristics of individuals in each study and the malnutrition determination tools applied.

When the distribution of nutritional status of the elderly according to gender was considered, it was discovered that 10% of men and 30.8% of women had malnutrition, and the difference between genders was statistically significant ($p<0.05$) (Table 1). In a study conducted in Taiwan, 1.7% of men and 2.4% of women were found to have malnutrition, according to the MNA test (Tsai et al., 2008). In the study of Başıbüyük (2017), it was determined that the risk of malnutrition and the prevalence of malnutrition are higher in female elderly compared to male elderly.

It is crucial to determine the individuals' protein and adipose tissue stores by making anthropometric measurements in elderly individuals (Kablan et al., 2020). A calf circumference of less than 31 cm, regardless of gender, associated with functional dependence and body muscle mass in the elderly, is accepted as an indicator of malnutrition (Doğan & Köksal, 2021). In this study, the difference between all groups regarding calf circumference values was significant ($p<0.05$). Borowiak and Kostka (2003) observed that the nutritional status was worse in those with lower BMI and calf circumference, and Drescher (2010) discovered that calf circumference and MNA were associated. In this study, the mean BMI of the elderly was observed as 21.6 ± 4.86 kg/m2 in the malnourished group. In contrast, the mean BMI was determined as 27.93±4.44 kg/m2 in a study conducted with a group of older people living in a nursing home in Kayseri (Soyuer et al., 2012). Cuervo et al. (2009) states that arm circumference can be used in malnutrition screening; low handgrip strength is also considered an indicator of a limited range of motion and low muscle mass (Doğan & Köksal, 2021). When the arm circumference and handgrip strength of the individuals participating in this study were evaluated, the lowest numerical values were determined in the malnourished group. Anthropometric measurements are considered a safe tool in determining malnutrition.

With aging, the level of dependence on others increases to meet the needs of individuals. There is a significant relationship between malnutrition and addiction levels in activities of daily

living (Cereda et al., 2008; Chan et al., 2010). According to MNA, 85.4% of individuals with normal nutritional status continue their daily living activities entirely independently in this study. In contrast, Ekici et al. (2019), in their research on older people living in nursing homes, it was determined that 95% of the elderly who do not have nutritional problems lead their independent lives. Naseer et al. (2016) found that the correlation between malnutrition and activities of daily living was significant, and 8.3% of individuals were dependent on malnutrition in their study with seven years of follow-up. Keskin (2021) observed a moderately statistically significant inverse relationship between malnutrition and activities of daily living ($r=-0.64$; $p<0.05$). Like the literature, in this study, the relationship between activities of daily living and MNA screening test results were statistically significant ($p<0.05$). It is thought that the functional status of the elderly may affect the malnutrition status.

4. Conclusion

17.1% of the individuals participating in the study were malnourished, 28.9% were at risk of malnutrition, and 54% had standard nutrition. It has been determined that the probability of malnutrition is higher in older women who have undergone MNA tests compared to male older people. In this study, a significant relationship was found between malnutrition and anthropometric measurements and activities of daily living. While evaluating the malnutrition status of individuals, anthropometric measurements and evaluation of daily life activities are essential in preventing unhealthy years of individuals.

Conflicts of interest

The authors declare that there are no potential conflicts of interest relevant to this article.

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