Original Article

Relationship between Malnutrition Risks and Functional Abilities of the Elderly in Home Care Services

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Abstract

Background: Malnutrition is an important and common public health problem that is frequently not diagnosed earlier among the elderly living in a home, nursing home, or hospital environment. Nurses can prevent the development of malnutrition and loss of functional ability in the elderly by evaluating malnutrition risks.
Objective: This research aimed to determine the relationship between malnutrition risks and functional abilities of the elderly living in a home environment, while revealing malnutrition risks and other affecting factors.
Methods: This research was planned to be descriptive and correlational, with a total of 288 elderly participants (73.8 ± 7.2) (aged >65 years) being included. Three questionnaires were administered to gather data on demographic characteristics, malnutrition risks and functional abilities.
Result: Upon examination of Mini Nutritional Assessment scores, 47.2% of the participants were found to have malnutrition risks, while 15.6% were identified as malnourished. Age range and education status were found to have an effect on malnutrition risk, whereas gender, socioeconomic status, and loneliness did not. A statistically significant difference was determined between malnutrition risk and functional ability ($X^2 = 143.265$; $p < 0.01$). Additionally, a statistically significant correlation was determined between Mini Nutritional Assessment and Bartel Index scores ($r = 0.613$; $p = 0.000$). Through stepwise multiple linear regression analysis, we determined that having children, cerebrovascular diseases, depression or dementia (including Alzheimer's disease), health problems related to the digestive system, lack of appetite, body mass index, mid-upper arm and calf circumference, and Bartel Index scores significantly affected the Mini Nutritional Assessment scores ($R^2 = 0.781$; $p < 0.01$).
Conclusion: This research revealed that a statistically significant positive correlation exists between malnutrition risks and functional abilities of the elderly living in a home environment, and that improvement in functional ability independence reduces such risks.

Keywords: Home care, Aged, Aged 80 and over, Malnutrition, Risk, Daily life activities.

Introduction

Aging is accompanied by physiological, psychological, social, and economic changes, which determine whether the elderly population may become vulnerable to malnutrition (Chen Scihiling and Lyder, 2001). Malnutrition is an important and common public health problem that is frequently not diagnosed earlier among the elderly living in a home, nursing home, or hospital environment (Rakıcıoglu, 2006). The prevalence of malnutrition ranges from 5.8% to 11.7% among the elderly receiving home care services (Cereda et.al., 2016). The factors that affect malnutrition in the elderly can be classified under three groups, namely *medical factors*, such as the lack of appetite, bad dentition, oral and dental health problems, chewing and swallowing problems due to decreased saliva secretion, sensory losses, systemic diseases due to the changes in the systems, infections, physical disabilities, and multiple drug use and drug interactions; *social and lifestyle factors*, such as age-related social isolation, loneliness, economic problems, and dependence on other people; and

psychological factors, such as confusion, dementia, depression, grief, and anxiety (Hickson, 2006). Malnutrition among the elderly is closely related to pathological cases that lead to autonomy loss, a decrease in the quality of life, an increase in the number of hospital admissions, extended hospitalizations, infections, decubit ulcer development, walking disorders, falls and fractures, and untimely deaths (Landi et.al., 1999, Pearson, Fitzgerald and Nay, 2003, Simon A.R., 2009, Seyhan, 2018). Therefore, routine screening for malnutrition needs to be considered a diagnostic standard for all those involved in the care of elderly individuals.

The Mini Nutritional Assessment (MNA), a rapid and easily applicable tool, has been developed to evaluate the risk of malnutrition in the elderly and identify those who could benefit from early intervention (Guigoz, 2006, Bauer et.al., 2008, Tsai, Ho and Chang 2008). The relationship between functional and nutritional status has been investigated in some studies (Souminen et.al., 2005, Han, Li and Zheng, 2009). Functional competency is evaluated by measuring the patient's ability to fulfill self-care needs and daily life activities (DLA). DLA are self-care activities that need to be performed by individuals daily. The loss of physical ability, which accompanies reduced mobility and difficulties in daily activities, like walking, cooking, and eating, may therefore conversely threaten nutritional status (Volkert, 2011). Malnutrition and the decline in functional ability are two important factors contributing to the loss of independence with increasing age.

Early identification of elderly at malnutrition and malnutrition risk followed by adequate nutritional intervention, is expected to contribute to maintenance of independency. Nurses and the other members of interdisciplinary health care teams play important roles in preventing malnutrition and malnutrition risks in home care settings. The nurse should assess digestive system problems and dental care problems. They screen elderly people in terms of malnutrition risks. Nurses should information about nutrition, nutrition programs and meal plans for elderly. Thus the risk of malnutrition in the elderly is prevented. Besides nurses could provide information community programs that provide home-delivered meals, elderly transportation services that would help their more independent (Pearson, Fitzgerald and Nay, 2003, Chen, Schilling and Lyder, 2007, Baz and Ardahan, 2016, Mangels, 2018).

Aim of The Research

This study aims to elucidate the relationship between malnutrition risks and functional competencies of elderly individuals while revealing malnutrition risks and the other affecting factors.

Method

This descriptive and correlational study (n = 288, participation rate 84%) was conducted on the elderly living in a home environment and receiving home care services that were provided by the municipality of Bornova, a metropolitan district of İzmir Province, Turkey. Home care services, which are provided by the municipality to elderly individuals living in a home environment through nurses and healthcare professionals, are free of charge.

A total of 288 subjects were initially screened, with 54 being excluded for meeting the aforementioned exclusion criteria All study subjects were aged ≥65 years. Exclusion criteria were as follows: being younger than 65 years, being bedridden, both living alone and having mental disorders, or speech and cognitive problems.

A questionnaire was administered to the participants to gather demographic data, such as gender, age, educational level, marital status, perceived socioeconomic status, living status, and chronic diseases. Their malnutrition risks were assessed using the MNA tool. MNA is currently the globally recommended tool for assessing the nutritional status of elderly individuals. It covers diverse topics, such as anthropometry, general status, dietary habits, self-perceived health, and nutritional states through 18 questions grouped into four subcategories (Bauer et.al., 2008, Guigoz,2006). This tool has two versions: the short MNA and full MNA. The current study made use of the full version, which can be filled out in less than 15 min. Each answer has a certain value that contributes to the final score. The maximum value of the final score is 30. Threshold values are ≥24 for well-nourished individuals, 17–23.5 for those under the risk of malnutrition, and <17 for malnourished individuals (Guigoz, 2006).

The Barthel Index (BI) is a scale used to evaluate functional competency. It comprises 10 articles measuring nutrition, mobility, personal hygiene,

ability to fulfill toilet and bathing needs, walking, ascending stairs, grooming, and bladder and bowel control. Each article is scored according to whether the function is fulfilled independently or with the help of others. The maximum score that can be attained from the scale is 100, which means that the person was able to fulfill all functions independently. The total scores vary between 0 and 100 (Mahoney and Barthel, 1965).

Statistical analysis was performed using SPSS Statistics 16, with $p < 0.05$ being considered statistically significant. Numerical and percentage distributions were used for the distribution of descriptive characteristics. Chi-squared tests were used to evaluate categorical data, malnutrition scores, and BI scores. The correlation between malnutrition score and functional ability was evaluated through correlation analysis. Stepwise regression analysis was used to determine the relationship among continuous variables, independent of other factors.

We had received the necessary approval from the Nursing School Ethics Board before conducting our research. The patients gave their informed consent before answering the questionnaires. The study protocol was also approved by the municipality ethics board. No invasive intervention was performed.

Results

The mean age of the subjects was 73.8 ± 7.2 (age range, 65–98) and 69.0% were women. The socio-demographic and descriptive characteristics of study participants are shown in Table 1.

Table 1. Sosyo-demographic charasterictics of study participants

Sosyo-demographic charasterictics		n	(%)	Mean (±SD)
Age (in years)	65-74	165	57.3	73.8 ± 7.2
	75-84	95	33.0	(min 65, max 98)
	85-98	28	9.7	
Gender	Male	89	30.9	
	Female	199	69.1	
Marital status	Currently married	167	58.0	
	Widowed	121	42.0	
Education level	Illiterate	89	30.9	
	Not formally educated	53	18.4	
	Primary school	121	42.0	
	Junior middle school	11	3.8	
	Senior middle school	10	3.5	
	College or over	4	1.4	
PSS	Income < expenses	76	26.4	
	Income = expenses	196	68.0	
	Income > expenses	16	5.6	
Total		**288**	**100.0**	

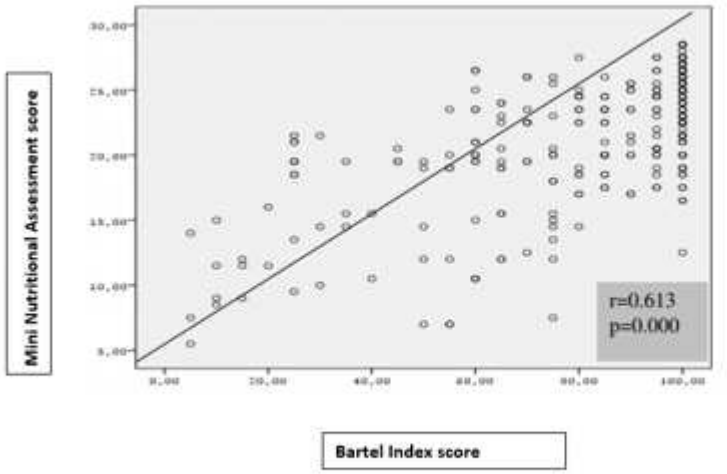

Figure 1. Correlations between malnutrition risks and functional abilities

Table 2. The distribution of the malnutrition risks of elderly people according to their functional competencies

	Malnutrition Score						Total		
	≥24		23.5-17		<17				
	N	%	n	%	n	%	n	%	p value
BI Score									
0-20	-	-	-	-	11	100.0	11	3.8	
21-61	3	6.1	27	55.1	19	38.8	49	17.0	**p=0.000**
62-90	15	19.5	50	64.9	12	15.6	77	26.7	
91-99	16	48.5	17	51.5	-	-	33	11.5	
100	73	61.9	42	35.6	3	2.5	118	41.0	
Total	**107**	**37.2**	**136**	**47.2**	**45**	**15.6**	**288**	**100**	

≥24 : No malnutrition, 23.5-17: Malnutrition risk, <17: Malnutrition

0-20 : Dependent, 21-61: Highly dependent, 62-90: Moderately dependent, 91-99: Slightly dependent, 100: independent, BI: Barthel Index

Table 3. The distribution of the malnutrition risks of elderly people according to their descriptive characteristics

	Malnutrition Score						Total		p value
	≥24		23.5-17		<17				
	N	%	N	%	N	%	n	%	
Age (in years)									
65-74	74	44.8	76	46.1	15	9.1	165	57.3	**p=0.001**
75-84	25	26.3	49	51.6	21	22.1	95	33.0	
85-98	8	28.6	11	39.3	9	32.1	28	9.7	
Education level									
Illiterate	33	37.1	36	40.4	20	22.5	89	30.9	
Not formally educated	26	49.1	19	35.8		15.1	53	18.4	
Primary school	38	31.4	67	55.4	16	13.2	121	42.0	**p=0.005**
Junior middle school	1	9.1	9	81.8	1	9.1	11	3.8	
Senior middle school	8	80.0	2	20.0		-	10	3.5	
College or over	1	25.0	3	75.0		-	4	1.4	
Marital status									
Currently married	63	37.7	78	46.7	26	15.6	167	58.0	**p=0.971**
Widowed	44	36.4	58	47.9	19	15.7	121	42.0	
PSS									
Income < expenses	25	2.9	35	46.1	16	21.1	76	26.4	
Income = expenses	73	7.2	97	49.5	26	13.3	196	68.1	**p=0.193**
Income > expenses	9	56.3	4	25.0	3	18.8	16	5.6	
The Source of Income									
65+ age pension	9	31.0	17	58.6	3	10.3	29	10.1	
Pension	70	39.5	83	46.9	24	13.6	177	61.5	**p=0.302**
No income	88	34.1	36	43.9	8	22.0	82	28.5	
Living Status									
Alone	17	36.2	23	48.9	7	14.9	47	16.3	
Only with spouse	36	36.7	45	45.9	17	17.3	98	34.0	**p=0.977**
With children or caregiver	54	207	68	161.8	21	30.4	143	49.5	

Only 12 (4.2%) participants did not suffer from any chronic medical condition, while others suffered from one to eight medical conditions. The most frequent chronic medical conditions were hypertension (68.4%), heart disease (51.1%), and bone and joint disease (34.3%). Fifty four subjects lived alone and were not requiring any support services.

The prevalence of malnutrition, which corresponded to an MNA score of <17, was 15.6% (n = 45), while almost half of the samples (47.2%; n = 136) were at risk of malnutrition. Forty eight percent of the elderly consumed three meals daily, 50% had two meals daily and consumption pattern varied significantly with nutritional status.

According to the BI score, 41% (n = 118) of the participants were found to be completely functionally independent. The BI score was determined to be significantly lower in the malnourished group than in the other two groups (Table 2). During correlation analysis, a moderately significant positive correlation was found between the malnutrition risks and functional abilities (r = 0.613; p = 0.000) (Table 2). Functional independence increased with increasing malnutrition scores, which meant that malnutrition risk diminished (Figure 1).

Malnourished individuals were found to be

significantly older. No differences with regard to MNA score were found between women and men. In addition, a statistically significant difference was found between malnutrition score and education level. This difference was determined to be specifically attributed to middle school graduates. No differences were found between malnutrition score and gender, marital status, perceived economic status, and lifestyle (Table 3).

Multiple regression tests were undertaken to determine factors that supposedly affected the malnutrition score. The resulting factors were determined to be having a child, cerebrovascular diseases, depression or dementia (including Alzheimer's disease), health problems related to the digestive system, lack of appetite, body mass index, mid-upper arm and calf circumference, and BI scores. According to the regression equation, each of these factors had a significant impact on the malnutrition score. It was determined that these factors contributed to 78.1% of the changes in malnutrition scores ($R^2 = 0.781$; $p < 0.01$).

Discussion

To our knowledge, this is the first report to describe the relationship between malnutrition risks and functional abilities of elderly individuals while revealing malnutrition risks and the other affecting factors in Bornova. In the present study, we found 15.6% of the study participants as malnourished, 47.2% were at risk of malnutrition and the remaning 32.7% were having normal nutritional status. Studies conducted in other parts of Turkey, reported prevelance of malnutrition risks 24.8% and 39.3%, malnutrition 5.4% and 33.1% (Şanlıer and Yabancı, 2006, Çevik et. al., 2014). According to another study conducted in Turkey, determined that 31.0% of the elderly admitted to the geriatric clinic in an ambulatory state were at risk of malnutrition, while 13.0% had malnutrition (Saka et.al., 2010). While in other countries it is reported prevelance of malnutrition risks 35.9% and 16.8%, malnutrition 1.2% and 3.4% (Buffa et.al., 2010, Lee and Tsai, 2012). According to another study conducted in other countries, determined that 32.5% of the elderly were at risk of malnutrition, while 9.1% had malnutrition (Konda et.al., 2018). These data indicate that the importance of screening for elderly people living in the community and institutional care for malnutrition.

The present study suggests that a significant correlation exists between malnutrition risk and functional ability of older adults. We observed that the functional competency of the elderly living under different environmental conditions (home, nursing home, or hospital) can be estimated through the MNA tool (Lee and Tsai, 2012). Castel had found a positive correlation between the malnutrition points and BI scores (OR = 0.26; p = 0.027) (Castel, Shahar and Harman 2006). Cereda et al. stated that the MNA tool was a good indicator of functional competency. In their correlation analysis, they determined a moderately significant positive correlation between malnutrition scores and BI scores (r = 0.55; p < 0.0001). (Cereda, Valzolgher and Pedrolli, 2008). In a research conducted on Taiwanese older adults, Lee et al. stated that it was possible to estimate the future probable functional regression using the MNA tool (Lee and Tsai, 2012). Stuck et al. also suggested that the MNA tool could sufficiently estimate the functional state. This is because the sub-variables of the MNA tool include mobility, cognitive state, independent living, and the ability to use cutlery to feed oneself (Stuck et.al., 1999). An examination of the results of these studies shows that they are consistent with those of the current study. According to the studies, an increase in the dependency of the elderly also increases their risk for malnutrition. Nurses can prevent the development of malnutrition and loss of functional ability in the elderly by evaluating malnutrition risks in those identified as having a decrease in functional abilities.

Şanlıer and Yabancı determined that there is a negative correlation between MNA score and age; age increases, MNA score decreases ($r = -0.10$; $p < 0.05$) (Şanlıer and Yabancı, 2006). Kabir et al. determined a negative correlation between MNA score and advanced age ($p < 0.01$) (Kabir et.al., 2006), while Kagansky et al. indicated that the malnourished elderly were older than non-malnourished ones (Kagansy et.al., 2005). These findings were also consistent with ours. The decrease in the malnutrition score with age can be regarded as an expected result. Different results regarding the relationship between the MNA score and gender can be found in the literature. In contrast with our study, Kabir et al. found a significant negative correlation between MNA score and being female ($p < 0.01$) (Kabir et.al., 2006). After several analyses, the same authors determined that both being elderly and

being a woman led to a 3.0% change in MNA score and concluded that both were socio-demographic indicators related to low MNA score (Kabir et.al., 2006). Buffa et al. determined that malnutrition and the risk thereof were more prevalent in women than in men (Buffa et al., 2010). We believed that there would be a difference in MNA scores because there were more women than men as a result of the longer lifespan of women. However, we did not obtain statistically significant results regarding this issue. Likewise, we believed that the presence of many variables affecting malnutrition could have affected the results of the study. Moreover, we believed that higher education levels may be related to higher income and that the elderly could lead a better life and have better nutrition in such cases. However, MNA score of those who had lower income than expenses were observed to be lower. Furthermore, no statistically significant difference had been found between MNA scores and socioeconomic status of the elderly. It has been suggested that participants may have financial resources that are not readily observable. Besides this, we believed that participants' chronic diseases and their wide use of medication could have had a negative impact on their malnutrition scores. This could also be the reason for their low malnutrition scores despite their good socioeconomic status.

In this study, we had identified the following independent variables that affect malnutrition: having a child, cerebrovascular diseases, depression or dementia (include Alzheimer's disease), health problems related to the digestive system, lack of appetite, body mass index, mid-upper arm and calf circumference, and BI scores. According to the regression equation, all variables had a significant effect on malnutrition score. We determined that 78.1% of the changes in MNA score were attributed to these variables ($R^2 = 0.781$; $p < 0.01$). Chen et al. identified overuse of drugs, being female, low functional state, and high depressive symptoms as variables affecting malnutrition. They also determined that 48.2% of the changes in MNA score were attributed to these variables ($R^2 = 0.48$; $p = 0.001$) (Chen, Schilling, Lyder, 2007). In the study of Kabir et al. the independent variables affecting malnutrition included age, gender, education level, daily expenditure per capita, respiratory problems, gastric problems, pain, sensory problems, and sleep problems (Kabir et.al., 2006). Moreover, Suominen et al. identified functional incompetency, eating less than half of an offered food portion, swallowing difficulty, dementia, and constipation as independent variables affecting malnutrition (Souminen et.al., 2005). Different study models have been observed in the literature.

Conclusion

The overall prevalence of malnutrition among elderly people was found to be 15.6%, but the proportion of elderly people at risk of malnutrition was relatively high (47.2%). In the present study, almost half of the elderly were found to be under the risk of malnutrition. As functional independence increases, malnutrition risks decrease. We determined that changes in malnutrition scores were attributed to having a child, cerebrovascular diseases, depression or dementia (including Alzheimer's disease), health problems related to the digestive system, lack of appetite, body mass index, mid-upper arm and calf circumference, and BI scores.

In conclusion, we recommend the incorporation of malnutrition risk and functional ability tests among routine tests administered to the elderly. Thus, malnutrition risk and functional ability should be evaluated periodically. In addition, nurses have the duty and responsibility to evaluate malnutrition risk and improve the nutritional state the elderly.

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