Nutritional Status of Elderly Patients Visiting Outpatient Clinics

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Abstract: The number of elderly people is growing rapidly which will be followed by various health problems in this population. Nutritional status of elderly whether, obese or malnourished can affect their overall health status. Little is known about the nutritional status of elderly. To assess the nutritional status of elderly patients who are visiting outpatient clinics. Cross- sectional study conducted in Outpatient Clinics at King Abdul-Aziz Medical City between April and December 2013. A total of 363 participants were included (198 men and 165 women) aged 65 years or older. The nutritional status of participants was assessed using body mass index (BMI) and the Mini-Nutritional Assessment (MNA) tool. The prevalence of malnutrition among elderly outpatient was found to be 9.6% and 27.5% were at risk of malnutrition with no difference between male and female. MNA total score was significantly lower with increasing age in both genders. The prevalence of overweight and obesity was 30.9% and 27% respectively. Obesity was significantly higher among females than males. Nutritional problems are highly prevalent among elderly outpatient, reaching 36.6% (obesity = 27%, malnutrition = 9.6%). Therefore, nutritional status of elderly needs to be assessed routinely for prevention, early identification and treatment.

<u>الملخص</u>

الحالة الغذائية للمرضى كبار السن من مراجعي العيادات الخارجية

المقدمة:ينمو عدد الأفراد من فئة كبار السن في المجتمع بشكل مضطرد , مما ينبأ بتزايد المشاكل الصحية لهذه الشريحة من المجتمع.

هدف الدراسة:تهدف الدراسة إلى تقييم الحالة الغذائية للمرضى كبار السن من مراجعي العيادات الخارجية.

طريقة البحث:تمت بواسطة دراسة مقطعية على مستوى العيادات الخارجية بمدينة الملك عبدالعزيز الطبية بالرياض للفترة مابين شهر نيسان إلى كانون الأول لعام 2013ميلادية.حيث ضمت الدراسة مامجموعه 363 مشارك توزعت كالتالي: 198ذكر و 165 أنثى ممن تزيد أعمارهم فوق 65 سنة.قيّمت الحالة الغذائية للمشاركين بواسطة قياس مؤشر كتلة الجسم وإجراء مايُعرف "بتقييم التغذية المصغّر"

النتائج:أظهرت الدراسة أن انتشار سوء التغذية لدى كبار السن من مرتادي العيادات الخارجية بلغت نسبته 9,6% وأن المعرضين لخطر سوء التغذية بلغت نسبتهم 27,5% , بلا فرق في ذلك مابين الذكور والإناث في مجموع النقاط المحرزة في تقييم التغذية المصغّر.

كما تبين أن نموذج التغذية المصغر المختصر يتوافق مع نموذج التغذية المصغر الكامل توافقا عاليا بلغ معامل الإرتباط فيه 0,925 ومستوى الدلالة أقل من 0,001

و اتضح من خلال الدراسة أن علاقة تقييم التغذية بالعمر هي علاقة عكسية أي أنه كلما زاد العمر قل مجموع تقييم التغذية.

في الجهة الأخرى, وصل انتشار زيادة الوزن والسمنة لدى كبار السن مانسبته 30,9% و 27% على التوالي.وبلغت نسبة الإناث من مجموع المصابين بالسمنة 72,4%, وكانت العلاقة مابين السمنة والعمر علاقة عكسية أي أنه كلما قل العمر زادت السمنة.

الخاتمة:بلغت المشاكل الغذائية لدى كبار السن من مرتادي العيادات الخارجية انتشاراً واسعاً بنسبة وصلت إلى36,6%(السمنة27%, سوء التغذية 9.6%).

ولذا ننصح بتقييم الحالة الغذائية للمرضى كبار السن بشكل دوري للوقاية من المشاكل الغذائية والحد من انتشارها.

Key words: Nutritional status, elderly outpatients, MNA, prevalence.

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1. Introduction

One of the main features of the world population in the 20th century has been a considerable increase in number of older people in both developed and developing countries. The number of elderly is expected to increase dramatically because of improved health conditions and standard of living.

In United States, the population of 60 years and above represented 19.7% of the population in 2013, and expected to represent 27% and 32.2% of the population in 2050 and 2100 respectively [1].

In Saudi Arabia, the elderly population represented 3.48% of the population in 2004 and 4.9% in 2013 [1, 2]. The population 60 and over will represent 25.3% of the population in 2050 and it is expected to represent 36.7% of the total population in 2100 [1].

In Saudi Arabia the life expectancy at birth is expected to increase from 74.3 year in 2010 to 81.8 in 2050 [1].

This increase in elderly population will be followed by the emergence of various problems in health care services. For that reasons, population aging has become an important issue that requires urgent actions to be a health policy priority. As the population ages, all physician especially family physicians will be treating an increasing number of elderly patients. A comprehensive health maintenance screening of elderly population is becoming an important task for primary care physician [3].

The growing number of elderly individuals is linked to high costs of treatment that could be reduced by appropriate nutrition oriented care.

It is estimated that 85% of non-institutionalized older persons have one or more chronic conditions that could improve with proper nutrition [4].

Nutritional status of elderly can be defined as followed: under nutrition, normal or obesity [3].

Both aging and obesity contribute to increased health care service use. Consequently, an increase in the proportion of older adults who are obese may compound health care spending [5].

Obesity is a chronic condition characterized by an excess of body fat. It is usually defined by the body mass index (BMI) $\geq$ 30 kg/m^2 [6]. The prevalence of obesity in the elderly is rising. This increase has been attributed to a complex interaction between sedentary lifestyles, dietary changes, and age-associated alterations in the metabolic rate. In older adults, excess weight is associated with a higher prevalence of many chronic health conditions and poorer quality of life. Obese elderly may also have a higher risk of death [7].

On the other hand, malnutrition is another nutritional problem encountered in elderly people due to the difference in the nutritional needs of older persons like decrease in caloric needs about 2% to 5% decline with each decade of life. Also weight gain tapers as humans age with peak weight for men at around 55 years and for women at around 65 years [8].

Malnutrition in the elderly is defined as faulty or inadequate nutritional status; undernourishment characterized by insufficient dietary, poor appetite, muscle wasting and weight loss [9]. The terms malnutrition and undernutrition are used interchangeably.

Etiology of malnutrition in the elderly are: depression, dementia, cancer, gastrointestinal disorder, medication effect, poor intake, TB, DM, unknown factors, etc [10]. Under-nutrition in older persons has been linked with longer hospital stays and greater mortality and up to 71% of older persons requiring hospitalization are believed to be at nutritional risk. Elderly people are particularly at risk of under-nutrition. Poor nutritional status in older people has been linked with more morbidity and mortality [11]. Malnutrition in old age is often not diagnosed properly resulting in failure to meet the nutritional needs of the elderly.

Early detection of nutritional problems in elderly population in outpatient setting results in early intervention which can prevent deterioration, hospitalization and improve quality of life.

Little is known about the prevalence of nutritional problems in elderly people visiting outpatient clinics in Saudi Arabia.

1.1 Aim of the Study

The aim of this study is to assess the nutritional status of Saudi elderly people attending outpatient clinics.

1.2 Specific Objectives

(1) To evaluate the prevalence of obesity among elderly outpatients.

(2) To evaluate the prevalence of malnutrition among elderly outpatients using the Mini Nutritional Assessment (MNA) tool.

1.3 Secondary Objectives

(1) To assess the association between malnutrition and neuropsychological problems.

(2) To compare the short MNA form to the full MNA form in outpatient setting.

2. Literature Review

In the Netherlands, a study conducted recently by Van Bokhorst-de Van der Schueren M. A. et al. [13] describes the nutritional status and its clinical correlates of independently living older individuals visiting a geriatric outpatient department. They included 448 consecutive patients at their first visit to a geriatric outpatient clinic of a large teaching hospital in the Netherlands. Nutritional status was assessed with the Mini-Nutritional Assessment tool MNA. Malnutrition was highly prevalent among study population, 17% were malnourished and 58% were at risk of malnutrition [12].

In Nigeria, L.A. Adebusoye et al. [14] assessed the nutritional status of elderly patients aged 60 year and older who presented to primary care clinic including 500 patients between September and December 2009. The prevalence of nutritional problems was 61.9%. Under-nutrition 7.8% and overweight was 54.1% [13].

In Turkey, B. Saka et al. [15] evaluated the malnutrition in 413 elderly patients aged 65 and above who visited the outpatient clinic. They found that 13% were malnourished, 31% were at risk of malnutrition and 23% were obese BMI ≥ 30kg/m² [14].

In Sweden, HLundin et al. conducted a cohort study of 351 free living elder women for evaluating the nutritional status. They found 8% of study population at risk of malnutrition and those at risk of malnutrition more than twice as likely to die (HR 2.36 CI 1.25-4.46) [15].

Kucukerdonmez et al. [17] assessed the nutritional status of 1,564 free living elders in Ankara. Using MNA score, 7.8% were malnourished and 76% were at risk of malnutrition. Using BMI, 17.4%, 47.1% were obese and overweight respectively [16].

Dela Montana J. et al. evaluated the nutritional status of 728 free living elder people in Spain. They found 12.5% were malnourished and 57.5% were at risk of malnutrition [17].

M. Cuervo et al. [19] evaluated the nutritional status of 22,007 Spanish community dwelling elders through MNA. 4.3% were malnourished and 25.5% were at risk of malnutrition. 25.5% of men were obese and 33% of female were obese [18].

D. Volkert et al. [20] assessed the under nutrition in 205 geriatric patients admitted to the hospital in Germany. Using MNA, 30.2% were malnourished and 60% were at risk of malnutrition [19].

In Saudi Arabia, Al Hamden et al. assessed the nutritional status of 85 elderly patients upon admission to the hospital. They found that 36.5% were malnourished and 35.3% were obese [4].

M. A. Elmadbouly et al. [21] assessed the nutritional status of 102 hospitalized elderly patients aged 60 year and older in Makah governorate using the MNA score, 22.6% were classified as malnourished, 57.8% were at risk of malnutrition and 19.6% were well nourished [20].

3. Materials and Methods

3.1 Study Design

Cross sectional design.

3.2 Study Setting

The study was conducted in Outpatient Clinics at King Fahad Hospital, Ministry of National Guard-Health Affairs, Riyadh between April and December 2013.

3.3 Study Population

All elderly patients aged 65 year or older visiting outpatient clinic.

3.4 Exclusion Criteria

Patients diagnosed with malignancy.
Patients admitted to hospital during the last month.
Patients not living independently at home.

3.5 Sample Size

Based on prevalence of malnutrition of 7.8% in older persons presenting at the General Outpatients Department clinic of university college hospital in Nigeria. we estimate an adjusted sample size of 380 derived from single proportion of $10\% \pm 3\%$ (margin of error) and 95% CI.

3.6 Sampling Technique

Convenient sampling to select 380 elderly patients visiting outpatient clinics was presented with inclusion criteria. Every Nth subject arrive the clinic will be screened for eligibility. N = computer generated random number between 1-5 generated on the day of subject selection.

3.7 Study Variables

The data collection questionnaire covered the following variables:
• Demographic characteristics.
• Anthropometric variables: weight, height, BMI, history of weight loss, mid-arm and calf circumference.
• General assessment variables: living situation, number of medications, mobility, skin ulcer and neuropsychological problems (dementia and depression).
• Dietary assessment variables: number of meals,

food and fluid intake and autonomy of feeding.
• Subjective assessment variables: self-perception of health and nutritional status.

3.8 Data Collection Methods, Instruments Used and Measurement

Elderly patients aged 65 years or older who presented to ambulatory care at King Fahad Hospital in King Abdul-Aziz Medical City, Riyadh National Guard between April and December 2013 were asked to participate in this study. Participants enrolled in the study were 363 after excluding 17 participants for incomplete data, not living independently at home or having malignant disease.

Nutritional status of the participants was assessed by calculating body mass index (BMI) and performing the Mini Nutritional Assessment (MNA).

BMI is a simple index of weight for height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m²) [21].

The MNA is a widely used international questionnaire to evaluate the nutritional status of elderly individuals. It is recommended by many organizations like the European Society for Clinical Nutrition and Metabolism (ESPEN) and American Medical Directors Association [22, 23].

The MNA is well validated tool with high sensitivity (96%), specificity (98%) and positive predictive value (97%) [24].

It has been translated into numerous languages and used in countries around the world [24].

It closely correlates with biochemical and anthropometric markers that was verified by a number of clinical studies on geriatric patients on many clinical setting like outpatient clinics, nursing homes and hospitals [25].

The MNA consists of 18 questions clustered in four domains: anthropometric assessment (BMI, history of weight loss, arm and calf circumference), general

assessment (lifestyle, medication, mobility, history of depression and dementia), dietary assessment (number of meals, food and fluid intake and autonomy of feeding) and subjective assessment (self-perception of health and nutrition).

Each question has a weighted point that contributes to the total score which is 30 points as maximum.

The participants were classified based on the total score to the following:

Well nourished (24-30 points), at risk of malnutrition (17-23.5 points) and malnourished (< 17 points).

Nurses and nurse interns were recruited for collecting data. All of them received training session about how to interview patient and how to complete the MNA questionnaire and were giving a booklet guide about using the MNA. The following points were considered while interviewing participants by the nurses: patients who were unable to be taken their weight or height were excluded; bedsores were examined by the nurse and for the patients who have cognitive impairment the consent and interview were done by their caregivers.

Measurement of height was taken by stadiometer after asking participants to remove their shoes and to stand up straight with head upright. The height was recorded to the nearest centimeter.

Measurement of weight was taken by electronic scale after asking patient to remove their shoes and their heavy clothes like jacket. Body mass index BMI was calculated by dividing the weight in kilograms by the square of height in meter. Measurement of mid arm circumference was done by taking the mid-point between acromion and olecranon and was recorded to the nearest 0.1 cm. Measurement of calf circumference was taken by wrapping an extensible tape measure around the calf at the widest part wile patient is standing with their weight distributed on both feet and measurement was recorded to nearest 0.1 cm.

3.9 Data Management and Statistical Analysis

The questionnaires were numbered serially, data entering and analysis were performed with statistical analyses (SPSS) version 20 for windows.

Results were expressed as mean ± SD and in number and percentage. Descriptive statistics were used to describe socio-demographic, dietary assessment and anthropometric variables. *T*-test was used to assess differences between male and female on MNA score. Pearson correlation was used to explore relationship between age, BMI and MNA score. Differences with $P < 0.05$ were considered significant.

3.10 Ethical Consideration

The study was approved by the retrospective research sub-committee and the ethical institutional review board IRB committee in King Abdullah International Medical Research Centre (KAIMRC).

All participants gave informed consent prior to participating in the study.

Participants were informed that all data will be confidential and will be used for research purpose only.

3.11 Funding Source

This research was funded by King Abdullah International Medical Research Center KAIMRC.

4. Results

A total of 363 participants were included in the study after excluding 17 participants because of incomplete data. Mean age ± SD of the total population (n = 363) was 74.23 ± 7.8 (range 65-97) distributed as 198 male (54.5%) and 165 female (45.5%). The mean weight was 70.6 kg ± 12.8 and their mean height was 162.7 cm ± 8.4, resulting in mean ± SD of BMI 26.8 kg/m² ± 5.2 (ranging between 16.2-55.5). The mean ± SD of MNA score of participants was 23.3 ± 5.2 (ranging between 3.5-30). There was no significant difference between male and female on MNA score. Mean of MNA on male was 23.4 ± 4.9 and on female was 23.2 ± 5.5, t = -0.27, *P* = 0.79 (Table 1).

Table 1   Descriptive characteristics of the elderly participants in study (n = 363).

Characteristics	Range	Mean ± SD of total	Mean of women	Mean of men	T-test P-value
Age (years)	65-97	74.23 ± 7.8	74.7	73.8	1.04 0.29
Weight (kg)	39-151	70.6 ± 12.8	69.2	71.8	-1.93 0.55
Height (cm)	132-180	162.7 ± 8.4	155.9	168.3	-19.8 < 0.01
BMI (kg/m²)	16.2-55.5	26.8 ± 5.2	28.5	25.4	5.93 < 0.01
MNA total Score	3.5-30	23.3 ± 5.2	23.2	23.4	-0.27 0.79

MNA, Mini Nutritional Assessment.

Table 2   The Mini Nutritional Assessment score, number and percentages among elderly outpatients.

MNA Categories	MNA Score	n	%
Well-Nourished MNA > 24 points	26.5 ± 1.5	228	62.9
At risk of malnutrition MNA 17-23.5 points	20.3 ± 1.9	100	27.5
Malnourished < 17 points	11.14 ± 3.7	35	9.6

Table 3   Age and anthropometric characteristics in the three categories of MNA.

Characteristics	Mean ± SD			F Statistic	P-value
	Normal (n = 228)	At risk (n = 100)	Malnourished (n = 35)		
Age	72.2 ± 6.7	75.02 ± 7.2	85.2 ± 7.4	53.9	< 0.01
Weight	74.8 ± 11.6	67.1 ± 10.9	53.8 ± 7.7	60.6	< 0.01
Height	162.6 ± 8.6	163.1 ± 8.5	161.9 ± 7.9	0.264	0.768
BMI	28.4 ± 4.9	25.3 ± 4.4	20.5 ± 2.3	51.9	< 0.01

Table 4   Body mass index of elderly outpatients.

BMI (kg/m²)	No	%
< 18.5	6	1.7
18.5-24.9	147	40.5
25-29.9	112	30.9
≥ 30	98	27

In this population of elderly outpatients, 9.6% were malnourished (MNA < 17), and 27.5% were at risk of malnutrition (MNA 17-23.5), and 62.8% were well-nourished (MNA 24-30) (Table 2).

The mean of age was found to be higher significantly in the malnourished participants (mean 85.2 ± 7.4 yrs) (F = 53.9, P < 0.01). The mean of weight and BMI were significantly lower in the malnourished people. There was no significant difference in height between MNA categories (Table 3).

Based on WHO categorization of BMI [26], it was found that 1.7%, 40.5%, 30.9% and 27% of the participants were underweight, normal weight, overweight and obese respectively (Table 4).

The prevalence of obesity in this study population was 27% (98 participants). Obesity (BMI ≥ 30) was most prevalent in age group 65-69 and 70-79 and less prevalent in those aged 80 years and older. None of the obese participants were found to have under nutrition by MNA tool (Table 5).

There was a negative statistical association between age and BMI (r = -0.22, P < 0.01) (Fig. 1).

Obesity was significantly higher among females than males (72.4% vs. 27.6%) (x^2 = 39.5, P < 0.01). Obese participants have significant higher MNA score (mean 25.8, SD 2.5) than to non-obese participants (mean 22.4, SD 5.6), (t 6.22, P < 0.01). The mean MNA score was found to increase significantly with the BMI from 5.58 ± 2.05 in those who were underweight through 21.24 ± 5.6 in those with normal BMI to 25.8 ± 2.5 in those who were obese (F = 63.1, P < 0.01).

Correlation analysis (Pearson's) showed a positive linear association between BMI and MNA score (r =

0.49, $P < 0.01$) (Fig. 2).

It was observed that age was negatively associated with total MNA score ($r = -0.49$, $P < 0.01$) (Fig. 3).

BMI and age were forced into multiple regression equations as predictors of MNA score. The regression model was strongly correlated with MNA score, $R = 0.63$. The regression model predicted 40% ($R^2 = 0.4$) of the variation in MNA score. The regression equation obtained from the model was as follows:

$$MNA = 32.45 + (-0.27 \times age) + (0.4 \times BMI).$$

Table 5   Characteristics of study population according to MNA categories.

| Socio-demographic | No | Malnutrition Indicator Score | | | | | | Chi square *P*-value |
		Normal (n = 228)		At risk (n = 100)		Malnourished (n = 35)		
		No	%	No	%	No	%	
Gender								
Female	173	107	64.8	42	25.5	16	9.7	0.68 0.71
Male	212	121	61.1	58	29.3	19	9.6	
Age group								
65-69	142	109	76.8	28	19.7	5	3.5	45.2 < 0.01
70-79	132	83	62.9	41	31.1	8	6.1	
≥ 80	89	36	40.4	31	34.8	22	24.7	
BMI groups								
< 18.5	6	0	0	0	0	6	100	112.5 < 0.01
18.5-24.9	147	64	43.5	56	38.1	27	18.4	
25- < 30	112	82	73.2	28	25	2	1.8	
30+	98	82	83.7	16	16.3	0	0	
BMI in two groups								
< 30	265	146	55.1	84	31.7	35	13.2	28.3 < 0.01
30+	98	82	83.7	16	16.3	0	0	
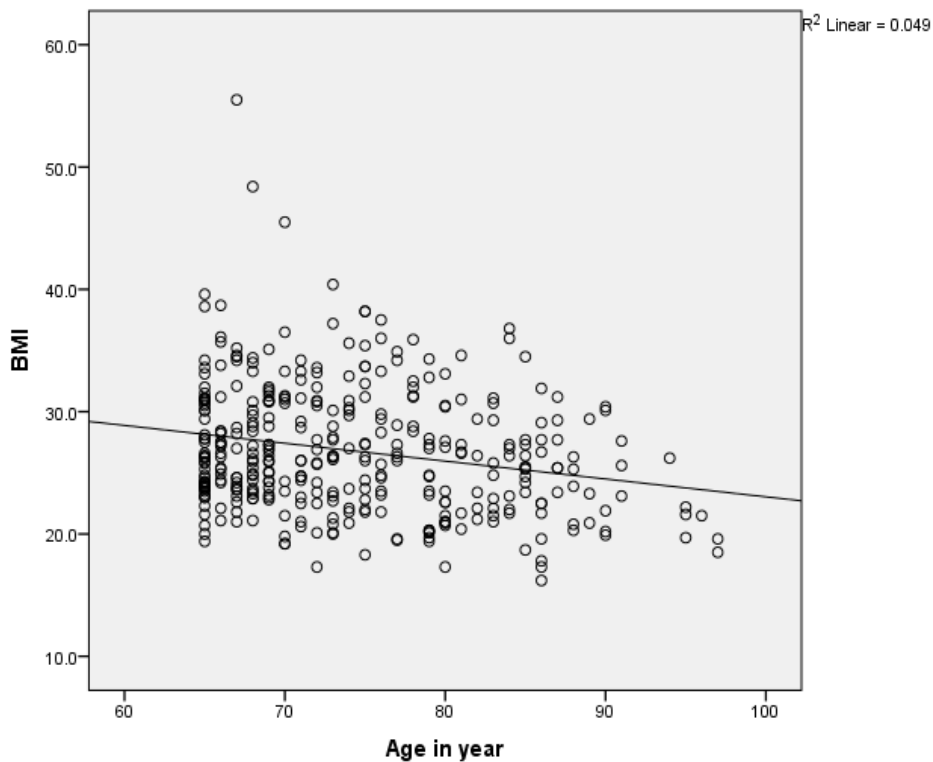
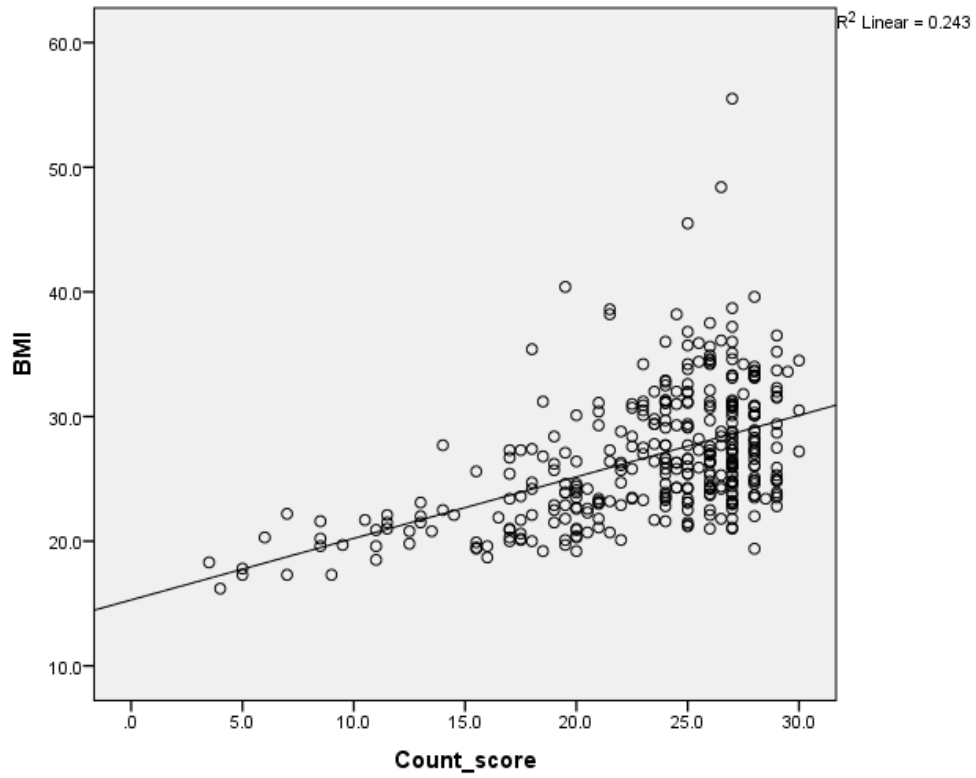**Fig. 1   Relation between age and BMI in elderly outpatients.**

Fig. 2   Relation between MNA score and BMI in elderly outpatients.
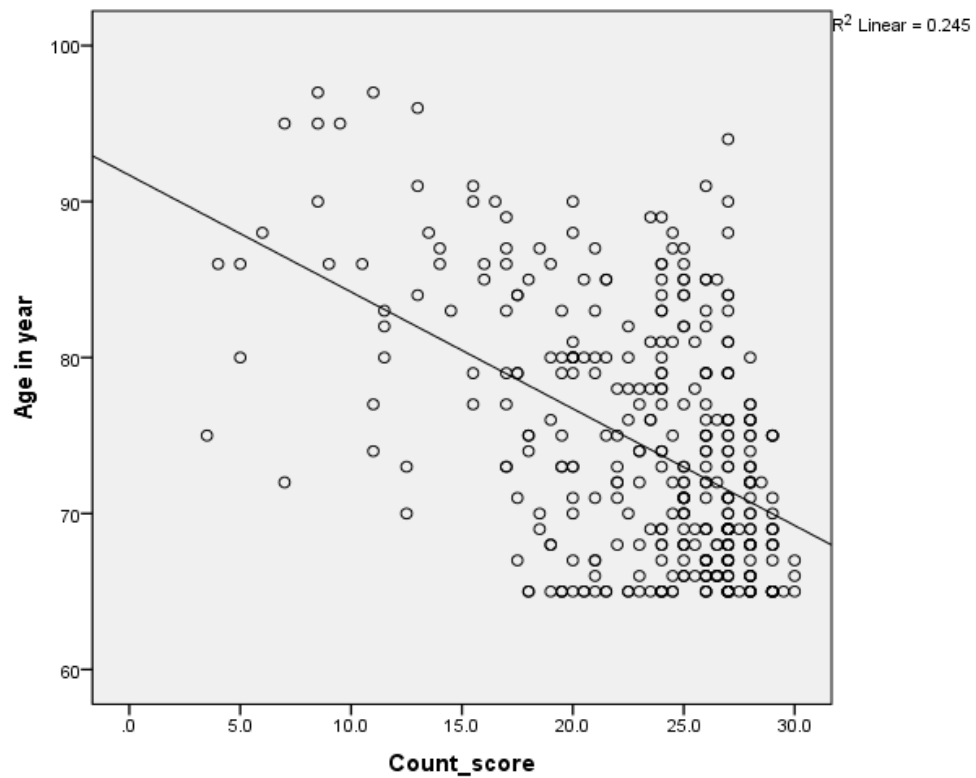

Fig. 3   Relation between MNA score and age in elderly outpatient.

Table 6   Multiple regression of MNA predictors in elderly Outpatients.

	B	SE	t test	sig
constant	32.4	2.6	12.7	< 0.01
Age	-0.27	0.28	-9.7	< 0.01
BMI	0.4	0.04	9.6	< 0.01

SE standard error, BMI Body Mass Index.

Table 7   Dietary assessment of elderly outpatients.

Item	No	%
Dietary assessment		
Number of full meals/day		
1 meal	7	1.9
2 meals	81	22.3
3 meals	275	75.8
Eat dairy products everyday		
Yes	314	86.5
No	49	13.5
Eat legumes or eggs everyday		
Yes	281	77.4
No	82	22.6
Eat meat, fish or poultry everyday		
Yes	317	87.3
No	46	12.7
Eat ≥ 2 servings of fruit or vegetables per day		
Yes	181	49.9
No	182	50.1
Daily fluid consumption (cups/day)		
< 3	34	9.4
3-5	49	13.5
> 5	280	77.1
Mode of feeding		
Need assistance	12	3.3
Self-fed with difficulty	24	6.6
Self-fed without difficulty	327	90.1
Decline in food intake over the past 3 months		
Severe	17	4.7
Moderate	93	25.6
None	253	69.7

Table 7 presents the dietary assessment section of the MNA, A 275 participants (75.8%) were found to eat three full meals per day, 81 participants (22.3%) eat two full meals per day and 7 participants (1.9%) eat only one meal daily. 314 participants (86.5%) eat dairy products every day and 317 participants (87.3%) eat meat, fish or poultry every day. Only 49.9% of participants eat two or more servings of fruit or vegetables per day. Twelve participants (3.3%) said that they required assistant while eating, 24 participants (6.6%) said that they fed themselves but with some difficulties, and 327 (90.1%) participants said that they fed themselves without difficulty. Seventeen participants (4.7%) experienced a decline in the food intake over the last 3 months due to loss of appetite, digestive problems, chewing or swallowing problems. Only 34 participants (9.4%) stated that they were consuming fluid less than 3 cups a day.

Table 8 presents the general assessment part of the MNA. It shows that 305 participants (84%) take > 3

prescription of drug per day. Also it was shown that 92 participants (25%) have dementia or depression and they have lower MNA score (mean 18, SD 6.4) compared to those with no dementia (mean 23.8, SD 4.7) (T = 6.22, $P < 0.01$).

Table 9 presents the anthropometric part of the MNA which shows that 22 participants (6.1%) lost > 3 kg in the last 3 months. and 36 participants (9.9%) viewed themselves as malnourished.

The pearson's correlation analysis highlighted the questions in the MNA which were the most predictive to the total score. Self-view of nutritional status, mid arm circumference and weight loss during the last 3 months were the predictive to MNA total score with correlation coefficient R 0.739, 0.64, 0.63 respectively (Table 10).

The MNA short form was strongly correlated with total MNA score (r = 0.925, $P < 0.01$).

5. Discussion

The present study among 363 elderly outpatients was conducted to assess the nutritional status of being obese, overweight, malnourished or at risk of malnutrition using BMI index and the Mini Nutritional Assessment tool (MNA). Most of the studies on the nutritional status have been focused on hospitalized or institutionalized elderly people. This is one of the first studies in Saudi Arabia describing the nutritional status of elderly patients presenting in ambulatory care clinics (outpatient setting).

Assessment of nutritional status at Outpatient setting allows us to intervene earlier and to improve patient prognosis [27].

Body mass index is a simple index of weight for height which is frequently used for assessment of nutritional status. Among our study population, 30.9%, 27% were overweight and obese respectively. Similar results were reported by L.A Adebusoye et al. [13] who found a prevalence of 51.4% of being overweight and obese.

B. Saka et al. [14] found the prevalence of obesity to be 23% while M. Cuervo et al. [18] reported 43%, 30.2% prevalence of overweight and obesity among community Spanish elders.

Table 8   General assessment variables of elderly outpatients.

Item	No	%
General assessment variables		
Live independently		
Yes	363	100
No	0	0
Take > 3 prescription drugs per day		
Yes	305	84
No	58	16
Pressure sore or skin ulcer		
Yes	29	8
No	334	92
Mobility		
Bed or chair bound	40	11
Get out of bed or chair but doesn't go out	58	16
Goes out	265	73
Psychological stress or acute disease		
Yes	71	19.6
No	292	80.4
Neuropsychological problems		
Severe dementia or depression	23	6.3
Mild dementia	69	19
none	271	74.4

Table 9 Anthropometric assessment of elderly outpatients.

Item	No	%
Anthropometric assessment		
Body mass index (BMI kg/m²)		
< 19	10	2.8
19- < 21	34	9.4
21- < 23	41	11.3
≥ 23	278	76.6
Mid-arm circumference(cm)		
< 21	18	5
21-22	33	9
> 22	312	86
Calf circumference(cm)		
< 31	52	14.3
≥ 31	311	85.7
Weight loss during the last 3 months		
> 3kg	22	6.1
1-3kg	85	23.4
does not know	32	8.8
no weight loss	224	61.7
Self-assessment		
Self-view of nutritional status		
Malnourished	36	9.9
Uncertain	86	23.7
No nutritional problem	241	66.4
Patient consider his/her health status		
Not as good	160	44.1
Does not know	19	5.2
As good	147	40.5
better	37	10.2

Table 10 Pearson correlation between total MNA score and MNA questions.

Variables	R*	P-value
Self view of nutritional status	0.74	< 0.01
Mid-arm circumference(cm)	0.64	< 0.01
Weight loss during the last 3 months	0.63	< 0.01
Calf circumference (cm)	0.52	< 0.01
Self view of his/her health status	0.47	< 0.01
Daily fluid consumption	0.42	< 0.01

* Correlation coefficient.

The increase of obesity in elderly can be attributed to a complex interaction between sedentary lifestyles, dietary changes, and age-associated alterations in the metabolic rate [7].

Women were found to be more obese than men as confirmed in this study which shows that more than two thirds of obese were women. Similarly, L.A Adebusoye et al. [13] study reported 55.9% of obese were female. The higher rates of obesity among female might be related to inactivity and hormonal changes like loss of estrogen [13].

The prevalence of malnutrition among participants in this study was 9.6% and 27.5% were at risk of malnutrition.

Using similar tool L.A Adebusoye et al. [13] reported a prevalence of 7.8% of malnutrition among older Nigerians, however the previous study was conducted among patients in primary care clinic who are expected to be healthier than our study population and the patients included were younger, 60 year or older with mean age of 66.7 ± 6.6 while in our study mean age was 74.2 ± 7.8 and the participants had to be 65 years of age or older.

While, B. saka et al. [14] reported a prevalence of 13% of malnutrition and 31% risk of malnutrition among Turkish elderly outpatient.

Van Bokhorst-de van der Schueren M. A. et al. [12] reported a higher prevalence of 17% of malnutrition among Dutch elderly outpatient. This could be attributed to relatively unhealthy patients included in the study like patients with malignant disease while in our study patient with malignancy were excluded and also the study participants were older with mean age of 80 ± 7 while in our study the mean age was 74.2 ± 7.

Both depression and dementia have been shown to contribute to unintentional weight loss in older adults [28]. Depressive symptoms were identified as independent determinants for malnutrition. Lack of appetite, loss of interest, apathy and physical weakness can explain the association between malnutrition and depression [12]. In this study, 25% of participants reported to have dementia or depression. They were significantly correlated with malnutrition. Similar results were shown with M. cuervo study [18] which reported 24.1% of participants to have dementia or depression. Also Elmadbouly and his colleagues [20] reported similar results of 25.4% of participants to have dementia or depression.

However, these results for dementia and depression prevalence may be not accurate because it was based on subjective answer of participants or their relatives on MNA questions about having dementia and depression or not, these figures were not based on

formal screening tool for depression and dementia. Also, the correlation of dementia and depression with malnutrition could be confounded by impairment in activities of daily living.

Unintentional weight loss can lead to functional decline in activities of daily living, increased morbidity, increased risk of hip fracture in women, and increased overall mortality [28]. In the current study, it was found that 6.1% of study participants lost > 3 kg in the last 3 months and this was highly correlated with malnutrition status. Similar results were shown in M. curvo study [18].

Polypharmacy which is the use of multiple medications or the administration of more medication than clinically indicated is common in older person. Elderly people often have comorbidities that required multiple medications. Among older adults, 30% of hospital admissions and many preventable problems such as falls and confusions are believed to be related to adverse drug effects [29]. In addition, polypharmacy has been shown to interfere with taste and causes anorexia [28].

Our study shows that 84% of elderly participants take > 3 drugs per day. Similar results reported in Al Hamden study [4] which showed that 82.3% of participants use > 3 drugs per day. But inconsistent results reported by M. Curvo study [18] stated that 57.1% of participants use >3 drugs per day.

Diets high in fruits and vegetables may be protective for heart disease and cancer. The American Cancer Society recommends at least five servings of fruits and vegetables daily [30, 31].

In this study, it has been shown that only 49.9% of participants consume two or more servings of fruits or vegetables per day, in contrast to M. curvo study [18] which was 83.2%.

Since dairy products are an excellent source of calcium, it is not advised to reduce or eliminate consumption of these products especially in women and older adults who have the greatest risk for low calcium intake [31]. The current study showed that

86.5% of participants consume at least one serving of dairy products per day in consistence with M. cuervo study [18] which reported 90.3% and Elmadbouly study [20] which reported 85.3%.

Dehydration is common in elderly and it is probably predisposed by age related changes in total body water, thirst perception, renal concentration ability and vasopressin effectiveness [32]. Our study revealed that only 9.4% of participants consumed less than 3 cups per day, different from that reported by M Cuervo and his colleagues [18] which was 18.5%. The short MNA strongly correlated with Full MNA ($r = 0.925$), closer to the one obtained in the development of short MNA by Rubenstein L. Z. et al. [33] which was ($r = 0.94$).

6. Limitations

The study was conducted in outpatient clinics of King Fahad Hospital, so the results might not be applicable to primary care patients.

Data collection was dependent on the reporting of patients or their caregivers which could have led to both under and over reporting of neuropsychological problems, number of medication and dietary habits.

Only those who were able to stand for height and weight measurement were included.

Our study design was cross sectional which limits conclusion of associations and causality.

7. Conclusions

This study indicated that nutritional problems are highly prevalent among elderly outpatient, reaching 36.6%. BMI showed that 27% of elderly outpatients were obese (BMI ≥ 30) especially female and younger elderly. In the other hand, MNA tool revealed that 9.6% were malnourished. Malnutrition increases with age with no difference between male and female. Using MNA in short and full form showed excellent agreement between each other. Self-view of nutritional status, mid-arm circumference and weight loss during the last 3 months were better correlated with the total MNA score.

8. Recommendations

It is necessary to implement policies and strategies for prevention, early identification and treatment of nutritional problems in elderly.

The prevalence of obesity is high especially among female elders and need to be routinely assessed.

The prevalence of malnutrition in elderly is concerning and the study indicated the importance and the applicability of performing MNA test on elderly outpatient as the short MNA is correlated with full MNA.

The importance of early identification of depression and dementia in elderly people is as they are associated with malnutrition.

Further research in assessment of nutritional status of elderly people in ambulatory and primary care is needed.

Dedication

To my mother, father, wife and son who supported me while working on this study.

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