Original Article

Screening of malnutrition and its correlates among a sample of rural elderly in Qalyobeya Governorate, Egypt

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ABSTRACT

Background: Malnutrition is a multifactorial problem that contributes to many health problems, as a cause or as a consequence. In elderly, it is a major health problem as it leads to progressive decline in physical and cognitive health, increased utilization of health services, and increased mortality.

Aim: To screen the elderly persons for malnutrition and to detect the underlying factors of this problem.

Materials and Methods: A cross-sectional study was conducted on 320 elderly persons. A structured interview questionnaire sheet was used. It included sociodemographic data; anthropometric measurement; the Mini-Nutritional Assessment-Short Form in its Arabic version; and physical, psychosocial, and cognitive risk factors of malnutrition.

Results: Overall, 35% of the participants were malnourished and 38.4% were at risk of malnutrition. There were significant associations between malnutrition or being at risk of malnutrition and all the studied sociodemographic characteristics (*P<0.05*) except tobacco smoking (*P=0.39*). Moreover, significant association (*P<0.05*) was detected between malnutrition and lack of physical exercise, oral and gastrointestinal tract problems, chronic pain, physical dependency, number of chronic diseases, and number of drugs taken regularly. Social isolation, insomnia, special senses problems, and depression were the significant psychosocial and cognitive risk factors.

Conclusion: Malnutrition or being at risk of malnutrition is prevalent among the rural elderly persons in Qalyobeya Governorate. The underlying factors were sociodemographic factors, lack of physical exercise, morbidities, and some psychological and cognitive factors. It is recommended that nutritional assessment should be included in any designed geriatric healthcare and health appraisal for the elderly.

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Key Words: Malnutrition, rural elderly, screening, underlying factors.

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INTRODUCTION

Health of the elderly has become a public health challenge globally, as there is an increasing share of older persons in the population, which is the most important social transformation of the 21st century. Moreover, aging is accompanied by many health problems and disabilities[1,2].

Two-thirds of the world's older persons live in the developing regions, and their numbers are growing faster than in the developed ones[3]. Developing countries face many challenges such as less developed health sector, limited resources, and social, political, and economic problems that make it difficult for these countries to deal with that emerging demographic transition of population aging and its accompanied problems[4,5].

Egypt is a large middle-east country that exists in the stage 2 of the demographic transition model with high life expectancy[6]. It has the highest percentage of elderly among Arab world (7.2%), and this proportion is expected to increase to 9.9% in 2030 and 15.3% in 2050[2,7].

The increasing number of elderly population in Egypt and other developing countries is accompanied by many problems, such as inadequate healthcare, inadequate pension, poverty, polypharmacy, and inadequate health insurance coverage. The elderly finance most of their healthcare consumption through out-of-pocket expenses[8]. All these factors make their expenditure on nutrition very low and expose them to different malnutrition disorders[9].

Malnutrition is defined as deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients[10]. In elderly, it is a major health problem which leads to progressive decline in health, reduced physical and cognitive functional status, increased utilization of health services, and increased mortality. It is a multifactorial

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problem that contributes to many health problems, as a cause or a consequence[11,12].

Studies conducted in Egypt in 2012 and 2013 revealed that malnutrition prevalence among elderly was 14.5 and 38.3%, respectively[9,13] but it is expected that severe economic problems facing Egypt may further aggravate the problem than that reported in the previous studies. The objectives of this work were to screen the elderly persons for malnutrition in Qalyobeya Governorate, Egypt, and to identify the underlying factors of this problem.

MATERIALS AND METHODS

Study design, sampling, and participants

This population-based cross-sectional study was conducted in a purposively selected village in Qalyobeya Governorate, Egypt. The collection of data was carried out over a period of 4 months (from the beginning of August 2016 till the end of November 2016). Cluster random sample technique was used, where the village was divided into five squares; A, B, C, D, and E (each square is defined by specific boundaries according to the plan followed during polio campaigns); from these, three squares were chosen by simple random sampling: B, D and E squares. All elderly individuals (60 years and above) were the target population. Elderly experiencing acute physical conditions; those with mental conditions such as dementia, wandering, and psychotic disorders; or those who had recent surgeries were excluded.

Sample size

MedCalc software version 16.1 (1993-2016; MedCalc Software, Mariakerke, Belgium) was used to calculate the least required sample size at 0.05 α error and power of 0.8. Based on the prevalence of malnutrition among elderly obtained from a previous study in Lebanon[5], the minimal required sample was 244. In this work, the number of the elderly fulfilling the inclusion criteria and accepting to participate was 320.

Data collection tools

The participants were interviewed in their homes using a structured interview questionnaire sheet containing five sections:

(1) The sociodemographic data of the participants including social class according to El-Gilany *et al.*[14].

(2) Anthropometric measurements: weight was measured by electronic digital scale to the nearest 0.1 kg, in light indoor clothes without shoes. Height was measured in the standing position to the nearest 0.1 cm. BMI was calculated as weight (kg)/height (m^2). Reliable measurement of height in the elderly might be difficult because of vertebral compression, loss of muscle tone, and postural changes. In these cases, calf circumference (CC) was measured instead to the nearest 0.1 cm and obtained at the most prominent point of the calf[15]. BMI in elderly was classified according to Mini-Nutritional Assessment-Short Form (MNA-SF)[16] into four categories: less than 19 (severe malnutrition), 19 to less than 21 (moderate malnutrition), 21 to less than 23 (mild malnutrition), and of at least 23 (no malnutrition). It is a functional classification where higher BMI in elderly is associated with better functional status even in BMIs (≥30 kg/m^2)[17].

(3) MNA-SF: nutritional status was assessed using MNA-SF in its Arabic version[16]. MNA is the most widespread nutritional assessment tool among the elderly population[18]. It includes six questions with total maximum score of 14 points; accordingly, patients were classified into three categories: malnourished (score 0–7), at risk of malnutrition (score 8–11), and normal nutritional status (score 12–14).

(4) Physical health-related risk factors of malnutrition: physical exercise was assessed by the duration of exercise (excluding housework) and its frequency being 'daily', 'occasionally', or 'never'. Oral problems (dental prosthesis and partial or total loss of teeth), gastrointestinal tract (GIT) problems (difficult swallowing, stomach problems, and maldigestion/malabsorption), chronic pain (>3 months), and physical dependency, defined as the inability to feed oneself, were noted. These items were defined according to Yamada, *et al.*[19] and Abdulrahim and El Asmar[20]. This section also included the number of prescribed drugs taken daily on regular basis and the number of chronic diseases. Random blood sugar assessment using a glucometer[21] was performed for all the diabetic participants (69/320, 21.5%) and to discover nondiagnosed (unaware) cases (0/320). Among the 69 diabetic participants, 16 individuals had random blood glucose level higher than 200 mg/dl. Fasting and postprandial blood sugar values were assessed for these individuals over 3 days; only five cases were found to still have high levels (fasting blood sugar (FBS)>126 mg/dl and 2 h postprandial ≥200 mg/dl). For these five cases, glycated hemoglobin (A1C) assessment was done, and levels above 7% were classified as uncontrolled diabetes mellitus (DM)[22]. (5) Psychosocial and cognitive risk factors of malnutrition: this part included five (yes/no) questions about sensory problems, special senses problems, insomnia, social isolation, and depression. Social assessment was based on three questions assessing the family network, as follows: 'How many relatives do you see or hear from at least once a month? How many relatives do you feel close to such that you could call on them for help? How many relatives do you feel at ease with that you can talk to about private matters? 'These same questions were repeated by replacing the word 'relatives' with the word 'friends'. The answers were as follows: none (scored 0), one (scored 1), two (scored 2) three or four (scored 3), five to eight (scored 4), and nine or more (scored 5). The total score is the sum of the six items, ranging from 0 to 30. At a score below 12, the person was considered socially isolated[23]. Depression was detected using the five-item Geriatric Depression Scale-5. Score of two or above indicated the presence of depressive symptoms[24].

The construct validity of the questionnaire was assessed by three academic professors. The applicability, content validity, and face validity were tested through a pilot study carried out in July 2016 on 20 randomly selected elderly persons. The required modifications were done. The results of the pilot study were not included in the analysis of this study.

Ethical considerations

Informed written consents were obtained from the participants. Moreover, an approval from the Research Ethics Committee in Benha Faculty of Medicine was obtained to carry out this work.

Statistical analysis

The collected data were tabulated and analyzed using SPSS version 16 software (SPSS Inc., Chicago, Illinois, USA). Qualitative data were expressed as frequencies and percentages, whereas continuous variables were presented as mean ±SD and range. χ^2 and Fisher's exact test were used to detect the association between malnutrition and the studied factors. Odds ratio (OR) and the corresponding 95% confidence interval (CI) were calculated when applicable. Continuous data were tested for normality using Kolmogorov–Smirnov test, assuming normality at *P* value more than 0.05. As proved to be nonparametric, continuous variables were analyzed using Mann–Whitney U-test and Spearman's correlation coefficient (ρ). Two-sided *P* value up to 0.05 was considered significant.

RESULTS

Sociodemographic characteristics of the studied elderly

The study was conducted on 320 elders (52.2% males and 47.8% females) whose age ranged from 61 to 89 years, with mean age of 70.1±7.05 years. Approximately half of them (52.5%) were younger than 70 years, 38.4% were between 70 and 80 years, and only 9.1% were older than 80 years. Most elders (87.8%) did not achieve secondary education. Only 29.7% were currently working, and 57.2% experienced total financial dependency. Considering marital status, 32.8% were widowed and 5.9% were divorced. Regarding living conditions, 80.6% lived in nuclear families and 18.1% lived alone; in addition, only 5.6% were of high social class. At the time of the survey, 17.8% of elders were currently smokers (34.1% of the studied males), but none of them were alcohol abusers (Table 1). Using the MNA-SF, the results revealed that the weight of the participants ranged from 50 to 80 kg, with mean value of 67.5±8.5 kg, and the average height was 166.1 cm and ranged from 160 to 170 cm. The mean BMI was 24.3±2.96 kg/m2 with range of 19.5–30.7 kg/m2. The minimum CC was 27 cm and the maximum was 34 cm, with mean value of 30.5±1.31 cm.

Table 1: Sociodemographic characteristics of the studied sample of rural elderly in Qalyobeya, Egypt

Variables	Frequency (n=320) [n (%)]
Age (years)	
<70	168 (52.5)
70–80	123 (38.4)
>80	29 (9.1)
Mean ±SD (range)	70.1±7.05 (61-89)
Sex	
Male	167 (52.2)
Female	153 (47.8)
Educational level	
University	15 (4.7)
Secondary	24 (7.5)
Basic	78 (24.4)
Read and write	74 (23.1)
Illiterate	129 (40.3)
Current work	
Yes	95 (29.7)
No	225 (70.3)

Financial dependency	
Totally	183 (57.2)
Partially	79 (24.7)
Independent	58 (18.1)
Marital status	
Married	196 (61.3)
Widowed	105 (32.8)
Divorced	19 (5.9)
Type of family	
Nuclear	258 (80.6)
Extended	62 (19.4)
Living condition	
Alone	58 (18.1)
With others	262 (81.9)
Social class	
High	18 (5.6)
Moderate	172 (53.8)
Low	130 (40.6)
Tobacco smoking	
No	263 (82.2)
Yes	57 (17.8)
Alcohol intake	
No	320 (100.0)
Yes	0 (0.0)

Table 2 illustrates the nutritional assessment of the studied sample. The results revealed that 15% of the studied elderly had severe decrease in food intake over the previous 3 months, and 55.3% of them were unaware of their weight loss. A high percentage (73.4%) of the elders experienced psychological stress or acute disease during that period; 39.1% of them were able only to get out of bed/chair but not out of home; 28.8% experienced mild dementia; 35.3% of them had BMI less than 23 kg/m2, that is, mild to severe malnutrition; and 22 of 27 participants (whose BMI could not calculated) had CC less than 31 cm (6.9% of the total). Total MNA-SF score ranged from 3 to 14, with average value of 9.2±3.2. The study also showed that 35% of the elderly were malnourished, 38.4% were at risk of malnutrition, and only 26.6% were adequately nourished (Table 2 and Fig. 1).

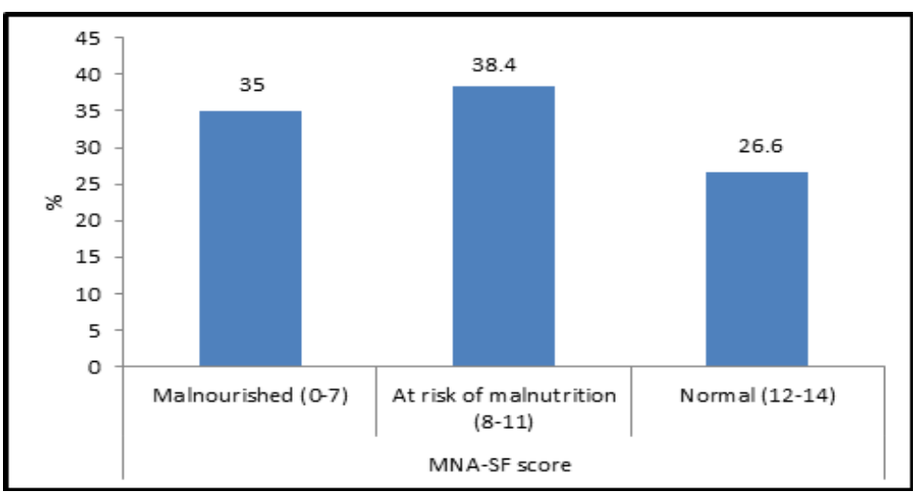

Fig. 1: Nutritional status among the sample of rural elderly according to Mini-Nutritional Assessment-Short Form (MNA-SF) score.

Table 2: Nutritional assessment of the sample of rural elderly using Mini-Nutritional Assessment-Short Form questionnaire

MNA-SF items and scores	Frequency (n=320) [n (%)]
Decreased food intake over the past 3 months	
Severe decrease	48 (15.0)
Moderate decrease	99 (30.9)
No decrease	173 (54.1)
Mean ±SD (range) score	1.39± 0.73 (0–2)
Weight loss during the last 3 months	
>3 kg	19 (5.9)
Do not know	177 (55.4)
1–3 kg	19 (5.9)
No weight loss	105 (32.8)
Mean ±SD (range) score	1.66± 1.0 (0–3)
Mobility	
Bed or chair bound	0 (0.0)
Able to get out of bed/chair but not out of home	125 (39.1)
Goes out	195 (60.9)
Mean ±SD (range) score	1.61± 0.48 (1–2)
Psychological stress or acute disease in the past 3 months	
Yes	235 (73.4)
No	85 (26.6)
Mean ±SD (range) score	0.53± 0.88 (0–2)
Neuropsychological problems	
Severe dementia or depression	0 (0.0)
Mild dementia	92 (28.8)
No psychological problems	228 (71.2)
Mean ±SD (range) score	1.73± 0.44 (1–2)
BMI (kg/m2) (n=293)µ	
<19	0 (0.0)
19 to <21	47 (14.7)
21 to <23	66 (20.6)
≥23	180 (56.2)
Mean ±SD (range) score	2.45± 0.75 (0–3)
Calf circumference (cm)	
<31	22 (6.9)
≥31	5 (1.6)
Mean ±SD (range) score	0.56± 1.18 (0–3)
Total score	
Malnourished (0–7)	112 (35.0)
At risk of malnutrition (8–11)	123 (38.4)
Normal (12–14)	85 (26.6)
Mean ±SD (range) score	9.2± 3.2 (3–14)

CC: calf circumference, MNA-SF: mini-nutritional assessment-short form, µ: height could not be measured for 27 patients as they could not stand up properly owing to back problems, osteoarthritis, and sensory problems in the lower limbs, instead, CC was used

Table 3 shows the association between nutritional status of the elderly and their sociodemographic characteristics. There were significant associations between malnutrition or being at risk of malnutrition and all the studied sociodemographic characteristics (*P<0.001* for all variables) except tobacco smoking (*P>0.05*). Malnourished elderly or those at risk of malnutrition were about 10 times more likely to be older than 70 years, 4.6-folds to be females, about four times more likely to be of educational levels less than secondary, 22.2-folds to be not currently working, and 64.7-folds to be of total financial dependency. They were also 29.4-folds more likely to be widowed or divorced, and 4.1 times to be living in nuclear families. Regarding social class, they were about three times more likely to belong to moderate and low social classes.

Table 3: Association between malnutrition and sociodemographic characteristics of an elderly sample in Qalyobeya, Egypt

Variables	Malnutrition/being at risk (n=235) [n (%)]	Normal (n=85) [n (%)]	χ^2 (*P*)	OR (95% CI)
Age (years)				
<70	94 (40.0)	74 (87.1)	55.7 (<0.001)	10.09[a] (5.08–20.02)
70–80	113 (48.1)	10 (11.8)		
>80	28 (11.9)	1 (1.2)		
Sex				
Male	101 (43.0)	66 (77.6)	30.07 (<0.001)	4.6 (2.6–8.1)
Female	134 (57.0)	19 (22.4)		
Educational level				
Secondary or higher	18 (7.7)	21 (24.7)	16.8 (<0.001)	3.93 (1.98–7.8)
Less than secondary	216 (92.3)	64 (75.3)		
Current Work				
Yes	30 (12.8)	65 (76.5)	121.4 (<0.001)	22.2 (11.8–41.7)
No	205 (87.5)	20 (23.5)		
Financial dependency				
Totally	179 (76.2)	4 (4.7)	220.7 (<0.001)	64.7[a] (22.7–184.5)
Partially	8 (3.4)	71 (83.5)		
Independent	48 (20.4)	10 (11.8)		
Marital status				
Married	114 (48.5)	82 (96.5)	60.6 (<0.001)	29.4[a] (8.9–94.4)
Widowed	103 (43.8)	2 (2.3)		
Divorced	18 (7.7)	1 (1.2)		
Type of family				
Nuclear	205 (87.2)	53 (62.4)	24.7 (<0.001)	4.1 (2.3–7.4)
Extended	30 (12.8)	32 (37.6)		
Living				
Alone	58 (24.7)	0 (0.0)	25.6 (<0.001)	-
With others	177 (75.3)	85 (100.0)		
Social class				
High	9 (3.8)	9 (10.6)	FET=12.5 (0.002)	2.97[a] (1.14–7.7)
Moderate	139 (59.1)	33 (38.8)		
Low	87 (37.1)	43 (50.6)		
Tobacco smoking (n=167 male)				
No	64 (63.4)	46 (69.7)	0.71 (0.39)	1.33 (0.69–2.57)
Yes	37 (36.6)	20 (30.3)		

CI: confidence interval; OR, odds ratio, [a]ORs were calculated for second and third categories together versus the first category, FET: Fisher's exact test.

Table 4 illustrates the relation between nutritional status and some physical and psychosocial and cognitive factors. Significant association (*P<0.05*) was detected between malnutrition and lack of physical exercise (OR=2.1; 95% CI=1.07–4.3), oral (partial or total loss of teeth and dental procedures) and GIT problems (difficult swallowing, stomach pain, and maldigestion) (ORs=12.2 and 2.8, respectively), chronic pain (OR=2.0; 95% CI=1.16–3.5), and physical dependency. Moreover, there was a significant negative correlation between MNA total score and number of chronic diseases and number of drugs taken regularly (Figs 2 and 3). Regarding psychological and cognitive factors, 35.5, 53.2, and 37% of the malnourished elderly or those being at risk of malnutrition experienced social isolation, insomnia, and depressive symptoms, respectively, compared with none of those with adequate nutrition. Moreover, there was a significant association (*P<0.001*) between malnutrition and having special senses problems (OR=2.7; 95% CI=1.6–4.5).

Table 4: Association between malnutrition and physical health, psychological, and cognitive factors among an elderly sample in Qalyobeya, Egypt

Variables	Malnutrition/ being at risk (n=235) [n (%)]	Normal (n=85) [n (%)]	χ^2 (*P*)	OR (95% CI)
Physical health-related factors				
Physical exercise				
Daily	–	–	4.76 (0.029)	2.1 (1.07–4.3)
Occasionally	23 (9.8)	16 (18.8)		
Never	212 (90.2)	69 (81.2)		
Oral problems				
No	96 (40.9)	76 (89.4)	59.2 (<0.001)	12.2 (5.8–25.6)
Yes	139 (59.1)	9 (10.6)		
GIT problems				
No	95 (40.4)	56 (65.9)	16.2 (<0.001)	2.8 (1.7–4.8)
Yes	140 (59.6)	29 (34.1)		
Chronic pain				
No	138 (58.7)	63 (74.1)	6.3 (0.12)	2.0 (1.16–3.5)
Yes	97 (41.3)	22 (25.9)		
Uncontrolled DM				
No	230 (97.9)	85 (100.0)	FET (0.33)	
Yes	5 (2.1)	0 (0.0)		
Physical dependency				
No	224 (95.3)	85 (100.0)	FET (0.041)	
Yes	11 (4.7)	0 (0.0)		
Number of chronic diseases [median (range)]	3 (1–4)	0 (0-3)	11.6‡ (<0.001)	
Number of drugs taken regularly [median (range)]	5 (1-10)	1 (0-4)	12.7‡ (<0.001)	
Psychosocial and cognitive factors				
Social isolation				
No	161 (68.5)	85 (100.0)	34.8 (<0.001)	
Yes	74 (31.5)	0 (0.0)		
Insomnia				
No	110 (46.8)	85 (100.0)	74.2 (<0.001)	
Yes	125 (53.2)	0 (0.0)		

Sensory problems			0.7 (0.4)	0.78 (0.43–1.4)
No	182 (77.4)	62 (72.9)		
Yes	53 (22.6)	23 (27.1)		
Special senses problems				
No	108 (46.0)	59 (69.4)	13.7 (<0.001)	
Yes	127 (54.0)	26 (30.6)		
Depressive symptoms				
No	148 (63.0)	85 (100.0)	43.2 (<0.001)	
Yes	87 (37.0)	0 (0.0)		

CI: confidence interval, GIT: gastrointestinal tract, OR: odds ratio: ‡Mann–Whitney U-test, FET: Fisher's exact test

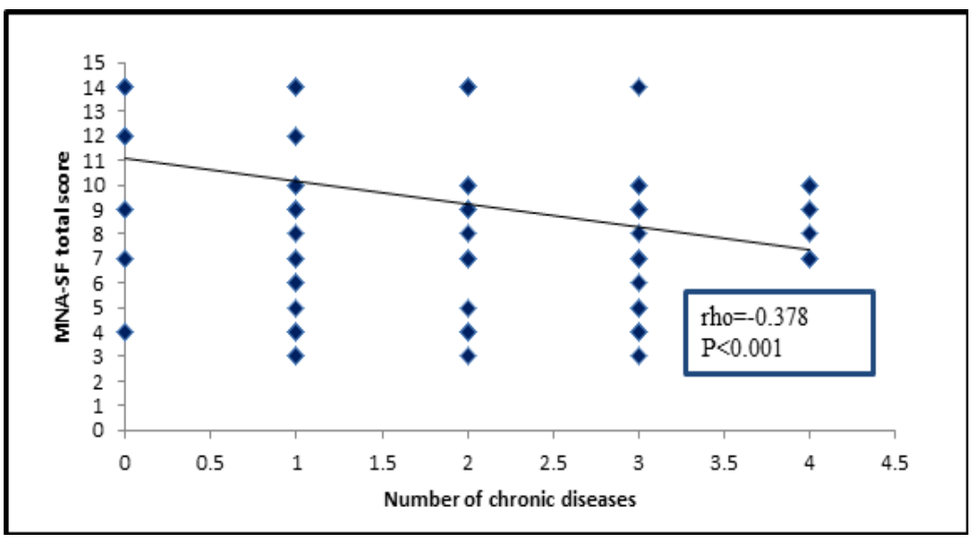

Fig. 2: Scatter plot for the correlation between Mini-Nutritional Assessment-Short Form (MNA-SF) total score and number of chronic diseases

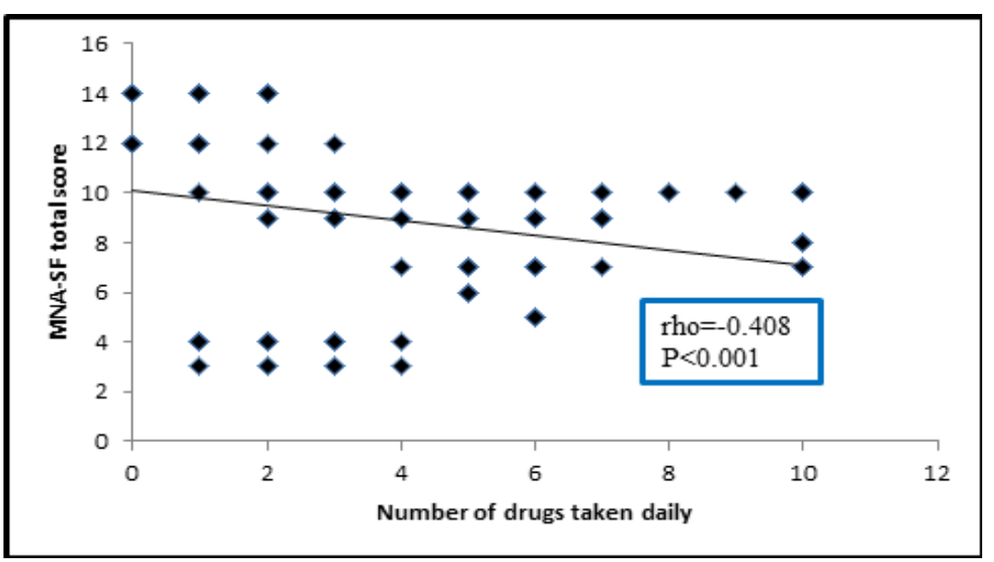

Fig. 3: Scatter plot for the correlation between Mini-Nutritional Assessment-Short Form (MNA-SF) total score and number of drugs taken daily.

DISCUSSION

This study showed that the prevalence of malnutrition among elderly using MNA-SF tool was more alarming than the the previously reported rates, as it was found that 35 and 38.4% of the studied participants were malnourished or being at risk of malnutrition, respectively. These results are higher than those reported by Boulos *et al.*[5] who conducted a cross-sectional study on 1200 elderly Lebanese and found that only 8% of them experienced malnutrition and 29.1% were at risk. Moreover, this prevalence is higher than the figure obtained by Agarwalla *et al.*[25] in their study in India, who reported that 15% of the elderly were malnourished. This difference could be attributed to bad economic, social, health, and environmental conditions in the rural areas that affect our participants in addition to the difference in characteristics and socioeconomic conditions of the study population. Compared with other studies conducted in Egypt, the present study revealed a higher prevalence of malnutrition than that reported by Abdelrahman and Elawam[9] in Cairo (14.5%). Moreover, using MNA score, a much lower prevalence (8.6%) was reported by Mahfouze *et al.*[13] in El Miniya. The present high rate could be explained by the deterioration of the economic indicators in the past years in Egypt, which aggravates the problem.

Malnutrition was more predominant among female individuals (57%). This agrees with the results of a study conducted in Iran which revealed that female elderly had higher prevalence of malnutrition than male ones[26]. Our finding also agrees with Donini *et al.*[27] in Italy who recruited elderly from nursing homes and community, and found that 26% of females and 16.3% of males were classified as being malnourished. Moreover, this significant association between female sex and malnutrition was found in another study[28]. This could be explained by the role of women in the society, as a large percentage of them are financially dependent, a fact that affects their nutritional status. On the contrary, these results do not agree with those obtained by Lee *et al.*[1] who collected already published data sets from 12 European countries. They found that elderly males were suffering experienced malnutrition (28%) more than females (20%). The differences in the social and demographic characteristics between Egyptian and European population may explain this difference.

This work demonstrated that most of the malnourished elderly had low educational level and were of total financial dependency and consequently belonging to moderate to low social classes. These results show similar trends to other community-based studies outside and inside Egypt, such as Saikia and Mahanta[29], Han *et al.*[30] and Mokhber *et al.*[31]. In Egypt, Abdelrahman and Elawam[9] found that having less years of education was a significant predictor for malnutrition. These findings could be explained on the basis that individuals with higher levels of education can properly select food with adequate quantity and quality and comply with sound and healthy behavior.

Those experiencing malnutrition or/at risk were more likely to live alone or in nuclear families. These results are close to those declared by Agarwalla *et al.*[25] who found a significant association between living alone or in nuclear families and under nutrition. This may be attributed to the fact that living alone or in a nuclear family is usually associated with poor appetite, anorexia, and loss of motivation to prepare and eat food. Our work revealed a nonsignificant association between smoking and nutritional status. This was supported by previous literature[32].

Further important findings in this study include having multiple chronic diseases such as oral, GIT problems, and uncontrolled DM or taking multiple drugs are risk factors of bad nutritional status. This is supported by the findings of Abdelrahman and Elawam[9] who concluded that polypharmacy was an independent risk factor for malnutrition. With age, there is increasing risk of developing various diseases and conditions that need multiple drug therapy. The drug therapy could negatively affect nutritional status through its adverse effects such as decreased appetite, nausea, alterations in taste and smell, constipation, diarrhea, and confusion[2].

Furthermore, this study outlined several psychological and cognitive factors that badly affected the nutritional status of the elderly. Social isolation, insomnia, special senses problems, and depression are common findings in many other studies; a cross-sectional study conducted between 2011 and 2012 on 370 elderly living in 36 rural areas in Isfahan, Iran, reported that malnutrition was significantly correlated with depression[33]. The current findings are also consistent with a previous Egyptian study[9], where a significant association between malnutrition and depression was revealed. These relations can be explained by the fact that cognitive impairment and dementia and other special senses problems often affect motivation and planning for life activities.

LIMITATIONS OF STUDY

This study had some limitations including being a cross-sectional study, a design which does not prove causality. Moreover, the biochemical parameters of nutritional status and hemoglobin could not be assessed because of limited resources. Current illness was reported by the informants, not verified by clinical examination or prescription checks. Recall bias is also common in the elderly. Micronutrient deficiencies were also not studied.

CONCLUSION

Malnutrition or being at risk of malnutrition is prevalent among the elderly especially those with higher age, lower

level of education, living alone, unemployed, cognitively impaired, depressed, chronically ill, and on polypharmacy.

It is recommended that nutritional assessment should be included in any designed care for elder persons at the primary healthcare level, outpatient setting, acute care hospital, or any long-term institutional care setting. Moreover, nutritional interventions should be included as a part of a complete strategy. Further studies are needed for planning for such interventions.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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