A Study of The Dietary Pattern, Nutrients Intake and Nutritional Status of Elderly in Alexandria

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Abstract: Malnutrition is a common public health problem in the elderly and is often associated with increased morbidity and reduced quality of life. This study was initiated to investigate the nutritional status, nutrients intake and dietary pattern of elderly males and females in Alexandria. The sample of the study was taken from two elderly clubs and two social clubs and included 131 males and 116 female aged 60 years and over. Each subject was privately interviewed to collect information on socio-demographic data, dietary pattern, appetite status and causes of its loss, nutrition related problems, preferred and avoided foods. The nutritional status was assessed by measuring height and weight that were used for the calculation of the BMI. The daily nutrients intake was assessed using the 24 hours dietary recall method. The results show that underweight was more prevalent among males (34.3%) while overweight and obesity were more prevalent among females. Obesity was also more prevalent among high income group (21.6%) while underweight was highly prevalent among low income elderly (35.2%). The nutrient density was acceptable with proteins providing around 12% of the caloric intake, fats around 28% and carbohydrates provided around 60% of the calories. A high proportion of males (31.27%) received less than two third of the energy RDAs, while 39.7% and 31.6% of the females received less than 67% of the iron and calcium requirements. Occasional and frequent loss of appetite was more common among females and was mostly induced by social factors (33.8%), health problems (30.9%) and emotional stress (19.1%) . Shopping for food represented a major problem for the elderly (27.1%) followed by chewing problem (23.5%), self feeding (20.7%) and recent weight loss (17.4%). The results show that more males (29.8%) were consuming special diet as compared with females (19.8%). The majority of the females consumed two meals daily (37.1%) while 57.3% of the males consumed three meals daily. Vitamin and mineral supplement were most common among the elderly. Animal protein and fruits were the most preferred foods and vegetables (23.1%), spicy foods (19.4%) and fried foods (19.0%) were the most avoided foods. The results confirm that both undernutrition, overweight and obesity are prevalent among the elderly and are associated with inadequate dietary food intake and poor dietary pattern which necessitates the planning and implementation of a nutrition intervention program to improve the nutritional status of the elderly.

INTRODUCTION

Malnutrition is a common health problem in the elderly.[1,2] This malnutrition is often unrecognized and is associated with increased hospitalizations, mortality, susceptibility to infection and reduced quality of life.[3-5] Alterations in taste, smell,

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mental status, physical incapacity, dysphagia, loss of control over food choices, medication side-effects and chronic medical conditions all contribute to developing malnutrition. Up to 66% of elderly do not meet the recommended dietary allowance for energy and protein.[6,7] This is typically linked to poor intakes of one or more micronutrients and almost one third of all elderly have some deficiencies in vitamins and trace elements.[8,9]

Malnutrition in the elderly will affect muscle mass even more than in younger individuals with the same degree of weight loss. Furthermore, correcting malnutrition in the elderly is more difficult than in younger patients with a similar degree of weight loss, stressing the importance of prevention in this population.

The significant reduction in muscle mass along with muscle strength will have profound effects in the elderly and will result in a progressive reduction in physical activity and a sedentary lifestyle. Reduced muscle strength is a major cause of the increased prevalence of disability and is a critical component of walking ability.[10] The high prevalence of falls among the elderly may be a consequence of their lower muscle strength.

Aging in man is accompanied by changes, which may impair food acquisition, digestion and metabolism. Weight loss is common and the causes are multifactorial.[11] There is a growing recognition that age related anorexia may predisposes to protein energy malnutrition, particularly in the presence of other pathological factors associated with aging.[12] Impaired smell and taste and poor dental health directly decrease food intake or influence food selection[13], physical activity and lean body mass decrease with aging, while body fat, increase. These factors may decrease energy requirements and intake. Lower food intake may lead to lower intake of

both macro and micronutrients.[14]

Age related changes in body composition can be considered the consequence of changes in energy and protein metabolism. Changes in organ and systems weights obviously affect energy balance regulation. However, it is still disputed whether age changes are related to aging per se or to conditions such as poor nutrition, disease or drug treatment that prevails in the elderly persons.[15]

Good nutrition benefits older adults in many ways. Meeting nutrient needs always delays the onset of some diseases; improves the managements of some existing diseases, hasten recovery from illness, increase mental, physical and social wellbeing and often decrease the length of hospitalization.

An understanding of the determinants of nutritionals status and food intake may be helpful in the early detection and prevention of malnutrition.[16] Literature does not provide sufficient evidence on population and subject characteristics, cultural, economic and social factors influencing the nutritional status of the elderly.

The nutritional status and dietary intake of the elderly population received little attention in Egypt. Assessing the diet quality of the elderly is critical to addressing issues relevant to their health and nutrition status.[17] The most recent study was carried out in Alexandria in 2004.[18] The subjects of the study were elderly hosted in geriatric homes which offer similar food to all clients. That is why this study was initiated to investigate the nutritional status, feeding pattern, energy and nutrients intake by male and female elderly in Alexandria.

SUBJECTS AND METHODS

The subjects of this cross-sectional study were male and female elderly aged 60 years and over. The sample was taken from elderly clubs and social clubs in Alexandria. Elderly clubs offer social and

recreational services to retired people with an average capacity around 100 members. Two clubs were randomly selected and the administration was contacted to gain their consent to implement the study. The members were contacted to brief them about the aim of the study and to gain their approval to participate in the study. The sample included all members who accepted to participate. The same procedure was followed in the two social clubs and a random sample was taken with size equivalent to that taken from the elderly clubs. The total sample size was 247 subjects including 131 males and 116 females.

A pre-designed interview questionnaire was formulated, tested through a pilot study on 20 males and female subjects, modified and finalized to collect data on socio-demographic data including age, sex and monthly percapita income. Elderly were requested to provide information on their food pattern. They were asked if they consume the regular family diet or a special diet. Information were collected on the number of meals consumed daily, the intake of nutritional supplement such as vitamin or mineral supplement, preferred and avoided foods.

Elderly were classified according to the status of their appetite into three groups including a group with normal appetite, a group suffering from occasional loss and those suffering from frequent loss of appetite. The main cause of appetite loss was recorded. They were also asked to report any problems related to their nutrition.

The body weight of each subject was measured to the nearest 0.5 kg, height was recorded to the nearest 0.5 cm using standard techniques.[19] Height and weight were used to calculate the body mass index (BMI; weight in kilograms divided by the square of height in meters). Elderly were classified according to their BMI into underweight with BMI<18.5, normal 18.5 to

less than 25, overweight 25 to less than 30 and obese with BMI more than 30.[20]

The daily dietary intake was assessed using the 24 hour recall method. Each subject was asked to recall as accurately as possible every item of food or drink consumed in the last 24 hours. Details regarding the type of food, the amount consumed as estimated by common house hold measures, the method of preparation and the time of consumption were recorded. Data were analyzed using the Egyptian food composition table.[21] Total daily intake was expressed as percent RDA according to age and sex for energy, carbohydrates, fats, protein, calcium, iron, vitamins (A and C). The nutrient density of the diet was calculated.

Statistical analysis was performed using the statistical package for social sciences version 12.0. Descriptive data were calculated as frequencies. Chi-square test was used to evaluate the association between variables. Data on nutrient intake

is presented in the form of means and standard deviations, t test was used to evaluate the significance of the difference between means, p values less than 0.05 were considered statistically significant.

RESULTS

The nutritional status of elderly males and females as expressed by their BMI percentile is presented in Table 1. The results show that underweight was more prevalent among males (34.3%) than among females (24.1%) . On the other hand, the prevalence of obesity was much higher among females (22.4%) when compared with males (13.1%), the prevalence of overweight followed a similar pattern, (25.0% and 15.3%). The differences were statistically significant, X^2= 9.74, p= 0.021.

The data show a clear but insignificant association between monthly percapita income and the nutritional status of the elderly. Underweight was more prevalent among low income group (35.2%) when

compared with a rate of 23.0% among the group with monthly income exceeding L.E. 1000. Obesity followed the opposite trend, the corresponding rates were 14.8% and 21.6%.

Table 2 presents the nutrient density and the proportion of elderly consuming less than two thirds of the RDAs from several nutrients. The results show that the diet of elderly males contained a high percentage of protein and fat when compared with the females. As a result, the latter group derived 61.2% of their energy from carbohydrates as compared with 58.4% among male counterparts. The difference was statistically significant t=3.02, p=0.003.

The proportion of elderly consuming less than two thirds of the RDAs from several nutrients varied significantly with both the sex of the subjects and the type of the nutrient. The results show that 31.2% of the males received less than two thirds of the energy RDA; this was significantly

higher than among females (16.1%). t= 27.27, p= 0.00.

As a result, more males were not fulfilling the protein requirements than females t= 8.76, p=0.00, the proportion not fulfilling the RDAs from vitamin A and C was also significantly modified by the sex of the elderly.

Iron requirements were not satisfied by 39.7% of females which was significantly higher, t= 29.56, p=0.00, than among males (18.9%). The same observation was noted with calcium requirement which was not fulfilled by 31.6% and 22.3% of elderly females and males respectively. The difference was statistically significant t=12.24, p=0.00.

The data presented in Table 3 show that only 44.9% of the elderly had normal appetite. The rate was higher among males (51.9%) than among females (37.1%). Frequent loss of appetite was reported by 27.6% of the females which was significantly higher than among males

(18.3%), X^2= 5.93, p=0.047. The main causes for the loss of appetite were social factors (33.8%) which were more common among females (39.7%) than among males (27.0%). This was followed by health problems which were reported by 30.9%, however, the rate among males (41.3%) was almost twice that reported by females (21.9%). Emotional stress was mentioned by 19.1% followed by irregular meal pattern and poor food quality (8.1%). The differences between sexes were not statistically significant.

Table 4 presents the nutrition related problem prevailing among elderly. The most common problem was shopping for food (27.1%) which was more prevalent among females than males, 33.6% and 21.4% respectively. The results show that 23.5% of the sample reported chewing problems and another 11.3% reported swallowing problems, the rate was comparable in both groups. Problems with self feeding and recent weight loss were reported by 20.7% and 17.4% of the elderly at a rate slightly but insignificantly higher among males than females.

Data presented in Table 5 show that 74.9% of the elderly were consuming the family meals while only 25.1% consumed special diet such as low salt or diabetic diets. Special diets were consumed at a higher but insignificant rate by elderly males (29.8%) than females (19.8%).

The results show that the majority of elderly males (57.3%) were consuming three meals daily; such ratio was significantly lower to 36.2% among females. The majority of the latter group was consuming two meals (37.1%). The results also show that 19.0% of the females were consuming one meal daily as compared with 14.5% of the males. On the contrary, 16.0% of the latter group consumed 4 or more meals daily, a rate that is more than twice that reported by females (7.7%). The difference was statistically significant X^2= 25.87, p=0.00.

The data show that nutrition supplement was not consumed by 57.1% of the subjects with comparable rates between groups. The most common supplement was a mixture of vitamins and minerals (24.3%) followed by vitamin supplementation (18.6%). The difference was not statistically significant.

The types of preferred and avoided foods are presented in Table 6. The results show that 22.7% of the elderly had no food performance. Animal protein was the most preferred food (21.1%) particularly by male elderly (26.0%) and considerably less by females (15.5%). Fruits were preferred by 20.2% of the subjects without significant difference between sexes. Dairy products were preferred by 16.0% of the males which was much higher than that reported by females (9.5%). Vegetables were least preferred, 12.1% and 9.1% respectively.

The results show that vegetables were the most avoided foods (23.1%) particularly by elderly males (25.9%). Meat was the most avoided food by elderly females (27.6%) followed by dairy products (22.4%). Spicy foods were avoided by 19.4% of the subjects; such practice was more common among males (23.7%) than among females (14.7%). The same trend was noted with fried foods, the corresponding rates were 22.1% and 15.5% respectively. The difference were statistically significant X^2=12.57, p=0.014.

DISCUSSION

Sound nutrition plays a major role in achieving healthy aging. Nutrition status and eating pattern of elderly are influenced by several interrelated factors. These include age related changes in body composition and function, lifestyle, eating habits and psychological factors.[22] Diet quality and quantity play major roles in preventing, delaying onset and managing chronic diseases associated with aging.[23] The results presented in this study show that both under-nutrition and obesity are prevalent among elderly in Alexandria.

Obesity is more prevalent among females, this in a function of the high prevalence of obesity among females from younger age groups when compared with the prevalence among male population.[24]

The prevalence of Under-nutrition was very high among elderly males (Table 1). This is associated with inadequate energy intake by males illustrated in Table 2. Elderly males could have more difficulty in preparing their meals unless they are living with other family members who assume this responsibility. Females can prepare their meals without dependence on other family members.

Under-nutrition was relatively more prevalent among low income elderly who could not cope with the rising food prices which represent a serious burden to their limited income. High income elderly were more likely to become obese as they enjoy eating better quality and quantity of food which they can afford.

The proportion of elderly consuming less than two thirds of the RDA's from several nutrients varied significantly. Females with their high requirement from calcium and iron were less likely to meat their requirements. Males with their high energy requirement were more susceptible to inadequate intake from energy and protein. In general, the results indicate that the nutrient density is acceptable for both sexes suggesting that the deficiency is due to inadequate dietary intake. Under-nutrition places additional burden on older adults, such as increased infections, imbalance of electrolytes and overall weakness and fatigue.[25]

Poor appetite adversely affect dietary intake in the elderly, the results presented in table 3 show that 55.1% of the elderly suffer from occasional or frequent loss of appetite. This was more evident among females who attributed depressed appetite to social factors such as feeling lonely, missing family members living abroad and the negative attitude towards aging. Elderly

males lost their appetite mostly because of other health problems (41.3%) or due to the same social factors (27.0%).

The data presented in Table 4 show that several nutrition related problems affects the health of the elderly. It was of interest to observe that shopping for basic food is a major problem for elderly who do not have a car or not having other family members to purchase their food. This was followed by chewing problems (23.5%). Problems with self feeding are also common among elderly having health problems that impair their movement and handling of food. Nutrition related problem will reduce dietary intake in the elderly and contribute to the worsening of their nutritional status.[26,27]

Elderly people are more susceptible to a number of non-communicable disease such as diabetes, hypertension and cardiovascular diseases which requires special nutritional care. The results presented in table 5 show that only 25.1%

of the subjects received special diet which was more common among males. The rest were consuming the family meal which may have an adverse effect on their health status. The results also show that only 47.4% of the elderly consumed there meals daily. This pattern of dietary intake will lead to a reduction in the variety of foods consumed that are thought to further reduced energy intake and render the elderly more susceptible to micronutrients deficiency.[28,29]

Several micronutrients pose particular challenges regarding intake in older adults including vitamins A, C, E, B_{12} and mineral such as calcium, iron and zinc. Although average diet containing nutrient dense foods can meet daily micronutrient needs, a daily multivitamin –mineral supplement specifically designed for the elderly may be necessary to meet the RDA's.[30] Such practice was not common in the present study as only 24.3% of the subject received a vitamin-mineral supplement despite of

the inadequate dietary intake illustrated in Table 2.

Food likes and dislikes affect the dietary intake of the elderly. A good proportion of the elderly preferred the good tasting animal protein and the easily consumed fruits (Table 6). In the mean time, a variety of foods were avoided for various reasons. Fried and spicy foods were avoided since they cause indigestion and increased gastric acidity. Vegetables are avoided because they need effort in their preparation and cooking. Dairy products were mostly avoided because of intolerance as reported by the elderly. The rate of rejection of dairy product was higher among females despite of their high calcium requirement.

Based on the findings of this study, malnutrition in the elderly can be treated by appropriate interventions. Routine screening, assessment and documentation of malnutrition and nutrition related problems will contribute to the elderly diagnosis of the problem and facilitates the implementation of adequate nutrition interventions and support programs.

Table 1: Distribution of elderly males and females according to BMI percentile

Variable	Nutritional Status								Total	
	Underweight		Normal		Over weight		Obese			
	No.	%	No.	%	No.	%	No.	%	No.	%
Sex										
Male	45	34.3	49	37.4	20	15.3	17	13.0	131	100
Female	28	24.1	33	28.4	29	25.0	26	22.4	116	100
	X^2=9.74, P= 0.021									
Percapita income L.E/month										
<500	31	35.2	32	36.4	12	13.6	13	14.8	88	100
500-	25	29.4	30	35.3	16	18.8	14	16.5	85	100
1000+	17	23.0	20	27.0	21	28.4	16	21.6	74	100
Total	**73**	**29.6**	**82**	**32.2**	**49**	**19.8**	**43**	**17.4**	**247**	**100**
	X^2=8.89, P= 0.180									

Underweight BMI<18.5, Normal BMI 18.5 to <25,
Overweight BMI 25 to <30, Obese BMI >30.

Table 2: Nutrient density and the mean percent satisfaction of RDAs for some nutrients among elderly.

Variable	Sex		t value	P value
	Male n=131	Female n=116		
Percent energy from				
Protein	12.7± 3.1	11.6± 2.8	t= 2.91	p=0.0039
Fat	28.9 ±5.6	27.2 ±6.3	t= 2.25	p=0.0026
Carbohydrate	58.4 ±7.5	61.2 ±7.0	t=3.02	p=0.003
Percent consuming less than 67% of RDA				
Energy	31.2±4.7	16.1±3.9	t= 27.27	p=0.0001
Protein	14.6±2.8	11.2±3.3	t= 8.76	p=0.0001
Calcium	22.3±5.1	31.6±6.8	t=12.24	p=0.0001
Iron	18.9±3.4	39.7±7.2	t=29.56	p=0.0001
Vit A	12.7±2.9	15.5±2.7	t=7.82	p=0.0001
Vit C	11.8±2.7	13.6±3.5	t=4.55	p=0.0001

Table 3: Appetite status and the causes of its loss among elderly males and females.

Variable	Sex				Total	
	Male		Female			
	No.	%	No.	%		
Appetite status						
Normal	68	51.9	43	37.1	111	44.9
Occasional loss	39	22.9	41	35.3	80	32.4
Frequent loss	24	18.3	32	27.6	56	22.7
Total	131	100	116	100	247	100
	X^2= 5.98,			P= 0.047		
Main Cause of appetite loss						
Irregular meal pattern	6	9.5	5	6.9	11	8.1
Emotional stress	9	14.3	17	23.3	26	19.1
Health problems	26	41.3	16	21.9	42	30.9
Social factors	17	27.0	29	39.7	46	33.8
Poor food quality	5	7.9	6	8.2	11	8.1
Total	63	100	73	100	136	100
	X^2= 7.46,			P= 0.113		

Table 4: Nutrition related problems prevailing among elderly males and females.

Nutrition Related problems	Sex				Total	
	Male		Female			
	No.	%	No.	%		
Chewing problems	32	24.4	26	22.4	58	23.5
Swallowing problems	17	13.0	11	9.5	28	11.3
Shopping for basic foods	28	21.4	39	33.6	67	27.1
Recent weight loss	26	19.8	17	14.7	43	17.4
Self feeding	28	21.4	23	19.5	51	20.7
Total	**131**	**100**	**116**	**100**	**247**	**100**
	X^2= 5.19, P= 0.268					

Table 5: Prevailing food habits among male and female elderly.

Variable	Sex				Total	
	Male		Female			
	No.	%	No.	%		
Type of meal						
Family diet	92	70.2	93	80.2	185	74.9
Special diet	39	29.8	23	19.8	62	25.1
	X^2= 3.24, P= 0.072					
No. of meals daily						
One	19	14.5	22	19.0	41	16.6
Two	16	12.2	43	37.1	59	23.9
Three	75	57.3	42	36.2	117	47.4
More than three	21	16.0	9	7.7	30	12.1
	X^2= 25.87, P= 0.000					
Intake of nutrition supplement						
None	72	55.0	69	59.5	141	57.1
Vitamins	28	21.4	18	15.5	46	18.6
Vitamins and Mineral	31	23.6	29	25.0	60	24.3
Total	131	100	116	100	247	100
	X^2= 1.40, P= 0.497					

Table 6: Preferred and avoided foods by male and female elderly.

Main preferred and avoided foods	Sex				Total	
	Male		Female			
	No.	%	No.	%		
Preferred foods						
No preference	23	17.6	33	28.4	56	22.7
Dairy products	21	16.0	11	9.5	32	12.9
Animal protein	34	26.0	18	15.5	52	21.1
Cereals	15	11.5	16	13.8	31	12.6
Fruits	26	19.8	24	20.7	50	20.2
Vegetables	12	9.1	14	12.1	26	10.5
	$X^2=9.22$, $P= 0.101$					
Avoided foods						
Fried foods	29	22.1	18	15.5	47	19.0
Dairy products	17	13.0	26	22.4	43	17.4
Meat	20	15.3	32	27.6	52	21.1
Vegetables	34	25.9	23	19.8	57	23.1
Spicy foods	31	23.7	17	14.7	48	19.4
Total	131	100	116	100	247	100
	$X^2= 12.57$, $P= 0.014$					

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