Factors Affecting Nutritional Status among Elders Attending Geriatric Clubs in Alexandria, Egypt

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Abstract: Background: Good nutritional status throughout life helps prevent the development and progression of diseases and disabilities in later life, thereby significantly contributing to the quality of life. **Aim:** The aim of the present work was to determine factors affecting nutritional status among elders attending elderly clubs in Alexandria. **Subjects and Methods:** A cross-sectional study design was conducted in all elderly clubs in Alexandria. The sample size was determined to be 380 elders. A structured interview questionnaire was used to collect data about socio-demographic characteristics, medical history, physical activity pattern, smoking pattern, food purchase and preparation, knowledge of the elders regarding sound nutrition and balanced diet, patterns of eating practices and anthropometric measurements. The dietary intake was determined using 24 hour recall method. **Results:** The study revealed that the problem of overweight and obesity was prevalent especially among the females. The highest percentage of elders who attained 100% intake satisfaction and more of RDAs for energy had no chronic diseases (51.3%), were not using medications (51.2%), had dental problems (44.8%), did not practice exercise (48.9%), used to watch TV for 4 < 8 hours (50.6%), were non smokers (44.7%) and had good or very good dietary knowledge (79.3%). **Conclusion:** Almost half of the elderly have poor dietary knowledge. The dietary pattern of the elders is far from being satisfactory. The problem of overweight and obesity is highly prevalent among the elders in Alexandria. **Recommendations:** It is recommended to establish comprehensive nutrition educational programs in the elderly clubs. Mass media should include information about healthy balanced diets and hazards of obesity among the elders.

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1. Introduction

Population aging is a global phenomenon that has a major impact on disease and disability patterns, and on health services use. A coordinated and appropriate public health response is essential if this phenomenon is to translate into an opportunity for longevity and healthy ageing, rather than a threat to global health and resources.(1)

Nutritional conditions of the older adults have changed dramatically in recent decades, in both genders and in all age groups. (2) In Healthy People 2010 Initiative, nutrition was defined as a priority area of health promotion for people of all ages.(3) As with other needs, nutritional needs are not exactly the same for older adults as those of younger individuals. An understanding of these needs is essential to providing good health care.(4)

Factors affecting nutritional status of the elderly

There are many factors affecting nutritional status of the elderly such as aging related physiological alterations and other psychosocial factors.(5)

I- Physiological factors

Age-related alterations to the sense of taste, smell, and touch can lead to poor appetite, inappropriate food choices, diminish the enjoyment or pleasure of eating, and lower nutrient intake. Other causes including conditions such as untreated mouth sores; tooth decay, poor dental or nasal hygiene, and cigarette smoking also can decrease these senses.(6)

Sensory impairment can create a situation of social isolation. Visual and hearing losses are common in elders. Hearing and vision loss, when combined with gradual declines in taste and smell, can result in diminished food intake and subsequent malnutrition. (7)

Gastrointestinal changes can negatively affect a person's nutrient intake starting in the mouth. Tooth loss, use of dentures, and dry mouth can lead to difficulties chewing and swallowing. (8) Decrease in saliva production makes eating less pleasurable and more difficult. Missing, loose, or rotten teeth or poor-fitting painful dentures make it difficult to eat some nutritionally dense foods.(6) Absorption of nutrients in the small intestine particularly calcium and vitamin D, appears to diminish with age. Peristalsis is decreased with age, but constipation usually results from other problems such as poor nutrition, immobility, or medications.(9)

Glomerular filtration rate declines with age resulting in an increase in serum creatinine concentrations. The progressive decline in renal function can lead to an inability to excrete concentrated or diluted urine, a delayed response to sodium deprivation or sodium load, and delayed response to acid load. Renal function is also

impacted by dehydration, diuretic use, and medications.[10]

Metabolic changes are 10-20% lower in old people compared with younger adults because of reduced muscle mass and increased fat mass with aging. In most circumstances, therapeutic diets should be liberalized for older adults who have chronic diseases that are treated with diet modification. Dietary restrictions can decrease interest in food and in turn lead to nutritional problems. Restrictive diets frequently are not palatable and differ markedly from long standing eating habits. The dependent older adult who finds eating less enjoyable because of dietary restrictions will likely consume less food.[6]

Men differ from women in their nutrient requirements due to differences in body composition. For men, the decrease in bone mass is slow and continuous throughout life, while for women, the estrogen deficiency initiated by menopause accelerates the bone losses between age 50 and 60 years. Thereafter, the decrease is slower, resembling that of men but even between 60 and 80 years, women had greater bone losses than men.[1]

Older adults use 30 % of all prescribed medications and 40% of all over the counter medications. Medications affect nutritional status through causing an unpleasant change in the taste of food; suppressing appetite, decreasing absorption or causing nausea and vomiting.[11]

Losses of function can make an elderly individual dependent on others for meals or limit the choice of foods. The decision of when and what to eat might be made for dependent elders, thus decreasing their control and choices. Failing motor abilities and eyesight also can make meal preparation impossible.[12]

People with limited physical mobility or transportation are likely to experience nutritional problems. A person who knows the importance of nutritious food but who cannot get to a store or afford the food will have difficulty maintain good health.[1]

II- Socio-cultural and psychological factors

Throughout life, preferences for particular foods bring deep satisfaction and possess emotional significance. Such foods are called "soul food" or comfort foods. Preferences for soul food influence food choices and affect nutrient intake where the quantity of food eaten diminishes and the adequacy of nutrition becomes questionable.[4]

Many aged persons are forced to remain isolated from the mainstream of life because of impinging factors. Loneliness is one of the most common risk factors for nutritional problems in older adults. When one eats alone, the outcome is often either overindulgence of depression, a common problem of aging and a significant inhibitor of appetite, or disinterest in food.[4]

Grief, failing health, loss of independence, and many other factors can cause depression. Malnutrition can also be a cause of depression. Often the problem is unrecognized until the person has lost significant weight or develops other health problem.[12]

Low-income elderly must choose among food, utilities, medications and medical care. Inflation is constantly eroding the purchasing power of the aged, forcing them to buy foods that satiate hunger but provide many empty calories.[4]

Nutritional knowledge presumably influences attitudes and eating behavior. Factors other than religious and cultural beliefs also play a part in health perceptions and health-maintenance practices.[13]

Aim of the Study

To determine factors affecting nutritional status among elders attending geriatric clubs in Alexandria, Egypt.

2. Subjects and Methods

Study design

The work was fulfilled through a cross-sectional study design.

Sampling

The study was conducted in all the governmental elderly clubs in Alexandria namely El Wafaa, El Hayah and El Amal, El Hanan, El Gomrok, Lekaa Elaheba, and El Saada clubs. The target population was the elderly aged 60 years and over of both sexes attending the previously mentioned elderly clubs. The capacity of each club was 100 elders. The average number of non-repeated names of elderly who attended each club was around 50 / month. The sample included all elderly attending the above mentioned clubs and accepting to participate in the study. The total number of elderly was 380. A pilot study was carried out during September/October 2009 including 15 randomly selected attendants. Those elders were excluded from the study. The time spent with each elderly to complete the interview ranged from 30 to 45 minutes . The data were collected by the researcher and extended over a period of eight months from the beginning of November 2009 till the end of June 2010. Each eldery club was visited once per week. Some clubs were visited in the morning and others were visited in the evening. Informed consents were obtained from the participants for their inclusion in the study. This study was approved by the "Ethics Committee" of the High Institute of Public Health, Alexandria Univeristy.

Methods of data collection

A pre-designed interview schedule consisting of four parts was used to collect the required data. The first part included socio-demographic characteristics such as name, age, sex, marital status, level of education, income, and family size.

It also included medical history such as presence of chronic diseases, medications used history of any dental problems hindering eating in addition to vision or hearing problems. Data about physical activity patterns such as type and duration of physical exercise practiced, causes of non practice, means of transportation to the elderly club, and time spent watching TV were also included. It also included smoking habits and data about the person responsible for food purchase and preparation. The second part included dietary knowledge regarding characteristics and importance of balanced diet and sound nutrition, source of iron, calcium and vitamin C, the main source of energy foods and protective foods, requirement for caloric needs, proteins, carbohydrates, vegetables, fruits, and fats with increasing age, amount of fluids needed per day and number of meals needed per day.

The total knowledge score was calculated by summing scores of all questions yielding a total score ranging from 0 – 40 and was classified to:

- Very good level of knowledge ≥ 70%
- Good level of knowledge 60% - < 70%
- Fair level of knowledge 50% - < 60%
- Poor level of knowledge < 50%

The second part also included patterns of eating practices of the elderly such as data about the usual number of meals per day, main meal of the day, having breakfast daily, taking snacks between the main meals, type of fat used for food preparation. It also included data about the methods of cooking, drinking tea directly after the meal, amount of fluid consumed daily, amount of milk consumed daily, number of eggs consumed daily and the amount of meat consumed weekly. It also included practicing any activities while eating, eating fast foods, food preferences, following special regimen recommended by the physician and degree of compliance. The elders were also asked if they were taking vitamin supplements and by whom such vitamins were prescribed.

As regards the third part, it included anthropometric measurements such as weight and height measured and recorded for every elderly according to the criteria of Jelliffe.[14]

- ***Body Mass Index (BMI)***

BMI Was calculated for each elderly according to the following equation:

[BMI= weight (kg)/height $(m)^2$].[15] The nutritional status of the elderly was assessed using the anthropometric index recommended by the WHO Expert Committee, which was BMI – for- age.[16]

- Underweight < 18.50
- Normal weight 18.50 – 24.99
- Overweight 25.00 – 29.99
- Obesity 30.00 – 39.99
- Morbid obesity ≥ 40.00

The fourth part included dietary intake assessment using a 24-hour diet recall method. Each elderly in the study was asked to recall and describe carefully all the food items and beverages, which he consumed the day before the interview. The quantity of food served was recorded.

The nutrient intake was evaluated using the Egyptian food composition tables developed by the National Nutrition Institute, Cairo 1996.[17] The energy, protein, carbohydrate, fat, vitamins and minerals content of the consumed diet were computed, and the adequacy of the consumed diet was compared with the recommended dietary allowances (RDA) 1989 and dietary reference intakes (DRI) 1997-1998.[18]

Data management

The SPSS program version 13 was used for data analysis. Differences at a p-value ≤ 0.05 were considered statistically significant. The arithmetic mean and standard deviation were used as descriptive measures. Chi square (χ^2), Fisher's exact, Monte Carlo's exact and student's t-test (t-test) were used as tests of significance.

3. Results

Figure (1) shows distribution of the studied sample by sex according to total dietary knowledge score. The table shows that more than half of elders (56.3%) had poor knowledge (61.3% of males and 51.1% of females), while more than one quarter of them had fair knowledge (25.3% of males and 27.4% of females). Those with a very good level of knowledge presented only 1.3% of elders (1.6% of females and 1.0% of males).

Table (1) illustrates the distribution of the studied sample according to the influence of psychological status on the elders' appetite, about two thirds of the elderly (64.7%) stated that their appetite decreased by mood changes while one quarter (25.0%) stated that their appetite was not affected (71.5% females, 58.2% males). There was significant difference between males and females (χ^2= 8.163, p=0.017).

Figure (2) represents distribution of the studied sample by sex and Body Mass Index (BMI). It shows that about half of the elders (51.8%) were overweight (58.2% of males and 45.2% of females), while about one third of them (33.9%) were obese (47.8 % of females and 20.6% of males). There was a statistically significant difference between both sexes (x^2= 52.820, p = 0.000).

Table (2) shows distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to socio-demographic characteristics.

As regards sex, the table reveals that about half of the females (50.5%) attained 100% intake satisfaction and more of RDAs for energy versus 38.7% of males. However, the difference was statistically significant (χ^2 = 7.973, p= 0.050).

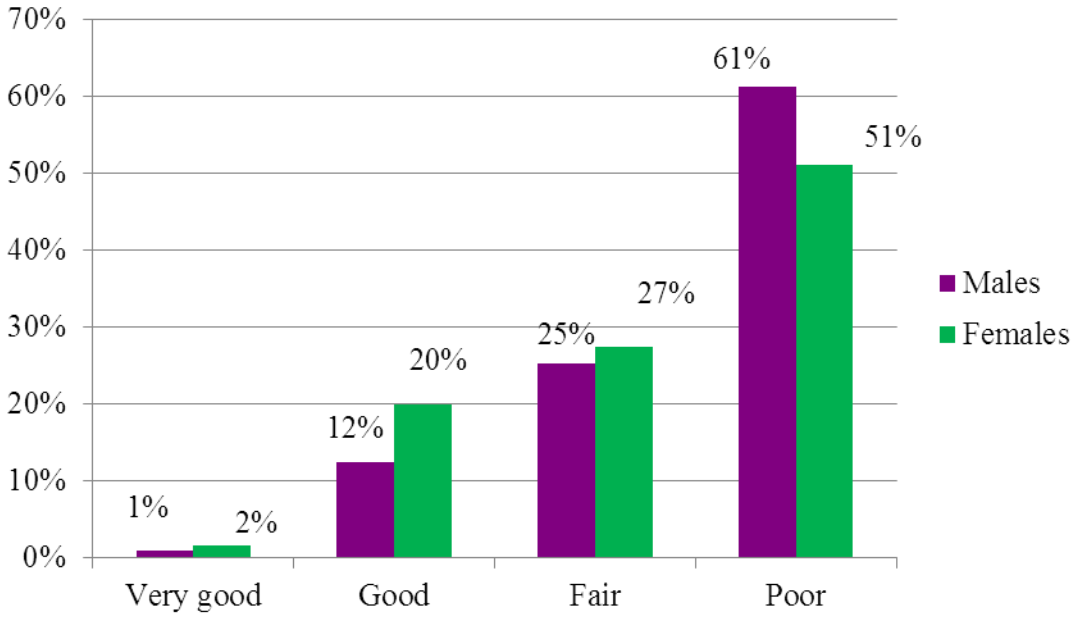

Figure (1): Distribution of the studied sample by sex according to total dietary knowledge score

Table (1): Distribution of the studied sample according to the influence of psychological status on the elders' appetite

Variable	Sex				Total n=380		Test of significance
	Males n= 194		Females n= 186				
	No.	%	No.	%	No.	%	
◆Influence of psychological status on appetite:							χ^2= 8.163
Decreases appetite	113	58.2	133	71.5	246	64.7	
Increases appetite	26	13.4	13	7.0	39	10.3	*p*= 0.017★
Doesn't affect appetite	55	28.4	40	21.5	95	25.0	

★Significant at $p \leq 0.05$

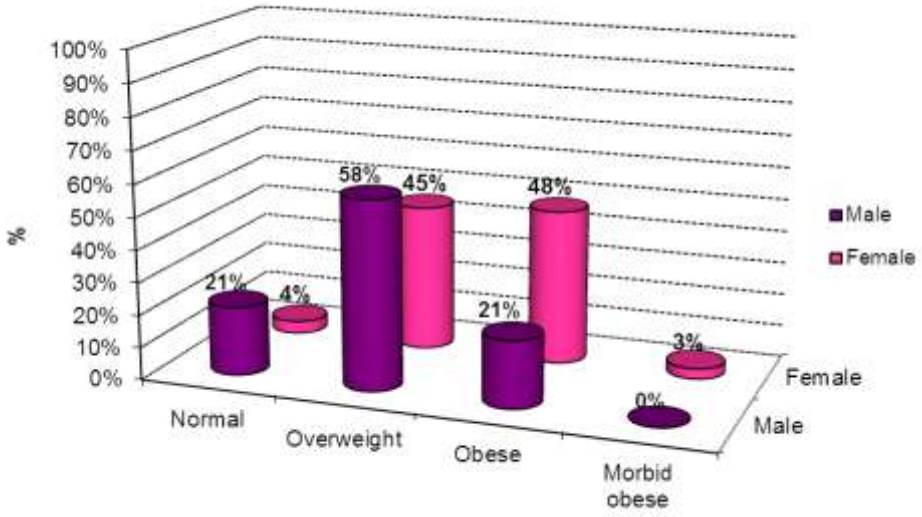

Figure (2): Distribution of the studied sample by sex and Body Mass Index (BMI)

The table also shows that there was an increase in percent intake satisfaction 100% and more from RDAs for energy with increase in age in all age groups except age group 75- < 85 years (44.7%).

Regarding the marital status, the table shows that the highest percentage of the elders (45.9%) who attained 100% intake satisfaction and more of RDAs for energy were married. There was no statistically significant difference (χ^2 = 3.47, p= 0.94).

The table also reveals that the lowest percentage of the elders (37.9 %) with primary or preparatory school education attained 100% satisfaction and more of RDAs for energy, these percentages increased to 48.2 % for elders who were illiterate or could only read and write.

Regarding the income, the table shows that the highest percentage of the elders who attained 100% intake satisfaction and more of RDAs for energy had income 500<800 pounds (50.9%). There was no statistically significant difference (χ^2 = 10.14, p= 0.34).

Table (2): Distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to socio-demographic characteristics

Variables	Percent intake satisfaction from RDAs for energy									
	< 50%		50%-		75%-		100% +		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sex:										
Males	15	7.7	42	21.6	62	32.0	75	38.7	194	100.0
Females	13	7.0	23	12.4	56	30.1	94	50.5	186	100.0
Total	28	7.3	65	17.1	118	31.0	169	44.5	380	100.0
χ^2 = 7.973, p= 0.050*										
Age (years):										
60-	5	7.5	13	19.4	23	34.3	26	38.8	67	100.0
65-	15	7.2	36	17.1	63	30.0	96	45.7	210	100.0
75-	8	8.4	15	16.0	29	30.9	42	44.7	94	100.0
85+	0	0.0	1	11.1	3	33.3	5	55.6	9	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.4	380	100.0
χ^2= 2.442, p = 0.983										
Marital status:										
Single, widowed & divorced	13	6.5	36	18.1	64	32.2	86	43.2	199	100.0
Married	15	8.3	29	16.0	54	29.8	83	45.9	181	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.5	380	100.0
χ^2 = 3.47, p= 0.941										
Educational level:										
Illiterate or read &write	4	7.1	8	14.3	17	30.4	27	48.2	56	100.0
Primary or preparatory	5	7.6	12	18.2	24	36.4	25	37.8	66	100.0
Secondary	9	5.7	25	15.8	52	32.9	72	45.6	158	100.0
University	10	10.0	20	20.0	25	25.0	45	45.0	100	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.4	380	100.0
χ^2= 5.328, p = 0.812										
Income (pounds/ month):										
<500	5	10.2	11	22.4	17	34.7	16	32.7	49	100.0
500<800	1	1.9	11	20.8	14	26.4	27	50.9	53	100.0
800≤1000	9	8.7	15	14.6	38	36.9	41	39.8	103	100.0
>1000	13	7.5	28	16.1	49	28.0	85	48.6	175	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.4	380	100.0
χ^2= 10.14 , p= 0.344										

* Significant at $p \leq 0.05$.

Table (3) shows the distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to medical history, medication use and dental problems.

Regarding chronic diseases, the table shows that the highest percentage of elders who attained 100% intake satisfaction and more of RDAs for energy had no chronic diseases, were not using medications and had dental problems (51.3%, 51.2% and 44.8% respectively).

Table (3): Distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to medical history, medication use and dental problems

Variables	Percent intake satisfaction from RDAs for energy									
	< 50%		50%-		75%-		100% +		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Chronic diseases:										
Yes	27	7.9	55	16.1	110	32.3	149	43.7	341	100.0
No	1	2.6	10	25.6	8	20.5	20	51.3	39	100.0
Total	28	7.3	65	17.1	118	31.1	169	44.5	380	100.0
χ^2= 5.220, *p* = 0.156										
Medication use:										
Yes	26	7.8	55	16.4	108	32.2	146	43.6	335	100.0
No	2	4.4	10	22.2	10	22.2	23	51.2	45	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.5	380	100.0
χ^2 = 3.161 , *p*= 0.367										
Dental problems:										
Yes	24	8.6	42	14.9	89	31.7	126	44.8	281	100.0
No	4	4.1	23	23.2	29	29.3	43	43.4	99	100.0
Total	28	7.3	65	17.1	118	31.1	169	44.5	380	100.0
χ^2 = 5.117, *p*= 0.163										

* Significant at $p \leq 0.05$.

Table (4) shows the distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to activity patterns and smoking.

As regards the activity pattern, the table shows that the elders who attained 100% intake satisfaction and more of RDAs for energy did not practice any exercise and used to watch TV for 4 < 8 hours (48.9% and 50.6% respectively).

Concerning smoking, the highest percentage of the elders who attained 100% intake satisfaction and more of RDAs for energy were nonsmokers (44.7%).

Table (4): Distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to activity patterns and smoking

Variables	Percent intake satisfaction from RDAs for energy									
	< 50%		50%-		75%		100% +		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sports practiced:										
None	11	6.1	29	1.1	52	28.9	88	48.9	180	100.0
Walking	16	8.2	35	17.9	65	33.3	79	40.6	195	100.0
Gymnastics &swimming	1	20.0	1	20.0	1	20.0	2	40.0	5	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.4	380	100.0
χ^2= 4.158 , *p* = 0.655										
Hours of watching TV:										
None	0	0.0	8	26.7	10	33.3	12	40.0	30	100.0
< 1 hr	7	7.5	18	19.4	25	26.9	43	46.2	93	100.0
2 < 4 hrs	16	10.3	24	15.5	48	31.0	67	43.2	155	100.0
4 < 8 hrs	3	3.8	13	16.5	23	29.1	40	50.6	79	100.0
> 8 hrs	2	8.7	2	8.7	12	52.2	7	30.4	23	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.4	380	100.0
χ^2 = 14.478 , *p*= 0.271										
Smoking:										
Yes	3	7.5	6	15.0	14	35.0	17	42.5	40	100.0
No	25	7.3	59	17.4	104	30.6	152	44.7	340	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.4	380	100.0
χ^2 = 0.380, *p*= 0.994										

* Significant at $p \leq 0.05$.

Table (5) shows the distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to total dietary knowledge score.

The table illustrates that the highest percentage of the elders who had good or very good knowledge (79.3%) attained 100% intake satisfaction and more of RDAs for energy as compared to 43.9% who had poor score. However, the difference was not statistically significant (χ^2= 12.754, *p*= 0.171).

Table (5): Distribution of the studied sample by percent intake satisfaction from RDAs for energy and its relation to total dietary knowledge score

Variables	Percent intake satisfaction from RDAs for energy									
	< 50%		50% -		75% -		100% +		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Total knowledge score:										
Good or very good	6	9.8	10	71.5	24	39.3	26	79.3	66	100.0
Fair	5	5.0	19	19.0	27	27.0	49	49.0	100	100.0
Poor	17	7.9	36	16.8	67	31.3	94	43.9	214	100.0
Total	28	7.4	65	17.1	118	31.1	169	44.5	380	100.0
χ^2= 12.754, *p*= 0.171										

* Significant at $p \leq 0.05$.

4. Discussion

Nutrition is important in promoting and maintaining health. Scientific evidence increasingly supports that good nutrition is essential to the health, self-sufficiency, and quality of life of older adults.[19] The aging process changes body composition and thus nutritional status changes, as one gets older. At the same time, the body becomes more susceptible to diseases and diet becomes even more significant than in earlier years.[4]

Physical activity is beneficial for the health of people of all age, including elderly people.[1] The results of the present study revealed that 48.9% of the elderly who consumed more than the recommended intake for energy did not practice any exercise. They also revealed that about half of the elderly (50.6%) who consumed adequate intake for energy were watching TV from 4 to less than 8 hours daily (Table 4). This goes with Centers for Disease Control and prevention CDC (2007) which reported that inactivity was more common in elderly and women were more likely to report no daily physical activity. [20]

Smoking is one of the factors affecting nutritional status. Nicotine and toxic substances found in cigarettes have a great impact on the detoxification process of the body resulting in cell damage and a variety of diseases including malnutrition. It decreases the body ability to absorb essential vitamins and minerals.[12] The present study showed that 44.7% of smokers consumed adequate intake for energy (Table 4). This finding goes with the study done in Taiwan among community dwelling elderly (2011) which documented that elders who were current smokers were more likely to be below the DRI for most nutrients especially calcium and iron. [21]

There are many factors that affect food consumption which should be considered. One of these factors is the psychological status.[12] The present study revealed that the mood of the elderly had a great effect on appetite. The appetite of two thirds of the elderly decreased by mood changes and this was more common among females (Table 1). This is in agreement with the study done in Sweden (2004) on elderly community dwellers which reported that the positive mood made the elders feel satisfied, loved and relaxed, thus improved their appetite and made them enjoy food and eating.[22]

Dietary knowledge is an important determinant of elders' nutrient intake.[13] The results of the present study revealed that only 17.4% of elders had good dietary knowledge and about half of them had poor knowledge. This is in agreement with the study done in Taiwan (2005) on community dwelling elders which reported that 50.6% of the elders had poor dietary knowledge. Also the same study found that dietary knowledge contributed to better nutritional intakes.[13] An association was detected between dietary knowledge and satisfactory dietary intake of elders in the present study, where elders who had good knowledge attained a satisfactory dietary intake (Table 5).

Nutritional assessment is a comprehensive evaluation of the person's nutritional status and typically includes data related to anthropometric measurements and dietary intake assessment.[22] It has been demonstrated that the weight, height, and consequently BMI for both males and females are decreasing with increasing age.[23] Females begin to lose cortical bone at a rate of 10-20% per decade after menopause and males experience bone loss of 3-5% per decade which leads to physical signs of bone loss including decreased body height.[24]

The prevalence and types of nutritional problems differ subsequently between communities and cultures. Overweight was found to be more prevalent among free living elderly in Mexico[25] and among community dwelling elderly in Egypt.[26] In the present work, overweight was prevalent among elders particularly males where 58.2% of males and 45.2% of females were overweight and about one third were obese with higher percentage among females (Figure 2). In another study done in California (2006) on elderly, more than half of the elderly (59.9%) were normal weight, 22.8% were overweight and only 2.5% suffered from obesity.[27] This difference in our finding may be due to reduced metabolic rate with increasing age and sedentary life style as about one half of the elderly did not practice any activity.

Men differ from women in their nutrient requirements due to differences in body composition.[22] The present study revealed that about half (50.5%) of elders who consumed more than the recommended intake for energy were females (Table 2). This finding is different from the study done on community elderly in Switzerland (2002) which reported that elderly females were at markedly increased risk for under-nutrition.[28] These findings may be due to the culture of the Egyptian society where about half of the sample did not practice any exercise with higher percentage among females (Table 4).

Regarding age, the present study revealed that more than half (55.6%) of the elders who consumed more than the recommended intake for energy were in age group 85 years and over (Table 2). This is different from a study done in Vienna (2008) on institutionalized elderly which stated that the prevalence of overweight and obesity increased with increasing age up to 65 years; in people older than 65 years an inverse tendency could be observed; as from this age upwards a high prevalence of underweight was found.[29]

The present study revealed that married elders consumed more than the recommended intake for energy (Table 2). This may be due to that eating is a social event and sharing someone the meals strongly motivates his appetite. This finding is in agreement with a study done in USA (2005) on community dwelling elders which recorded that being married is associated with increased food intake in both men and women and increased BMI.[30]

Education provides the knowledge, skills, and motivation to take individual or collective action needed to create a sustainable quality of life.[31] The present study revealed that level of education influenced food consumption, where about half of the elders (48.2%) who were illiterate or could only read and write consumed more than the recommended intake for energy. This goes with the study done in China (2008) on community dwelling elders which reported that educational level had significant correlations with nutritional status of the elders as well-educated elders were knowledgeable about elderly-specific daily diet regulations.[32]

It is not surprising that household income is negatively associated with elder's risk of nutrient deficiencies.[12] In the present study about two thirds (67.3%) of the elderly who consumed less than the recommended intake for energy had low income (Table 2). This finding is in agreement with a study done in Malaysia (2010) on free living elders which recorded that elders living in medium and high income are less likely to be under-consuming energy and nutrients.[33]

The present work demonstrated that about half (51.3%) of the elderly who consumed more than the recommended intake for energy had no chronic diseases. Medications have a great effect on nutritional status; more than one quarter 28.2% of the elders in the present study who used medications consumed less than the recommended intake for energy (Table 3). This finding is in harmony with the study done in Oxford on institutionalized elders (2000) which stated that medications induced malnutrition.[34]

Conclusion and Recommendations

According to the findings of this study, the following can be concluded:

Almost half of the elderly have poor dietary knowledge. The highest percentages of the elders who have good or very good dietary knowledge attain 100% intake satisfaction and more of RDAs for energy.

The highest percentage of elders who attain 100% intake satisfaction and more of RDAs for energy have no chronic diseases, do not using medications, have dental problems, do not practice any exercise, are used to watch TV for 4 < 8 hours and are nonsmokers.

The problem of overweight and obesity is prevalent especially among the females. The mean percentage of the elders who have dietary intake below two thirds of RDAs is higher among males for most of the nutrients.

Based on the results of the present study and in view of the previous conclusions, the following recommendations are suggested:

Establishing nutrition education program as part of the activities in the elderly clubs including how to eat properly and to avoid unhealthy eating habits. Mass media such as Radio, TV, newspaper and magazines should include information about well-balanced diet, hazardous consequences of obesity and healthy food which should be adopted on nationwide scale. Booklets and pamphlets with simple explanation may be available in the elderly clubs. Encouraging elderly to practice simple exercise regularly in the clubs. Further research

could also focus on analyzing the nutritional problems among the elderly with special emphasis on the different physical and psychological factors impacting such problems.

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