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Editorial

Editor:

Dr Abdulrazak Ahyad

Chief editor

In this issue various topics are discussed including exercise, nutrition and education in the elderly. A paper from Iran attempted to investigate the effect of Romberg exercise on balance improvement in elderly persons. 70 elderly persons with the history of two or more falls during the previous 3 months were selected from Kahrizak nursing home in Tehran. Romberg exercise was practiced in a training group every day (once a day for 45 minutes) for 3 months. The authors concluded that although the effect of Romberg exercise on improvement of balance disturbance and falling was not demonstrated, it needs additional studies with larger sample size and longer follow-up.

A paper from Nigeria looked at Food Consumption Patterns and Micronutrient Intake of Elderly Yorubas in Southwest Nigeria. The authors sampled a total of 300 households and 305 elderly (age 60 and older) Yoruba were studied.

The authors concluded that overall, the elderly Yoruba's diet was inadequate in terms of calories, protein and vitamin A when compared with the RDA. However, the mineral intake was high, especially for calcium and iron. The sources of energy consumed were mainly carbohydrates. The elderly Yoruba require nutritional and social intervention to improve their health outlook.

In contrast a paper from Iran looked at a nutrition education program and health promotion in aged people in Iran. The authors included 192 elderly were interested in study (50 men and 142 women). They concluded that nutritional indices such as Alb, HB and HCT and a decreased number of severely and moderately malnourished elderly, shows the effectiveness of the intervention. They emphasized the need for continuous training programs accompanied by diet modification for the elderly.

A paper from Egypt explored the impact of educational level on the Mini Mental State Examination among Egyptian elderly. The study included three hundred cognitively normal elderly participants, males and females, who were recruited from eight elderly clubs randomly chosen from a list of Geriatric clubs in Cairo and Giza Governorate. The mean MMSE score of males (27 ± 3.5) was statistically significantly higher than that of females (24.7 ± 4.0). A statistically significant association was found between MMSE score with marital status ($p=0.03$) but not with age ($p=0.1$). ANOVA testing showed statistically significant interaction between education and MMSE score ($p=0.000$). There is a higher mean of total MMSE among cases with 10-12 years and above 12 years education compared to other groups and the difference is highly significant statistically. Logistic regression model revealed lower educational years to be an independent risk factor for low total score of MMSE. Those with low educational years have twelve times the risk of having lower MMSE score compared to those with high educational years.

The Application of Romberg Exercises on the Falling State of Elderly Persons in Nursing Homes

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ABSTRACT

To investigate the effect of Romberg exercise on balance improvement in elderly persons, 70 elderly persons with a history of two or more falls during the previous 3 months were selected from Kahrizak nursing home in Tehran (38 for training and 32 as the control group). Romberg exercise was practiced in training groups every day (once a day for 45 minutes) for 3 months. Among all participants, 28 persons in the training group and 21 persons in the control group were followed for 6 months, and then incidence and frequency of falling was assessed during this time. The Incidence of one or more fall in the training and control group was 31.3% and 47.6% in men and 57.9% and 27.3% in women, respectively. No significant relationship between gender and the incidence of falling ($P=0.460$) was found. Also, no significant relationship was found between age and incidence ($P=0.554$) and frequency of falling ($P=0.144$) in elderly persons. Although the effect of Romberg exercise on improvement of balance disturbance and falling was not demonstrated, additional studies are needed with larger sample size and longer follow-up.

Keywords: Romberg exercise, Falling, Elderly, Balance

Introduction

Both the incidence and severity of falls related complications rise steadily after the age of 60. Thirty five to forty percent of the community dwelling population aged 65 and older fall annually so that 50% of those 80 and older, fall each year around the entire world (Gillespie, 2003). Also, falls account for approximately one quarter of all emergency department visits per year (Burt & Fingerhut, 1998). The majority of patients who fall are children or the elderly. In those older than 65 years, the risk of falling has been found to be greater than 20% per year and carries a significant mortality rate (Tinetti, Speechley, & Ginter, 1988; Mackenzie, & Fowler, 2000). Falls result from a variable combination of intrinsic health problems, extrinsic environmental and task related hazards, and the effects of medication - many of which can be ameliorated. Risk factors for falling are classified as intrinsic or extrinsic. Intrinsic factors are internal to the individual. Increased age, a history of falls, impaired balance, poor muscle strength including ankle strength, and slow walking speed are examples of intrinsic risk

factors (Mustard, & Mayer, 1997; Davis, et al, 1999). Other intrinsic risk factors include age-related physiologic changes and chronic conditions of various body systems, particularly cardiovascular, neurologic, musculoskeletal, and urologic conditions (Tinetti, et al 1988; Edwards, & Lee, 1998). There is now good evidence that a range of interventions can be effective in reducing falls rates among older people. The interventions best supported by evidence include: professionally prescribed muscle strength and balance retraining, professionally prescribed home hazard assessment and modification, and exercises. Older adults benefit from exercise of various types, including muscle strengthening exercises, flexibility training, aerobic exercises, and walking, to offset declining strength or to increase muscle strength and to improve balance and gait velocity (Chandler, & Hadley, 1996). Romberg exercise is one of the recommended exercises for balance assessment, because this type of exercise is simple and without need of special instruments. However, this method was used for clinical assessment of balance, not for balance improvement. The aim of

this survey was to study the impact of Romberg exercise on balance improvement in elderly persons.

Materials and Methods

In this study, 70 elderly persons (= 65 years old) with the history of two or more falls during recent three months were selected from Kahrizak nursing home in Tehran between November 2005 and March 2006. Patients with neurological diseases or limitation on physical activity, were excluded. Also persons who used neurological or psychiatric drugs, or drugs which affected balance, were excluded. Individuals who agreed to participate met with the researcher or research assistant who explained the purpose of the study and obtained informed consent. Ethical committees in Tehran University of Welfare and Rehabilitation Science have approved this study. Persons were divided randomly into two groups: 38 persons as the training group and 32 persons as the control group. The structured interview consisted of questions including general characteristics, past medical history, drug history, and numbers of falls during the past six months. Then, Romberg exercise was done in a training group every other day (45 minutes per day once a day) for 3 months. This exercise was guided by a physiotherapist in the mornings.

To do this exercise, one foot of person was placed directly in front of the other (heel to toe) in a corner with the physiotherapist's hands on the patient's hips and this position was held for 60 seconds. Then the position of the person feet was switched and the exercise was repeated.

Among all persons involved, 20% in the training group and 34% in the control group were excluded for the reason of death, admission to the ward, or discharge. Other persons were followed for 6 months and then the incidence and frequency of falling was assessed during this time and compared between the two groups.

Results were reported as the mean \pm standard deviation (SD) for quantitative variables and percentages for categorical variables. Groups were compared using the Student's t test for continuous variables, the χ^2 test for dichotomous variables, and the Mann-Whitney U test for skewed variables. P values of 0.05 or less were considered statistically significant. All statistical analyses were performed by using SPSS version 13 and SAS version 9.1 for windows.

Results

General characteristics of elderly persons are summarized in Table 1. The mean age of persons undergoing Romberg exercise and the control group was similar. Male/female ratio was 0.84 and 1.9, respectively.

The mean of body mass index was also similar between the groups. Orthostatic hypotension was found in 8.8% and 16.7%, respectively. After the first three months duration, 28 and 21 persons in training and control groups were followed up for 6 months. After this period, no significant differences in frequency and incidence of falling between the two studied groups was found (Table 2).

The incidence of one or more falls in men in training and control groups were 31.3% and 47.6% and in women was 57.9% and 27.3%, respectively. Also, the mean of frequency of falling was similar between the two studied groups in both

genders (Table 2). We found no significant relationship between gender and the incidence of falling ($P=0.460$). Also, there was found no significant relationship between age and incidence ($P=0.554$) and between age and frequency of falling ($P=0.144$) in elderly persons.

Discussion

Effective preventive strategies require better understanding of the causes of, and risk factors for, falling among the elderly. The risk factors identified may be helpful to those planning fall prevention initiatives within long-term care settings. One of the most important risk factors for injury among those who fell, was altered mental state and physical balance. Patients who have fallen more than once or who have problems during initial balance and gait testing should be referred to physiotherapy or an exercise program. Physiotherapy and exercise programs can be done at home if patients have limited mobility. Physiotherapists customize exercise programs to improve balance and gait and to correct specific problems contributing to fall risk. Several general exercise programs in health care or community settings can improve balance and gait. Older adults benefit from exercise of various types, including muscle strengthening exercises, flexibility training, aerobic exercises, and walking to offset declining strength or to increase muscle strength and to improve balance and gait velocity (*Chandler & Hadley, 1996*). There is evidence that exercise can also reduce falling and risk of falling in older people. A review of controlled clinical trials reported that studies successfully reduced falls or risk of falls when strength and balance retraining, and endurance training were used (*Gardner et al., 2000*).

A Medline search from 1966 to 2007 using the key words "Romberg exercise" produced 12 articles. A large number of articles were related to the role of exercise in improvement of balance disturbance in elderly patients such as patients with multiple sclerosis or neurological disorders and the diagnostic role of Romberg test, but they were not directly linked to the curative role of Romberg exercise.

In this study, we considered the effectiveness of Romberg exercise on improvement of balance in elderly patients with history of falling. In our study, mean age of persons in two study groups was 78 years old, whereas mean age of persons with history of falling in the Friedman study was lower (72.6 years old) and in the Robertson study was higher (81.1 years old) than our study (*Robertson et al., 2001; Friedman et al., 2002*). It seems that the mean age of falling in elderly persons is different in other societies and related to several factors. Also we found no relationship between increasing age and incidence of falling. In the Omert et al study, it is demonstrated that age did not impact on injury severity or outcome of falling and the Injury Severity Scores and mortality rates for both young and older groups were low (2004).

Sex ratio of falling in studies was different so that in our study, male to female ratio was 0.84 and 1.9 in Romberg exercise and control groups, respectively. This ratio in *Friedman (2002)*, *Omert (2004)*, and *Robertson (2001)* studies was 0.7, 3, and 0.5, respectively. In the Prudham study, the rate of falling was twice as high in women as in men and rate increased with age, but more steeply in men as in women (*Prudham & Evans, 1981*).

The impact of exercise on improvement of muscle weakness and decrease of falling rate was assessed in several studies and results were different. In our study, no significant differences in frequency and incidence of falling between the two studied groups were found. In the Mulrow study, although the rates of falls after exercise did not decrease, the experimental group did show a 15% improvement in mobility and a reduced use of assistive devices and wheelchairs (Mulrow *et al.*, 1994). Also, in the Robertson *et al.* study, falls were not reduced by the exercise program in a sample of women and men aged 65 years and older who were taking psychotropic drugs, however in other persons, a 46% reduction in the number of falls during the trial for the exercise group compared with the control group was found (Robertson *et al.*, 2001).

Several studies of exercise interventions to improve muscle strength have been done with mixed results in persons living in institutions. In one uncontrolled study of an 8-week exercise program among frail nursing home residents with a mean age of 90 years, remarkable increases in muscle strength, a 9% increase in the mid-thigh muscle area, and a 48% increase in mean tandem gait speed were seen (Fiatarone *et al.*, 1990). In addition to physical therapy or exercise training programs, simple walking programs may also improve strength and function. Residents should be encouraged to be as physically active as possible, even if that only consists of walking with assistance a few minutes each day, as long as it can be done with reasonable safety (Robenstein *et al.*, 1994).

Conclusion

Although in our study, the impact of Romberg exercise on improvement of balance disturbance and decrease of incidence and frequency of falling was not demonstrated, there is a need for additional studies with larger sample sizes and longer follow-up time, which could reveal the effect of Romberg and other exercise programs in decreasing falls in elderly persons. This would enable nursing home managers to make the correct choice of suitable treatment strategies.

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Table 1: General characteristics of elderly persons

Characteristics	Romberg exercise group (n=35)	Control Group (n=32)	P value
Mean age (Mean±SD)	78.66±7.56	78.53±6.92	NS
Male sex (%)	45.7	65.6	NS
BMI (Mean±SD)	23.05±2.19	24.70±2.30	NS
Orthostatic hypotension (%)	8.8	16.7	NS
BMI: Body mass index			

Table 2. The incidence and frequency of falling in Romberg exercise and control groups

Characteristics	Romberg exercise group (n=28)	Control Group (n=21)	P value
Incidence of falling (%)	50.0	52.4	NS
Frequency of falling (during past 6 months)	44	28	NS

*Original Contribution/Clinical Investigation***Education Effect on Mini-Mental Status Examination (MMSE) among Egyptian Elderly**

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ABSTRACT

Background: The use of cognitive screening tests such as Mini-Mental State Examination (MMSE) have an adverse effect on the evaluation of illiterate and low education individuals. The aim of the current study was to explore the impact of educational level on the Mini Mental State Examination among Egyptian elderly.

Method: Three hundred cognitively normal elderly participants, males and females, were recruited from eight elderly clubs randomly chosen from a list of Geriatric clubs in Cairo and Giza Governorate. Comprehensive geriatric assessment including personal history, educational level, past medical history, mood assessment using Geriatric Depression Scale-15 items (GDS-15) and functional assessment using Activities of Daily Living Scale (ADL), and cognitive function assessment using Arabic version of the MMSE were done on all participants.

Results: The mean MMSE score of males (27 ± 3.5) was statistically significantly higher than that of females (24.7 ± 4.0). A statistically significant association was found between MMSE score with marital status ($p=0.03$) but not with age ($p=0.1$). ANOVA testing showed a statistically significant interaction between education and MMSE score ($p=0.000$). There is a higher mean of total MMSE among cases with 10-12 years education and above 12 years compared to other groups and the difference is highly significant statistically. Logistic regression model revealed lower educational years to be an independent risk factor for low total score of MMSE. Those with low educational years have twelve times the risk of having a lower MMSE score compared to those with high educational years.

Conclusion: Education and gender influence cognitive screening results using MMSE. This should be taken into consideration when using such instruments. Different cut-off scores should be laid down for different educational levels.

Keywords: Cognition, Education, Elderly, MMSE.

Introduction

Early recognition of cognitive impairment is important for diagnosis of potentially reversible medical conditions, and initiation of treatment interventions. Patients and caregivers will have time to prepare for lifestyle changes and plan for the future e.g. arranging finances and discussing end-of-life care while the patient is still competent (*Boutsani et al, 2003*).

Cognitive screening instruments developed for detecting dementia contain items that are partly reading and writing dependent. Therefore, they must be adapted for education and cultural difference before applying to illiterate populations (*Xu et al, 2003*). Less educated people were found to perform worse on mental status tests than those with more education

(*Mortimer & Graves, 1993*).

Mini Mental Status Examination (MMSE) (*Folstein et al, 1975*) is the most widely used short cognitive test in clinical practice, research, and epidemiological studies (*Huppert et al, 2005*). It is considered the most commonly administered psychometric screening assessment of cognitive functioning. The MMSE is used to screen patients for cognitive impairment, track changes in cognitive functioning over time, and often to assess the effects of therapeutic agents on cognitive function (*Strauss et al, 2006*).

MMSE specificity and sensitivity are limited when the test is applied to subjects with little or no formal education, thus limiting its appropriateness as a screening instrument for

dementia in populations with high illiteracy rates. Adjusting the MMSE cutoff scores according to schooling reduces the number of false-negatives in samples with more schooling and the number of false-positives in the less educated, especially the illiterate (Mungas et al, 2003).

The traditional MMSE cut-off score of 23 or less had a sensitivity of 69% and a specificity of 99%. Use of age- and education-specific cutoff scores improves the sensitivity to 82% with no loss of specificity. The clinical utility of the MMSE and acceptance by physicians may be improved through awareness of the influence of education on the MMSE (Tangalos et al, 1996).

The aim of the current study is to explore the impact of educational level on the score of the Mini Mental State Examination (MMSE) in a sample of elderly Egyptians.

Methods

Study population:

The study was carried out - between July 2008 and December 2008 - in 8 elderly clubs randomly chosen from a list of Geriatric clubs in Cairo and Giza Governorate, was reviewed and updated by the Ministry of Social Affairs, and provided by the social worker of the Department.

The study was reviewed and approved by the Research Review Board of the Geriatrics and Gerontology Department, Faculty of medicine, Ain Shams University.

Three hundred participants were recruited for the study. The subjects who were apparently healthy, cognitively normal, and ambulant at the time of assessment, aged 60 years and over, both males and females, were included in the study.

A subject was defined as cognitively normal if there were no complaints about memory impairment or any other cognitive domain and no evidence of impairment in the activities of daily living stemming from cognitive disturbances (Inzelberg et al., 2007).

Explanation of the study aim and procedures was given to all subjects with informed consent taken from each and those who refused to participate were excluded from the study. Also, subjects who scored more than 5 in the Geriatric Depression Scale, fifteen items (GDS-15) were excluded from the study.

Tools of Assessment:

All participants were subjected to Comprehensive Geriatric Assessment (CGA) including:

- Full medical and personal history including Educational level, marital status and medical history
- Functional assessment was done using Activities of Daily Living questionnaire (ADL) (Katz et al, 1963), whereas, presence of depression was assessed using Geriatric depression scale 15 items (GDS-15) (Sheikh & Yesavage, 1986).
- Mini-mental status examination (MMSE) (Folstein et al, 1975) -Arabic version (El Okl et al, 2001) provided by the Department, was used for assessment of cognitive function. The MMSE assesses different domains of cognitive functions with a total score of 30.

The MMSE comprises:

- 30 questions with 10 devoted to orientation (five regarding time and five regarding place);
- three items requiring registration of new information (repeating three words);
- five questions addressing attention and calculation (mental control questions requiring patient to make five serial subtractions of 7 from 100 or spell word backwards);
- three recall items (remembering the three registration items);
- eight items assessing language skills (two naming items, repeating phrase, following a three-step command, reading and following a written command and writing a sentence);
- and one construction question (copying a figure consisting of two overlapping pentagons).
- A score less than 24/30, indicates cognitive impairment.

Statistical methods

The data was collected, coded and entered into a personal computer (P.C.) The data was analyzed with the program (SPSS) statistical package for social science under Windows version 13.0. Qualitative data was presented in form of frequency tables (number and percentage). Quantitative data was presented in form of mean \pm standard deviation and range.

Education level was treated as an ordinal variable by grouping the subjects by years of formal schooling. Subjects were divided into 4 groups according to educational levels: Group A (less than 3 years of education), Group B (from 3 to 9 years of education), Group C (from 10 to 12 years of education), Group D (more than 12 years of education)

Pearson correlation coefficient was performed to test correlation between 2 quantitative variables, while One way Analysis of Variance (ANOVA) was used to test for comparison between multiple groups with Quantitative continuous variables. Independent sample-t test was also used to compare two groups with quantitative continuous variables.

Multinomial logistic regression analysis was done to determine the independent association of different factors. P value was always set as significant at 0.05.

Results

Of the subjects who were approached, 20 elderly who had depressive symptoms (GDS more than 5) were excluded as depression itself sometimes is associated with lower cognitive functioning even when dementia is excluded (Ganguli et al, 2006), 13 refused to participate, whereas 300 cognitively normal subjects constituted the study group. There were 165 (55%) male and 135 (45%) female.

Age of the studied sample ranged from 60 to 90 years with mean age 70.7 ± 6.5 (SD) (males 71.03 ± 6.6 , females 70.4 ± 6.4). 108 of them (36%) were unmarried (single or widow) while 192 (64%) were married.

Educational years of the studied sample ranged from 0 to 16 years with mean educational years 9.3 ± 6.5 (SD) (Table 1). Males (11.5 ± 6.1) had more educational years than females (6.6 ± 6.1) with statistically significant difference ($t=6.98$, $p=0.000$).

Of the studied sample, 57.7% ($n=173$) had at least one

chronic disease, 42.3% (n=127) were hypertensive on therapy, 23.7% (n=71) were diabetic, 14.3% (n=43) had ischemic heart disease (IHD) and 10.7% (n=32) had chronic obstructive pulmonary disease (COPD) previously diagnosed.

Mean MMSE score of the studied sample was found to be 26.02 ± 3.9 (Table 2). Males were found to have higher mean MMSE (27 ± 3.5) compared to females (24.7 ± 4.0) with the difference being highly significant statistically ($t=5.2$, $p=0.000$), whereas, no statistically significant correlation was found between age of the studied cases and the total MMSE score ($r=-0.087$, $p=0.1$).

Eighty one participants were within the lowest percentile (25th) and 61.1% of them were females (n=56).

There was a lower mean MMSE among unmarried (single or widowed) participants (25.3 ± 3.7) compared to married participants (26.3 ± 4.0) and the difference was found to be significant statistically ($t=2.1$, $p=0.03$).

Variables with the lowest scores among the studied group were the calculation and then the recall variables (Table 3). All studied subjects got 100% scores on registration point.

When comparing the MMSE score of the studied group and their education, a highly significant positive correlation was found between number of educational years and the total mean MMSE ($r=0.742$, $p=0.000$).

There was a higher mean of total MMSE among cases with 10-12 years and above 12 years compared to other groups and the difference was highly significant statistically ($F=106$, $p=0.000$) (Table 4).

LSD test showed significant difference between; Group A vs B, C, D -

Group B vs C, D, whereas, no significant difference was shown between group C and D.

There was a highly significant positive correlation between the educational years and the orientation score, calculation score, and language score whereas no significant correlation was found with the recall score (Table 5).

There was a statistically significant higher mean educational year among cases with positive visuo-spatial score compared to cases negative for visuo-spatial (Table 6).

When assessing each gender separately, again a statistically significant difference was found between different educational levels as regards their MMSE score (Table 7).

Factors found significantly related to MMSE in the current study included education, marital status and female gender. Logistic regression analysis showed powerful education correlates to test performance independent of other factors (Table 8).

Discussion

Education was found to be the most powerful independent factor affecting MMSE score compared to age and gender. The results of the current study showed that there was a highly significant positive correlation between number of educational years and the total mean MMSE. Those with low educational years have twelve times the risk of having lower MMSE score compared to those with higher educational years.

Education introduces a psychometric bias leading to a misclassification of individuals from different educational backgrounds (Tombaugh & McIntyre, 1992). Subjects of limited literacy do worse than educated subjects, having 6 years of compulsory formal primary education, on a variety of neuropsychological tests later in life clarifying the value of education in early life on cognitive performance in the elderly (Elwan et al, 1996).

Crum et al. (1993) reported the MMSE scores to be related to schooling level. The mean was found to be 29 for individuals with more than 9 years of schooling, 26 for those with 5 to 8 years of schooling, and 22 for those with 0 to 4 years of schooling.

In another study employing the CERAD battery (Consortium to Establish a Registry for Alzheimer's Disease), which includes the MMSE, regression analyses indicated powerful education and less marked age and gender correlates of test performance (Unverzagt et al. 1996).

Marcopulos et al., (1997) attempted to establish preliminary norms for nine commonly administered neuropsychological tests including the MMSE. The use of previously existent test norms with lower-educated, rural-dwelling, older adults was found to result in over-estimation of cognitive impairment. Persons with fewer than 8 years of education often scored below the cutoff originally suggested for indicating cognitive impairment, including on the MMSE, irrespective of racial identity.

Scores at low levels of education should be treated with caution to prevent false positive interpretation (Inzelberg et al, 2007). In a Brazilian study, analysis of covariance taking age into account showed that MMSE scores were significantly lower among those with no formal education (Almiedo, 1998).

In a healthy older Hispanic sample, educational level effects were found to be stronger than age effects on the MMSE scores. The performance of participants with no schooling was similar to that of moderately demented patients, while the performance of participants with 1-4 years of education resembled the performance of mildly demented patients (Solis et al, 2000).

Also when the Korean Mini Mental State Examination (K-MMSE) was applied to the cognitively normal, results showed that the K-MMSE scores were related to the level of education and concluded that the normative data of those with lower educational levels should be different than those with higher educational levels (Changsu et al, 2008).

When correlation coefficient was studied between the educational years and the individual items included in the MMSE, there was a highly significant positive correlation between the educational years and the "calculation", "Language", and "orientation" scores among studied patients ($P<0.01$). But, there was no significant correlation between educational years and the recall score.

These results agree with Solis et al., (2000) who mentioned that items that were most sensitive to educational level were those that involve reading, writing, and calculation.

Also in an Italian study, MMSE results were coded in 10 item bundles. Six of the 10 item bundles were found to have

differential functioning related to education. Items that required literacy skills (writing a sentence, following a written command) mathematics-based serial sevens and interlocking pentagons items, were much more difficult for those with less schooling (*Crane et al, 2006*).

In the current study, there was no statistically significant correlation between age of the studied subjects and the total MMSE score. This might disagree with some of the normative scores published for both age and educational levels (*Grigoletto et al, 1999; Solis et al, 2000*). *Crum et al. (1993)* found an inverse relationship between MMSE scores and age, with a mean of 29 for those 18 to 24 years of age and 25 for individuals 80 years of age. The current study had a narrower range of age (from 60 to 90 years) to assess.

When Mini-Mental State Examination (MMSE) was adapted to the Slovenian language and the influences of age and education on its score were evaluated, the positive effect of education was stronger than the negative effect of age. Older non-demented subjects with a high level of education achieved higher scores than did similar subjects with less education (*Rakuska et al, 2006*).

As regard gender influence on the MMSE, there was a higher mean MMSE among males compared to females and the difference is highly significant statistically.

There was actually more of those with lowest education level (A) among females in the studied sample (n=52/135, 38.5%) compared to the males (n=27/165, 16.4%) and males had more mean educational years. Yet, within the same education level (B, C), females tend to have lower mean score, suggesting additional factors beyond education. One of them could be the different social exposure and lifestyle of males versus females in this cultural group.

Gender was also found to be associated with the Korean version of the MMSE (K-MMSE) scores (*Changsu et al, 2008*).

While in those with more than 12 years education (D), females tend to have a higher score, a possible explanation could be that in the studied generation, girls who were intellectually privileged were given the opportunity to spend more years in education, while boys had the opportunity to study routinely (*Inzelberg et al, 2007*).

Nowadays, females have the same opportunities of higher education, health literacy and employment as males, so gender difference in MMSE may disappear in a few decades.

Effect of companionship on cognitive functions was clear in the current study as we have noticed that being married was associated with higher MMSE scores than being single or widow.

Intimate, confiding relationships may be most valuable to a person's well-being and mental health in old age. About four out of five elderly persons report having confidantes. When available, spouses are most likely to be listed as confidantes, followed by friends, children, and siblings (*Johnson & Troll, 1994*).

The main limitation of our work is the possibility that very mild dementia might have been unrecognized and misclassified as cognitively normal. Older adults in the Egyptian community mostly are being cared for by

their families, and certain functional limitations may be underestimated owing to low expectations from the elderly.

Because of the effect of education on performance, different cut-off scores should be used for different educational strata. Further studies are needed to develop norms accordingly for such an Arabic translated form. Adjusting cut-off scores according to educational level can raise the sensitivity and specificity of the MMSE.

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Table 1 Distribution of education level in the studied sample

N=300			
Education	No.	%	
Group A = <3 years	79	26.3	
Group B = 3-9 years	75	25.0	
Group C = 10-12 years	21	7.0	
Group D = >12 years	125	41.7	
Educational years	9.3 (Mean)	6.5 (SD)	0-16 years

Table 2 Descriptive statistics of the total MMSE score among studied sample:

	Mean	SD	Range
MMSE	26.02	3.9	15-30
25th percentile(n=81)	23.0		
50th percentile	27.0		
75th percentile	29.0		
95th percentile	30.0		

Table 3 Descriptive statistics of the mean parameters included in the calculation of MMSE

	Mean %	SD	Range of %
Time orientation	91.8	15.7	40-100
Place orientation	98.8	5.7	40-100
Calculation	62.9	41.3	0-100
Language	92.9	11.3	50-100
Recall	76.2	27.8	0-100

Table 4 Correlation between EDUCATION of the studied patients and the mean MMSE

Education	Mean MMSE	SD	Range
<3 years (A) N=79	21.5	3.1	15-29
3-9 years (B) N=75	26.0	3.8	15-30
10-12 years (C) N=21	27.7	2.2	23-30
>12 years (D) N=125	28.5	1.5	23-30

Table 5 Correlation coefficient between the educational years and the parameters included in the calculation of MMSE

	Educational years	
Time orientation	r= 0.497	P= 0.000**
Place orientation	r= 0.235	P= 0.000**
Calculation	r= 0.730	P= 0.000**
Language	r= 0.790	P= 0.000**
Recall	r= -0.007	P= 0.908

Table 6 Correlation between results of visuo-spatial item and the mean educational years

Visuo-spatial	Mean Educational years	SD	t	P
Negative N=112	5.0	6.4	9.9	0.000**
Positive N=188	11.8	5.2		

** P<0.01 Highly significant

Table 7 Correlation between EDUCATION of studied males and females and the mean MMSE ANOVA test

Males' Education	Mean MMSE	SD	Range	F	P
<3 years (A) N=27	21.2	4.1	15-29	62.8	0.000**
3-9 years (B) N=30	27.4	3.1	19-30		
10-12 years (C) N=10	28.9	1.3	26-30		
>12 years (D) N=98	28.3	1.4	25-30		
Females' Education	Mean MMSE	SD	Range	F	P
<3 years (A) N=52	21.7	2.4	18-28	39.6	0.000**
3-9 years (B) N=45	25.0	4.0	15-30		
10-12 years (C) N=11	26.6	2.3	23-30		
>12 years (D) N=27	29.1	1.7	23-30		

** P<0.01 highly significant

Table 8 Logistic regression model for the independent risk factors for LOW MMSE score (below 50th percentile) median score

	P	OR	95% CI
Low educational years	0.000**	11.9	6.1-23.1
Being single	0.000**	4.2	2.2-8.0
Being female gender	0.05	1.7	0.9-3.2

Nutrition Educational Program and health Promotion in Aged People in Iran

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ABSTRACT

Background Aging is a natural course of life that is accompanied by some changes in body metabolism. These changes make the elderly susceptible to malnutrition. Data shows 3-13% of elderly society suffer from malnutrition and this rate is 30-60% in the institutionalized elderly. In this study we assessed the effects of medical care staff education on the nutritional situation of elderly who lived in Kahrizak Charity Foundation in Tehran over a 4 month period.

Materials and Methods 192 elderly, interested in the study (50 men and 142 women), living in KCF, who were 65 years old or more, and not affected with progressive hepatic and renal diseases and with no history of surgery within the last month, were randomly chosen and assessed. In this group laboratory tests HB, HCT, LDL, HDL, FBS, Alb, and CRP were measured before and after intervention. The nutritionists also assessed MNA, MMSE, ADL and Norton Scores. Then all the medical and nursing staff of KCF were trained in a 3 day workshop. After 4 months, all the above clinical and para clinical tests were evaluated again. Data was statistically analyzed with SPSS software.

Results The research, due to findings and based on MNA, revealed that 35/9% of elderly had very severe and severe malnutrition prior to the study, decreasing to 18/3% following training. The mean Albumin, HB, HCT, LDL, FBS all increased from 3/98 to 4/11, 12/7 to 13/03, 37/86 to 38/8, 135/13 to 146/25, 81/92 to 95/8, respectively and the difference was meaningful. The mean HDL differed from 43/84 to 42/85, which was not meaningful. The nutritional situation was meaningfully related to age, mouth and swallowing disorders, poly pharmacy, cognitive state, ADL score in eating and Norton.

Conclusion Nutritional indices such as Alb, HB and HCT decreased and the number of severely and moderately malnourished elderly, shows the effectiveness of the intervention. We emphasize the need for continuous training programs accompanied by diet modification for the elderly.

Key words: Nutrition; Nutrition education; aged people; Iran.

Introduction

The elderly are a vulnerable group of society all around the world and are taken into particular consideration. During recent years, due to reduced mortality, improved hygiene and increased life expectancy, the number of elderly is higher than any time in history and of each ten people in the world; one is more than 65 years old⁽¹⁾.

Also in Iran increased general population has led to increased number of elderly and according to the most recent data, 7/8% of population is 65 years old and older. Regarding the increase in population, it is predicted that this will reach 16% in next decades^(2,3). However, the elderly population distribution in the world and particularly in developing countries shows the importance of the increasing elderly population on future planning and since they are considered as a vulnerable group and the main health care consumers, it seems necessary to provide and perform proper health programs for them.

Age is accompanied by cognitive, metabolic and mood changes as a natural progressive and irreversible phenomenon

occurring in each person's life. These changes are followed by changes in health and nutritional status. Nutrition as one of the most important parts of health can greatly influence healthy aging, disease prevention, and shortening of convalescence periods in the elderly. Data shows 30 to 60% of institutionalized elderly suffer from malnutrition^(4,5).

As it is always confirmed, the improvement and repair of nutrition quality starts with health education.

By means of proper education, we can prevent many nutritional problems and improve the nutritional health status of the elderly. So, we assessed the effect of the nutritional education program for Kahrizak foundation staff on increasing the nutritional health status of their inhabitants and proper intervention to improve the nutritional quality for the elderly.

Background

The nutritional status of the elderly can be affected by many factors including inadequate nutrient absorption, acute or chronic medical problems, drug therapy, physical or mental shortcomings, low income and social isolation.

Many of these factors compromise nutritional health status.

Recent research concerning the nutritional status of the elderly, shows the high incidence of protein-calorie nutrient malnutrition in this group. For instance, the Rodman study showed that in 30 to 50% of institutionalized elderly, the bodyweight, arm circumference and serum albumin levels are below the normal standards⁽⁷⁾. Other studies show that weight loss and cachexia of the elderly are accompanied by increased mortality and health status disorders⁽⁷⁾.

Malnutrition can cause significant disability and abnormal functions^(8,9). The results of other studies in the elderly show a firm relationship between the nutritional status of elderly and their functional capacity⁽¹⁰⁾. Some of the malnutrition indices are strongly related to reduced functional capacity of the elderly and their inability to complete daily activities (ADLs), and this is regardless of their age and gender^(11,12,13). In another study, the effect of reduction in some nutritional indices such as body mass cells, Albumin, transferin, total cholesterol, hemoglobin, skin wrinkle thickness and body mass index (BMI), on worsening of function and daily activities was highlighted⁽¹⁴⁻¹⁶⁾. Other studies on home resident elderly show that in this group, in spite of living in their own homes, still 3 to 13% suffer from malnutrition^(17,18). According to the study on 92 elderly, 65 years old or more, in two governmental foundations in Tehran, in 25% of samples, the received energy was less than the recommended dose, and this was more prominent in men⁽¹⁹⁾. In another study in three private sanatoriums among 100 elderly 65 years old and more, 49/2% of women and 43/2% of men received less energy than the recommended dose. This study showed that 54% of low-weight women and 46% of low-weight men were suffering from malnutrition⁽²⁰⁾.

In another study on 170 65 year old elderly in Tehran, the following results were found : poor nutrition was seen in 52/9% of them and energy intake and all nutrients except vitamins B1 and B12 were more in elderly man than women. These elderly had a deficiency in most nutrients particularly vitamins B6 and B2 and from the viewpoint of energy intake 51% and protein intake 42%, were deficient. Anorexia, dental problems, singleness and/or living alone were effective factors in receiving nutrients, respectively⁽²¹⁾.

Proper nutrition is important in prevention of many ailments including degenerative diseases. According to one estimate one half to one third of health problems in the elderly are due to insufficient nutrient intake. Therefore improper nutrient intake in old age not only causes nutritional deficiency, but also facilitates many disorders of this period, indicating the need for intensive health care services. Then it is morally, economically and socially so important to take care of nutritional problems in the elderly⁽²⁰⁾. On the other hand, improving the nutritional status of the elderly is of the most important and basic parts of elderly health. Health education is an important issue in primary prevention and many studies have identified the role of health education in health improvement⁽²²⁾. So, we evaluated the effect of health education programs in improving the nutritional status of the elderly.

Methods

This is a semi experimental interventional and prospective study. The main purpose is to determine the effect of health

education programs for the staff on improving the nutritional status of the elderly living in Kahrizak foundation in Tehran.

Sampling and number of samples:

The qualified cases were randomly selected among 1100 institutionalized elderly of Kahrizak foundation. Regarding the previous studies, the prevalence of malnutrition was considered $P=0/3$ and based on the formula:

$N = t^2 p/q$ ($t = 1/96$, $d = 0/06$), the number of samples was calculated as 200.

Samples Criteria

In this study the elderly were 60 years old and more, and at least institutionalized for the last 2 months.

They did not have dialysis dependent renal failure or progressed liver failure. They did not undergo surgery 4 weeks prior to study and those with Nasogastric tubes or jejunostomy were not included.

Instruments and Methods

Data collection was via questionnaires designed into several parts. The first part included demographic data (age, gender), the second part contained questions concerning nutritional status, the third part was a Mini Nutritional assessment (MNA), the fourth part Activities of Daily Living (ADL) and the fifth part, the laboratory indices (Albumin, HB, HCT, LDL, HDL, CRP and FBS), the sixth part was about assessment of bed sore risk (Norton), the seventh part about brief cognitive state (Folstein) and the last part about the evaluation of drugs influencing the nutritional status of the elderly. These questionnaires were completed by 3 nutritionists, already trained in this field, prior to study and 4 months after it.

Validity and Reliability

We used content validity method, so that after using foreign and internal sources to design the questions, health and nutritional science specialists confirmed the scientific validity. In order to determine the scientific reliability of data collection instruments, we used repeated questionnaire evaluation method. So 10 qualified randomly chosen elderly completed the questionnaires twice within a 10 day interval. The results were analyzed by Pierson relationship method and no meaningful difference was found. Kapla ratio also showed no meaningful difference about inquiries.

Educational program (Intervention)

In this research, the intervention was to perform an educational program (3 day workshop) for all medical, nursing, nutritional and administrative staff of Kahrizak foundation, parallel with problem solving and case studies. It was carried on in 2 levels regarding the educational level of staff for medical, nursing and nutritional staff, and others.

Analytical Method

After data collection, and before and after the educational program, data was encoded and computerized. Descriptive statistics including mean, standard deviation and frequency distribution were found by means of SPSS software and charts were drawn. Parametric and non-parametric paired tests and

some other statistical tests were used to analyze the data.

Findings

Among 200 qualified samples, 192 were completely assessed (8 elderly did not cooperate). This included 142 women (74%) and 50 men (26%). The mean age was 77 years old with 8/9 SD. Women were mostly in 75-84 years age group (32/8%) and men mostly in the 66-74 years age group (12/5%). 94% of male elderly were single in a way, and only 3 were married. 73/2% of female elderly were widowed and only 7 (4/9%) were married. 59/9% of elderly women and 40% of men had children. The mean residency period in the institute was calculated as 40 months (3 years and 4 months).

Laboratory indices assessment prior to education

The mean serum Albumin level was 3/98 gr with 0/44 SD minimum 2/1 and maximum 5/3 gr/dL. The mean serum Albumin in women and men was 4 with 0/45 SD and 3/9 with 0/41 SD, respectively. 16/4 % women had Albumin equal to or less than 3/5 and 22% men had Albumin equal to or less than 3/5 gr/dL.

The mean Hemoglobin level of all samples was 12/68 mg/dL with 2/78 SD.

The mean hemoglobin in women and men was 12/56 with 2/91 SD and 13/03 with 2/39 SD, respectively. 51/5% of all samples had hemoglobin less than 12/5 and 32% of men had hemoglobin equal to or less than 13 mg/dL.

The mean hematocrit was 37/86 % with 5/3 SD, and 37/24% with 5/1 SD and 39/64 with 5/43 SD in women and men, respectively, 36/62% of women had HCT equal to or less than 36% and 28% of men had HCT equal to or less than 39.

The mean low density serum lipoprotein was 135/13 mg/dL with 44 SD.

The mean LDL in men was 124/4 with 42/2 SD and in women 138/87 with 44 SD. 31/6% of all samples had LDL less than 110, 32/8 % more than 150 and 35/6% had LDL 110-150. 40% of men had LDL less than 110 and 22/2% more than 150 and 37/2% had LDL 110-150. 23/7% of women had LDL less than 110 and 36/4% more than 150 and 34/9 % had LDL 110-150.

The mean HDL high density lipoprotein of all samples was 43/89 mg/dL with 11/5 SD, the mean HDL in women was 44/46 with 12/53 SD. 14% of women and 27/3% of men had HDL less than 35.

17/3% of all samples had HDL less than 35.

The mean fasting blood sugar was 81/42 mg/dL with 19/9 SD, and this was 82/59 with 20/75 SD in women and 80/02 with 17/23 SD in men. 21/7% of all samples had blood sugar less than 70 and 7/2 %, more than 110. 71/1% of all samples had blood sugar 70 - 110. 20/3% of women and 25/5% of men had blood sugar less than 70 and 8/3% of women and 4/3% of men had blood sugar more than 110. 71/4% of women and 70/1% of men had fasting blood sugar 70-110 mg/dL.

Assessment of questions concerning nutrition prior to education

Only 3 elderly were on special diets. Most of them (56/8%) had no problem with their sleep condition. 69/8% had good

appetite and 52/1% were satisfied with their lives. 57/3 were not worried or anxious and 4/7% had recreational activities. 69/8% were not happy most of the times. 88% did not achieved ADL score in eating and only 12% (23 people) did.

72/4% had Norton score equal to or more than 14 and 27/1% of elderly had Norton score less than 14. 5/7% had MNA score less than 11 and 30/2%, 11-17 and 60/9% 17-23/5, and only 1/6% (3 people) had a score more than 23/5. 84/9% had no mouth disorder and 19/3% had swallowing problems. 29/2% (56 people) were taking one or two drugs affecting their nutritional state. Regarding the cognitive state of elderly 16/5 % had a score 5-7 and 83/5% a score more than 8. 27/1% of elderly had a CRP situation + 2 and + 3 and 7/8% + 1, and 58/9% had negative CRP.

Laboratory indices assessment after intervention

Mean albumin level of all samples was 4/11 gr/dL with 0/39 SD minimum 2/1 and maximum 5/2. Mean albumin in men and women was 4/16 with 0/31 SD and 4/1 with 0/42 SD, respectively. 5/1% of all samples had albumin equal to or less than 3/5 gr/dL. 7% of women had albumin equal to or less than 3/5 and all men had albumin more than 3/5.

Mean hemoglobin of all samples was 13/03 mg /dL with 1/88 SD. Mean hemoglobin in women and men was 12/67 with 1/75 SD and 14/04 with 1/86 SD, respectively. After intervention, 41% of women had a hemoglobin equal to or less than 12/5 mg/dL and 20% of men had a hemoglobin equal to or less than 13 mg/dL.

Mean hematocrit in all samples was 38/8% with 5/82 SD. Mean hematocrit in women and men was 38/6% with 4/69 SD and 40/79% with 7/83 SD, respectively. 31/7% of women had a hematocrit equal to or less than 36 and 26% of men had a hematocrit equal to or less than 39. Mean LDL of all samples was 146/25 mg/dL with 51 SD. Mean LDL in women and men was 147/58 with 52/5 SD and 141/7 with 46/07 SD, respectively.

25/5% had LDL less than normal and 41/4% had LDL more than normal range. 25/6% of women had LDL less than normal and 45/3% had LDL more than 150 mg/dL, 25% of men had LDL less than normal and 30% had LDL more than 150 gr/dL. After intervention, mean HDL was 42/85 mg/dL with 11/92 SD and 24/1% of all samples had HDL less than 35 mg/dL. Mean HDL in women was 44/9 mg/dL with 12/40 SD and 16/9% had HDL less than 35 mg/dL. Mean HDL in men was 36/77 mg/dL with 7/8 SD and 45% of men had HDL less than 35 mg/dL. Mean fasting blood sugar of all samples was 95/8 mg/dL with 29 SD. 6/2% of all samples had FBS less than 70 mg/dL and 16/7% more than 110 mg/dL. Mean FBS in women and men was 99/42 mg/dL with 31/5 SD and 85/47 mg/dL with 13/47 SD, respectively. 4/8 % of men and 20/8 % of women had FBS more than 110 mg/dL and 11/9 % of men had FBS less than 70 mg/dL. The comparison of mean blood indices for all samples and also according to sex prior to and after intervention is illustrated in Table 1.

Ethical considerations

Approval of the research as well as the national ethical committee was gained. Informed consent was signed by participants after explanation of purpose of the study, the

direct and indirect benefits and risks, as well as confidentiality of collected data with their right to withdraw at any stage of the study.

Results

A total of 28 patients completed two follow up visits, one for re-injection and the other for response analysis. Eighteen were females and 10 males (Table 1). The age range was from 40 to 50 years with mean age of 45.96 +3.21 SD years (Table 2). Visual analogue scale (VAS) analysis was used to see the response along with clinical examination and ESR. No response was received from 11 patients, (6 females and 5 males) with VAS 10/10 for pain and swelling, flexion up to 30 degree and ESR>60mm/hr. Partial response was recorded in 11 patients (7 females and 4 males), with VAS 5-10/10 for pain and swelling, flexion 30-90 degree and ESR 41-60mm/hr. Good response (VAS 0-4 /10 for pain and swelling) was noted in 6 patients with flexion >90 degree and ESR 20-40mm/hr. Flexion, swelling and sex cross tabulation clinically elicited response analysis of patients is shown in Table 3. Reduction in ESR improvement in pain that was orally explained by patient and recorded in terms of percentage improvement is shown in Table 4.

Assessment of questions concerning the nutritional state after intervention:

81/3% of elderly had a Norton score 14 or more and 16/1% less than 14. 1/6% had MNA score less than 11, 16/7%, 11-17, 60/5%, 23/5 - 17 and 2/6% more than 23/5. Table 2 shows the comparison of MNA score prior to and after intervention.

84% of all samples had no mouth disorder and 80% had no swallowing problem. 23/8% had a cognitive status score 8-7 and 76/2% had a score more than 8. The CRP status was +2 and +3 in 26% < +1 in 4/7% and negative in 62% of elderly.

Discussion

Comparing the blood indices prior to and after education in both males and females using paired test with a certainty level of 95% the following results were found:

- There was a meaningful difference between serum albumin level in all samples prior to and after education (3/98 VS 4/11, $p < 0/002$ and $T = 3/2$).
- There was a meaningful difference between serum albumin level in males prior to and after intervention (3/9 VS 4/2 gr/dL, $p < 0/003$ and $T = 3/2$).
- There was no meaningful difference between mean serum albumin level in women prior to and after intervention (4 VS 4/1, $p < 0/051$ and $T = 1/97$).
- Overall 5% of samples had serum albumin less than 3/5 gr/dL and this was only in the female group.
- There was a meaningful difference between mean hemoglobin level prior to and after intervention (12/7 VS 13/03 mg/dL, $p < 0/000$ and $T = 5/2$), women had a mean hemoglobin level less than men.
- There was a meaningful difference between mean hemoglobin prior to and after education in men and women (women $p < 0/001$ and $T = 3/53$) and (men $p < 0/000$ and $T = 4/07$).
- There was a meaningful difference between mean

hemoglobin levels prior to and after education (37/86 VS 38/8), (7=3/36 and $p < 0/001$). Also there was a meaningful difference between mean HCT levels in both women (37/24 VS 38/6 with $p < 0/021$ and $T = 2/4$) and men (39/64 VS 40/8 with $p < 0/027$ and $T = 2/3$).

- There was a meaningful difference between mean LDL prior to and after intervention (135/13 VS 146/25 mg/dL), ($T = 2/1$ and $p < 0/39$).
- Overall prior to education 32/8% of samples had LDL more than 150, increasing to 41/4% following education. 31/6% of all samples had LDL less than normal, reducing to 25/5% following education.
- There was no meaningful difference between mean HDL prior to and after intervention (43/84 VS 42/85 mg/dL) ($T = 0/19$ and $p < 0/89$).
 - Overall 25% of samples had HDL less than 35 mg/dL.
 - HDL had a meaningful rise from 29/07 to 38/96 mg/dL ($p < 0/001$).
 - There was a meaningful difference between Fasting blood sugar prior to and after intervention from 81/92 to 95/8 mg/dL ($p < 0/000$ and $T = - 6/72$). After intervention 10% of all samples had FBS more than 110 mg/dL.
 - There was no meaningful difference in Norton score prior to and after intervention. 16/1% of all samples were at risk of bed sore and 81/3% were not. There was no meaningful difference about mouth disorders and swallowing problems prior to and after intervention.
 - Those elderly with a good cognitive state increased from 16/5% to 23/8% and those with a worse cognitive state decreased from 83/5% to 76/2%. This was statistically meaningful ($p < 0/01$).
 - There was no meaningful difference in CRP situation prior to and after education.

5/7% of elderly had a MNA score less than 11 (profound malnutrition), decreasing to 1/6% (3 people) after education.

30/2 % had 11 to 17 score (severe malnutrition), 60/9 % had 17-23/5 score (threatened malnutrition), 1/6% had a score more than 23/5 (at no risk for malnutrition) all increasing to 16/7%, 60/5% and 2/6%, respectively.

Overall, MNA score difference using non parametric test prior to and after intervention, was meaningful ($p < 0/05$).

Generally it was concluded that education was effective in improving blood indices such as albumin, hemoglobin and hematocrit, but it did not affect LDL, HDL and FBS.

Assessment of relationship between some variables and the nutritional state:

- Nutritional state was meaningfully related to Norton score ($p < 0/000$), in other words, the higher the Norton score, the better the nutritional state. Nutritional state also had a meaningful relationship with mouth disorders ($p < 0/002$), and swallowing problems, ($p < 0/05$) and drugs ($p < 0/01$). Also, the more severe the malnutrition, the higher the age of samples ($p < 0/013$). There was no sex predilection.

Those with worse cognitive state, had worse malnutrition ($p < 0/01$).

Those who were dependent regarding eating (ADL score)

had a worse nutritional state ($P < 0.001$). Also those who were dependent for their daily activities, had a worse nutritional state.

Results

Overall, according to our research and MNA questionnaires, prior to education 35/9% of elderly had profound and severe malnutrition and 60/9% were at risk for malnutrition. The Rodman study in a group of institutionalized elderly showed 30-50% were below standard levels for body weight, arm circumference and albumin concentration⁽⁷⁾. Another study in Australia showed 35/4 - 43/1% of institutionalized elderly had moderate to severe malnutrition according to MNA score⁽²³⁾. Of course only 5% of samples had serum albumin less than 3/5 gr/dL; this may be due to abundant meat consumption of the elderly (because of people oblations) that serum albumin level is within normal limits. But other indices are less than normal.

The elderly are at risk for bed sore because of factors such as urinary incontinence, limited activity, kind of activity, cognitive state and nutritional insufficiency. This was assessed with Norton device. 27/1% of elderly were at risk for bed sore. The relationship between nutritional state with Norton score prior to and after education was meaningful. In another study in Florida, 38/4% of institutionalized elderly had bed sores. Another study also showed that malnutrition is more common in institutionalized elderly⁽²⁴⁾.

ADL score shows most elderly can independently perform their private activities except eating. This is concordant with studies in other countries⁽¹³⁾. Our research revealed that 88% of samples could not eat independently and need help.

Regarding the limited number of staff, this may jeopardize the nutritional state of the elderly. There was also a meaningful relationship between nutritional state and ADL score prior to and after education. Other studies show that the nutritional state of institutionalized elderly has a strong relationship with their functional state⁽⁸⁾. And some of the malnutrition indices have a very strong and independent relationship with their functional capacity regardless of age and gender (8 and 9).

Assessment of albumin level before and after education showed an increase in mean serum albumin of samples. Also mean hemoglobin, hematocrit, LDL, HDL, and FBS all increased after intervention.

After intervention 40/8% of women and 20% of men had a hemoglobin level less than normal. This was concordant with the studies in other countries⁽⁵⁾. Men had a better nutritional state. These were also in concordance with other studies^(24,23,4,7).

Poly pharmacy is one of the risk factors for malnutrition and can lead to side effects such as increased or decreased appetite changes in test, constipation, weakness, drowsiness, diarrhea, nausea and so on. In our study, 29/2% of elderly were taking one or more drugs that could have an important role in their malnutrition.

Overall, we can conclude that:

Education is effective in improving albumin, hemoglobin and hematocrit, also in increasing MNA score and reducing those with moderate to severe malnutrition. LDL and FBS had

also a meaningful difference prior to and after education, but HDL had a relative reduction which was not meaningful.

Suggestions

MNA scale showed 35/9% and 18/3% of elderly had severe and profound malnutrition respectively. So, the elderly were at risk for some nutritional indices and the following suggestions can improve their nutritional quality:

1. Education is a basic factor in prevention and improving health in every society. So job training for the staff seems necessary.
2. Since continuous education and its evaluation has an important role in maintaining results, we should keep on evaluating the education and its results to perform proper changes, if indicated.
3. Nutritional education is effective only when it is continuous and accompanied by a wide socio-economic development and improving the health of the general society particularly in vulnerable groups like the elderly.
4. Since most medical and health staff including physicians, technicians, nurses, cooks and others, they need proper nutritional information. We suggest that nutritional educational programs should be considered to improve the health state.
5. Continuous research and evaluation of nutritional state of institutionalized elderly should be done intermittently, so that we can recognize their nutritional deficiencies and treat them immediately.
6. Educational texts concerning different occupational responsibilities of staff should be provided. And all staff should be trained.
7. Education is also necessary for managers and laboratory staff, to facilitate management performance in improving the health state.

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Table 1. Laboratory indices according to sex prior and after intervention

P value	After intervention				Prior to intervention				Variable	
	SD	Overall mean	Mean in men	Mean in women	SD	Overall mean	Mean in men	Mean in women		
P<0/002	0.39	4.11	4.16	4.1	0.44	3.98	3.9	4.00	Albumin g/dL	1
P<0/000	1.88	13.03	4.04	12.67	2.78	12.68	13.03	12.56	HB mg/dL	2
P<0/039	51	146.25	141.7	147.8	44	135.13	124.4	138.87	LDL mg/dL	3
P<0/84	11.92	42.85	36.77	44.9	11.54	43.84	42.02	44.46	HDL	4
P<0/000	29	95.8	85.47	99.42	19.9	81.92	80.02	82.59	FBS mg/dL	
P<0/001	5.82	38.81	40.8	38.6	5.3	37.86	39.64	37.24	% HCT	

Table 2. Assessment of nutritional state of elderly by means of MNA tool prior and after intervention

Without malnutrition MNA>23/5	Threatened malnutrition 17<MNA<23/5	Severe malnutrition 11<MNA<17	Profound malnutrition MNA<11	
% 106	% 60.9	% 30.2	% 5.7	Prior to education
% 2.6	% 60.5	% 16.7	% 1.6	After education

84% of all samples had no mouth disorder and 80% had no swallowing problem. 23/8% had a cognitive status score 8-7 and 76/2% had a score more than 8. The CRP status was +2 and +3 in 26% < +1 in 4/7% and negative in 62% of elderly.

Food Consumption Pattern and Micronutrient Intake of Elderly Yorubas in Southwest Nigeria

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ABSTRACT

Objective: To evaluate the dietary patterns and micronutrient intake of the elderly Yoruba living in the Ogun state in southwest Nigeria.

Design: A total of 300 households were sampled, and 305 elderly (age 60 and older) Yoruba were studied.

Methods: Data was collected using structured household questionnaires, personal interviews, and direct weighing of consumed foods for one year.

Results: The questionnaires revealed that most elderly Yoruba eat three times daily and 69%, were daily consumers of roots and tubers. Most individuals patronized food vendors (57%), did not eat fruit daily (77%) and had food avoidances (55%). The mean energy consumed was 1663 ± 60 kcal/day for males and 1451 ± 41 kcal/d for females. The protein intake varied from 25 to 93 g/day in males and was similar in females. The males consumed 45% of their Recommended Dietary Allowance (RDA) of vitamin A. Micronutrient intake was significantly higher in elderly males than in females.

Conclusions: Overall, the elderly Yoruba's diet was inadequate in terms of calories, protein and vitamin A when compared with the RDA. However, the mineral intake was high, especially for calcium and iron. The sources of energy consumed were mainly carbohydrates. The elderly Yoruba require nutritional and social intervention to improve their health outlook.

Keywords: dietary, assessment, nutrition, malnutrition, Africa.

Introduction

The structure of the definition of Quality Of Life (QOL) is mainly based on the individual's perception of his/her position in life regarding sense of well-being, meaning, and value of self-worth¹. This self-perception can be influenced by several factors such as gender, age, self status, and cultural factors. Among these factors, age has the most important role because of disability to change health attitude, behavior, and lifestyles in the elderly².

These age groups sufferer from chronic disorders such as acute coronary syndrome and the adverse events of these disorders have been known to be higher in older patients than those younger. Therefore, it seems that the age factor can be an important predictor for outcome of cardiac interventions and can effectively determine postoperative complications such as high morbidity and prolonged length of stay in hospital and also in intensive care units^{3,4}.

According to the fact that a strong relationship has been

proved between age and different aspects of QOL and also the potential effects of the age factor on outcome of cardiac surgeries, patient's baseline QOL may have a pivotal role to predict this outcome in the elderly.

We tried to assess this hypothesis in patients undergoing isolated coronary artery bypass graft surgery (CABG) in a sample of older patients among the Iranian population.

Methods

Subjects

All participants were at least 60 years of age, had resided in the study area for at least five continuous years, and gave informed consent to participate in the study. All procedures were approved by the research committee of the Department of Nutrition and Dietetics at the University of Agriculture, Abeokuta, Nigeria.

Geographical background of the Yoruba

The Yoruba people primarily reside in south-western Nigeria. They live on a stretch of land that is approximately 120 miles long on the coast of the Gulf of Guinea, east of the Benin border, and approximately 200 miles inland towards the savannah belt of West Africa¹⁵. South-western Nigeria manufactures approximately 40% of the country's products, including furniture, textiles, clothing, paper, confectionary and beverages. The elderly Yoruba surveyed in this study lived in Ogun, which is one of the five states in south-western Nigeria. A multistage sampling procedure was used.

Selection of families

Within each of three selected communities i.e Egba, Yewa and Ijebu areas of Ogun state Nigeria, 100 families were randomly chosen to represent each zone with a subsample of 50 families in an urban setting and 50 families in a rural setting. Thus, a total of 300 households were selected from the three zones.

Data collection

Demographic information was collected using a structured household questionnaire. Non-demographic information, such as health situation, was collected via an interview.

Food frequency questionnaire

A food frequency questionnaire was administered to the respondents to record their consumption patterns of various food groups. Along with the questionnaire, a direct weighing method was used to measure dietary intake.

Direct weighing method of food intake

A direct weighing method was used to measure food consumption daily for three days. Each day, food was weighed using a Salter scale at meal times. The name of each food item was entered in the local language on a coded record form. At each visit, subjects were asked to recall what other foods they had eaten which were not recorded within the day. These foods were usually in-between meals outside their homes, such as snacks and food from vendors. The equivalent portion of these foods was then purchased, weighed, and the data were recorded on the respondent's coded form. Food intake was converted to nutrient intake using food composition tables¹¹, and these values were entered into the computer. Using Microsoft Excel, the average energy and nutrients per day were calculated for each respondent.

Results

Socio-demographic characteristics

The demographic characteristics of the elderly Yoruba are provided in Table 1. Of the 305 individuals studied, 53% were male and 47% were female. It was found that 24% of the subjects were between the ages of 60 and 64, and 18% of the subjects were 80 or older. In terms of marital status, 61% were married, and 31% were widowed. Of the individuals studied, 58% had no formal education.

Dietary patterns and food habits

The food habits and dietary patterns of the elderly Yoruba are shown in Tables 2 and 3. The majority of the individuals ate three times a day (67%), although the source of these foods was most often food vendors (Table 2). As shown in

Table 2, 43% of the elderly Yoruba had food avoidances for either tubers or vegetables for various reasons, including health, parental instructions and religion. The overall food consumption patterns showed a low frequency of fruit intake (Table 3) and moderate consumption of legumes. Roots and tubers, such as cassava and yam, were highly consumed. The majority of the respondents ate tubers daily (69%) as paste and porridge.

Nutrient intake

The nutrient intakes of the elderly Yoruba are shown in Table 4. The mean intake of energy was 1663 ± 604 kcal/day among males and 1451 ± 41 kcal/day among females (Table 4). The majority of individuals ate less than the minimum energy requirement. Males met 79% of their minimum energy requirement, while females met 78% of their minimum requirement. Our results demonstrate that carbohydrates were the principle sources of energy. The mean protein intake was 58 g/d among males, which was 77% of their Recommended Dietary Allowance (RDA). In females, the mean protein intake was 52 g/d, which was 69% of their RDA. The main protein sources were plants.

None of the individuals studied had a protein intake that contributed at least 20% of their energy intake. The vitamin A intake, measured in retinol equivalents (RE), was low compared to the RDA. Among males, the mean intake of vitamin A was 340 RE, which was 45% of the RDA. The mean vitamin A intake in females was 300 RE, which was 40% of the RDA. Males consumed significantly more calories, protein, iron and calcium, than females (Table 5).

The mineral dietary intake was very high. Minerals, such as calcium, were mainly derived from plant sources. Nutrient intake correlated with socio-demographic factors and health status. Education, health status and socioeconomic status positively correlated with healthy food habits (Table 6).

Discussion

The elderly Yoruba had inadequate dietary intake patterns when compared with the RDA of the Food and Agriculture Organization (FAO) and World Health Organization (WHO) (1985)¹⁶. The poor intake of energy, proteins and vitamin A may be attributed to their dependency on others, due to their low socioeconomic status. According to our observations, some of the elderly eat whatever their independent relatives can afford. Dependence on others contributes to variations in diet and nutrient intake, but does not affect calcium and iron intake. The dietary calcium intake among the elderly exceeded 100% of the RDA, and calcium intake was mainly derived from plants (95%). Dietary calcium of plant origin has not been implicated with hypercalcemia or related ailments due to poor bio-availability¹⁴.

Our observations are similar to those of *Oguntona et al.*¹⁷ in their dietary assessment of the elderly in a rural Nigerian community.

The calcium intake measured in this study fell within the intake range of most countries, such as those reported in the National Health and Nutrition Examination Survey, with a range of 477 to 895 mg¹⁴. A higher calcium intake in our study was positively correlated with a higher health status score ($r =$

0.23, $p < 0.05$). These results agree with those of Delmas and Fraser¹⁴ who observed that calcium intake, is important to bone health in the elderly, since it reduces hip and spine fractures.

Dietary intake measurements showed specific gender distributions. For instance, the mean nutrient intake was significantly higher in males than in females for protein, calories, calcium and iron. Therefore, it is unsurprising that the overall nutritional vulnerability score was significantly higher in females than in males.

The fact that women have a greater nutritional vulnerability than men may be traced back to their socioeconomic environment. In this study, no female reported earning more than \$100 USD per month, whereas some men reported greater incomes. Men have higher incomes mainly from property, such as houses, vehicles, company shares, and inherited land and farmland. Meanwhile, the majority of women have no property of any type, which contributes to their impoverished condition. Sources of income for women consisted of petty trading, charity and money from their children.

In most parts of Africa, the historical and socio-cultural domination of men is now having an inter-generational effect on women's access to social, economic, property and political prosperity^{18,19}. For example, in Nigeria, discrimination in property inheritance laws has a greater impact on women than on men¹⁹. This situation adds to the high level of poverty, economic dependence and limited decision-making power among women. Consequently, most women are removed from the main stream of economic resources, which results in their poor socioeconomic condition and nutritional vulnerability.

There was a positive correlation between food habit scores and both health and educational status among the elderly. Food habits are predictors of health and nutritional status^{20,21}. In view of this relationship, researchers have concluded that dietary surveys must be taken in conjunction with measurements of food habits and socioeconomic factors to create useful intervention procedures and public health programs^{22,23,24}, which was the theory behind our study of the elderly Yorubas.

Conclusion and Recommendation

Both male and female elderly Yorubas in Nigeria had a low intake of calories, vitamin A and protein. Elderly women have a greater nutritionally vulnerability than men, since they consume significantly less calories, protein and iron. There is a particular need for a nutrition intervention program, specifically for elderly individuals in Nigeria.

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Table 1. Socio-demographics of the elderly Yoruba

Variable		% P opulation
Sex	<i>male</i>	53
	<i>female</i>	47
Age structure (years) mean = 71 ± 9	<i>60-64</i>	24.3
	<i>65-69</i>	24.3
	<i>70-74</i>	18
	<i>75-79</i>	15
	<i>80+</i>	18.4
Family structure	<i>monogamous</i>	39
	<i>polygamous</i>	61
	<i>have children</i>	97
	<i>have dependents</i>	64
	<i>regular income</i>	59
Marital status	<i>married</i>	61
	<i>widowed</i>	31
	<i>divorced</i>	5
	<i>separated</i>	3
Education level	<i>no formal education</i>	58
	<i>primary education</i>	19
	<i>secondary/technical</i>	13
	<i>tertiary education</i>	10

Table 2. Food habits of elderly Yoruba

Variable	Frequency	% Population
<i>food avoidance</i>	131	43
<i>eating between meals</i>	122	40
<i>food vendor patronage</i>	174	57
<i>skips meals</i>	122	40
<i>alcoholism</i>	30	10
<i>scheduled meals</i>	82	27
<i>three meals/day</i>	204	67

Table 3. Food consumption patterns of elderly Yoruba

Type of food	% Population		
	Daily	Weekly <i>2-6x/wk</i>	Occasionally <i>< 1x/week</i>
<i>animal protein (fish, meat, eggs)</i>	23	32	44
<i>tubers (cassava, yams)</i>	69	22	9
<i>legumes (beans)</i>	38	47	15
<i>fruits</i>	21	22	57
<i>other vegetables</i>	29	62	9
<i>grains (maize, rice)</i>	35	45	20
<i>vitamin A rich foods (liver, etc.)</i>	21	22	67

Table 4. Nutrient adequacy of the respondents

Nutrient intake	Males		Females	
	Average	%RDA	Average	%RDA
<i>calories (kcal/d)</i>	1663 ± 60	79	1451 ± 41	78
<i>protein (g/d)</i>	58 ± 25	77	52 ± 20	69
<i>fat (g/d)</i>	36 ± 17	61	26 ± 15	51
<i>calcium (mg/d)</i>	671.71 ± 24	149	561.74 ± 20	124
<i>iron (mg/d)</i>	29.21 ± 15	290	23.08 ± 10	109
<i>vitamin A (RE/d)</i>	340 ± 22	45	297.65 ± 25	40

Table 5. T-test comparisons of nutrient intakes, nutritional vulnerability scores and incomes of elderly Yoruba men vs. women

Variable	Mean values for each sex		Statistical results	
	Male	Female	T value	P value
protein (g/d)	58.0	52.2	- 1.92	0.005
calories (kcal/d)	1663	1451	- 3.31	0.001
calcium (mg/g)	671	561.7	- 2.91	0.004
vitamin A (RE/d)	340	297	- 1.226	0.220
iron (mg/d)	29	23	- 3.73	0.000
vulnerability score	13	15	2.35	0.020
income (Naira)	5003	2481	- 5.52	0.000

Table 6. Pearson product-moment correlations of dietary intake and socio-demographic indices of 305 elderly Yoruba

Correlation		Statistical Results	
Variable 1	Variable 2	R value	P value
age	health score	- 0.20	0.001
socioeconomic status	protein intake	0.31	0.000
health status	caloric intake	0.23	0.003
caloric intake	chewing problems	- 0.30	0.000
food habits	health status	0.29	0.003
education	food habits	0.48	0.000
education	sanitation score	0.40	0.000
education	vulnerability score	- 0.35	0.000

