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Energy and B Vitamins Intake in Elderly Population under Health Care in Isfahan, Iran

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ABSTRACT

Background: B vitamins are essential nutrients to maintain body health. These water soluble vitamins are critical co-enzymes in different cycles. Also, the intake of an adequate energy in elderly contributes to more ability to perform daily activities. This study aims at assessing the energy and water-soluble vitamins intake in elderly population under health care in Isfahan, Iran.

Methods: One hundred and fifty two old men and women (82 were under health care in Ghadir Elderly Care Center, Isfahan, Iran and 70 without health care) were enrolled in a case-control study. Food frequency questionnaire (168 items) was used for dietary intake assessment and N4 software for analysis of food content of the used diet.

Results: The intake of energy was significantly higher in the elderly population under health care than those without health care ($p=0.038$). Also, after adjustment of variables for energy and B vitamins, B1 and B9 vitamins were higher in case group when compared to the control group ($p=0.032$, $p=0.012$), respectively.

Conclusion: Old population in elderly centers had desirable levels of vitamins B1 and B9 and also energy intake denoting to the high health cares in the health centers.

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Introduction

Malnutrition which is a deficiency of energy, protein or specific nutrient can affect functional and clinical outcome (1, 2). This condition that negatively affects health status is more prevalent in old population due to their less activity, malabsorption disorders, a decrease in their smell and taste senses and their financial problems (3,

4). A study in Iran showed that the prevalence of malnutrition among the elderly was 12% in different socioeconomic conditions (5). Since the low energy intake is hard for diagnosis, elderly people are at higher risk of weight loss, further nutritional deterioration, morbidity and mortality (6, 7). Also nutritional inadequacy can contribute to cardiovascular diseases (CVD), osteoporosis,

mental disorders and other health problems like infection or dehydration (8).

B vitamins are critical nutrients that have roles in central nervous system and play specific roles in the methylation and decarboxylation processes which can govern the DNA synthesis and integrity, synthesis of proteins, monoamine, phospholipids and some neurotransmitters (9) and their deficiency can disturb synthesis of macro-molecules and cause some related disorders such as depression, anemia, tiredness, chronic fatigue syndrome, etc. (10-12). Health care can increase life expectancy in the elderly people, so more professional care can help to achieve optimum health in this vulnerable age group (13). Since adequate energy intake and vitamins can affect the elderly both mentally and physically, the aim of our study was to determine the intake of total energy and B complex vitamins in the group of the elderly population under health care and compare them with those who lack any healthcare.

Materials and Methods

This study was performed on 152 old people (75 males and 77 females) aged over 60 years old based on a case-control study in Ghadir Center, Isfahan, Iran. The sample size was determined according to the formula with confidence level of 95 percent. The case group (39 males and 43 females) was selected from elderly population living in nursing care center (elderly people under care) and control group (36 males and 34 females) from the elderly who referred to nursing care center at the beginning of the entry to the center (elderly without care). In this study, the method of group matching was used to increase the accuracy of the study. Inclusion criteria were to be older than 60 years old, living in nursing care centers, non-smoker and willingness to participate in the study. Exclusion criteria were

to be less than 60 years old, not living in nursing homes, smoker and refusing to participate in the study. Also, after choosing the study groups, the consent form was completed by each participant in the study. The study was approved in institution ethics committee (Ir.mui.rec.1395.1.200).

Dietary intake of the case and control groups was carefully evaluated by an expert nutritionist with a semi-quantitative Food Frequency Questionnaire (FFQ). Regarding the validation of this questionnaire, the validity and reliability was approved in previous studies (14). The consumption amount of each common food in this questionnaire was determined and then the frequency of consumables during the past year was assessed daily, weekly and monthly for each elderly. Also, in order to measure the daily intake of each food and nutrient intake, the consumption of each food item was converted to grams per day by Nutritionist4 software (N4). The weight and height of each person was extracted from their files.

Statistical analysis was undertaken using SPSS software (Version 21, Chicago, IL, USA). Comparison of quantitative variables and dietary intake of each soluble vitamin in both case and control groups were performed by independent sample t-test. Also, ANCOVA was used to adjust any of the B vitamins from the average energy consumed from daily food intake. P value <0.05 was considered as a significant level of statistical test.

Results

Daily energy intake in case group was significantly higher than the control group. Also, the level of B1, B2, B3 and B9 vitamins before the energy intake was significantly higher in the case than in the control group (Table 1), while other vitamins presented in Table 1 were not significantly different

Table 1: Demographical characteristics and result of sample t-test for variables according to Food Frequency Questionnaire (FFQ)

Variables	Elderly under health care	Elderly without health care	<i>p</i> -value*
	Mean±SD	Mean±SD	
Age (years)	68.60±4.9	68.90±6.1	0.779
Weight (kg)	63.60±8.2	63.40±7.6	0.881
Height (cm)	163.40±6.7	161.60±7.4	0.125
BMI (kg/m ²)	23.90±3.4	24.40±3.2	0.371
Energy (kcal)	2165.53±645.1	1965.26±533.4	0.038*
B1 (mg)	1.86±0.8	1.55±0.5	0.007*
B2 (mg)	2.57±1.0	2.24±0.8	0.032*
B3 (mg)	21.58±9.0	18.05±6.6	0.008*
B6 (mg)	1.94±0.7	1.85±0.6	0.436
B9 (µg)	382.52±271.1	261.62±191.0	0.002*
B12 (µg)	6.41±5.9	5.46±8.8	0.450

**p*-value<0.05 was considered as significant level. BMI: Body mass index

between both groups. By comparing the intake of B vitamins after adjusting of the energy intake as shown in Table 2, B1 and B9 vitamins were higher in case group in comparison to the control group. B2, B3, B6 and B12 vitamin levels were not statistically different between the two groups after adjusting the daily intake of energy too.

Discussion

The present case-control study proved that the level of energy and vitamins B1 and B9 intake among the elderly with health care was higher than elderly without care and there was no significant difference in the level of B2, B3, B6 and B12 vitamin levels among the elderly under health care, when compared to the control group. Elderly is a period of life which is associated with a variety of physiological changes in vital body systems. Two of the most important physiological changes associated with age are related to the digestive and the nervous systems (15, 16).

As the age increases, gastric acid secretion decreases (hypochloridia) and subsequently the absorption of folic acid is reduced. The prevalence of gastric atrophy in the elderly was shown to be 20-50%. Gastric atrophy results in decreased absorption of B12 vitamin level. In the Framingham Heart Study which was conducted on elderly people, a high prevalence of vitamin B deficiency was reported and the prevalence of folate deficiency was reported 30%, and for B12 vitamin was 25-20% and for B6 was 20% (17). Among the vital systems of the body, the nervous system is recognized as the neediest system for nutrients, including B vitamins (18).

One of the roles of B vitamins is to participate in glucose metabolism reactions. Glucose is known as the main fuel of the body cells. Each of the physiological systems in the body, especially the nervous system, needs glucose to function properly (19). It was shown that aging leads to a reduction in the number of brain receptors related to eating behavior. Also, as the age increases, the olfactory and taste function decreases, which can reduce

the dietary intake of each nutrient (17). One of the important functions of B6, B9 and B12 vitamins is to maintain blood levels of homocysteine. Increasing blood homocysteine has a direct correlation with the increase in nervous system disorders, especially in the elderly. Generally speaking, the shortage of any nutrients would lead to an increase in the daily requirement of these substances during aging (20, 21).

There are many studies that have assessed the nutritional intake in the elderly. Cousson *et al.* in their study in 2011 showed that energy and B vitamins were inadequate among the elderly population (22). Also, Fernandez-Barres and colleagues evaluated the extent of nutrient intake in Spanish population of elderly and showed that folic acid intake was lower than recommended daily allowance (RDA) (23). In addition, several studies have been conducted on the effect of nursing care on the nutritional status of these people. A study by Olin *et al.* demonstrated that energy intake from high-calorie meals in elderly patients undergoing nursing care has improved (24). Woods and colleagues have reported that the intake of energy, protein and micronutrients such as folate, magnesium and calcium in the elderly with a low level of care is lower than the Estimated Average Requirement (EAR) (25).

However, the result of this study is following the results of some studies showed that the intake of energy and vitamins B1 and B9 among the elderly under health care was higher than the control group. There are several strengths in this study. This study is one of the few studies about the elderly people under care in nursing care centers in Iran. Also, the results obtained in this study are highly valued due to the control of effective variables such as energy intake. The limitations of this study include the lack of measurement of blood levels of each vitamin due to high financial costs and the low number of participants in this study, which may also be effective in the final conclusion.

Conclusion

Results of our study showed that old people in the

Table 2: Result of sample t-test for variables according to Food Frequency Questionnaire (FFQ) after the adjusting of energy intake

Nutrients	Elderly under health care	Elderly without health care	p-value*
	Mean±SD	Mean±SD	
B1 (mg)	1.836±0.7	1.585±0.7	0.032*
B2 (mg)	2.479±0.7	2.356±0.7	0.302
B3 (mg)	20.690±5.6	19.090±5.6	0.089
B6 (mg)	1.871±0.5	1.945±0.5	0.384
B9 (µg)	370.090±225.8	276.198±226.1	0.012*
B12 (µg)	6.048±7.1	5.889±7.1	0.071

*p-value<0.05 was considered as significant level.

elderly centers have desirable intake level of B1 and B9 vitamins and energy which can be due to the high care they received. Increasing the level of care for the elderly can improve micronutrient intake and reduction in the incidence of nervous system disorders among this population. Therefore, in order to increase the validity of our results in present study, further studies should be conducted with more participants.

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Conflict of Interest

None declared.

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