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Original Article

Dietary Behaviors of Elderly People Residing in Central Iran: A Preliminary Report of Yazd Health Study

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Introduction: Food habits play important roles in maintaining physical and mental health and preventing chronic illnesses in the elderly. The aim of the present study was to investigate dietary behaviors of elderly people residing in Yazd city which is located in central Iran.

Methods: The present analysis was conducted on 1684 participants entered to Yazd Health Study aged over 60 years during 2014-2015. Demographic characteristics, health status, physical activity, economic status, education and dietary behaviors were collected by using a validated questionnaire.

Results: Our analysis revealed that only 1.2% of the elderly consumed more than two servings of dairy per day. Furthermore only 3 and 9.8 percent of elders consumed more than three servings/day of vegetables and fruits, respectively. The study also showed that 22.9% ate more than five servings of sugar per day, 22.5% took more than four units of legumes weekly, 56.1% ate two to three servings of poultry per week, 77% reported eating fast foods for at least once a week, 47.8% consumed canned foods less than once a week of and 86.3% reported taking breakfast for at least five times a week. For cooking 18.9% of elderly still use hydrogenated vegetable oils, 52.8% of the elderly did not separate visible fats from red meat before cooking, 65.8% chose high-fat dairy and 24% of older people reported using frying and grilling as their primary cooking method. Our findings also suggest that dietary behavior is different between elder men and women.

Conclusion: Unhealthy dietary habits, including low vegetables, fruits and dairy products intake, are highly prevalent among elderly people residing in Yazd. Community based interventions targeting this age group, in order to improve their dietary intake, are highly recommended.

Keywords: Food Habits, Diet, Elderly, Iran

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Introduction

Health promotion and providing appropriate care for the elderly are the key factors in having a healthy population (1). In 2009, almost 737 million people aged more than 60 years worldwide, while nearly two thirds of whom lived in developing countries(2).It is estimated that the world's elderly population will grow from 11 to 22 percent from 2000 to 2050. Studies also showed that Iran's population is aging like the rest of the world as in 2006, approximately 6% and in 2012, 8% of the population were aged over 60 years; with the continuation of this process, it is supposed that we will face an enormous increase in the number of elders in Iran (2, 3).

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Aging usually causes physiologic changes such as progressive loss of muscle mass and increase in fat mass (4). Metabolic changes including decreased anabolic hormones levels like testosterone, estrogen and growth hormone levels also happen in elder people (5).

Metabolic and physiological changes along with lifestyle modifications like reduced physical activity levels and changes in dietary behaviors might lead to increased risk of chronic diseases such as type 2 diabetes, hypertension, cardiovascular diseases, arthritis, dyslipidemia and cancer which are strongly associated with aging. Therefore, improved lifestyle-related factors might help to reduce the development of these chronic diseases and therefore an improved quality of life in the elderly (6-9). Several studies showed that Long-term fish consumption and High intake of low-fat dairy products are associated with Improved renal function and reduced risk of metabolic syndrome in elderly people, respectively (10, 11). Fruits and vegetables which have anti-inflammatory properties might protect the nervous system (12). Also it is suggested that Mediterranean diet and the use of food products has been associated with low plasma concentration of fibrinogen and C - reactive protein in the elderly (13). It is also revealed that higher consumption of dairy products and fruits can reduce the risk of osteoporosis in postmenopausal women (14). Furthermore, red meat consumption has been associated with cancer and death in this population (15).

A limited number of studies have tried to assess the dietary intakes and nutritional status of elderly, worldwide. For instance, a research done in Slovenian elderly reported that the majority of seniors had good eating habits (83.1%) and on average, the elderly ate 3-4 meals per day (59.8%) as well as overall population. Furthermore, meat was the preferred food in both male and female and the preference for fish was associated with a higher educational level, whereas more elders from rural areas reported preferred fruit and vegetables compared to those residing in urban areas (16).

In another study, a sample of Italian elders It was shown that food intake significantly declines with age in both genders and the most consumed food items were white bread, fresh fruit, olive oil, raw vegetables and pasta (17).

Data on the food habits of elderly people living in the Middle East are scarce. In a study conducted in Rasht city settled in northern Iran, Masomy et al. revealed that 87.1 percent of elders had usual nutrition, 12.9 percent of them had probable mal-nutrition, 4 percent were malnourished and the normal nutritional status was higher in females and in the aged with higher income (18).

In another study in urban and rural areas of Urmia, a city situated in north-west Iran, it was shown that according to recommended dietary allowance (RDA), consumption of vitamins such as B1, B2, B3, B6, B12, E and calcium was not adequate. The most insufficient intakes were for B12 and calcium, and elderly population living in rural areas had better nutritional statues than urban elderly population (19). Since the food intake habits play an important role in healthy aging (20, 21), it is essential to find adverse dietary behaviors in elderly to make proper dietary recommendations (22). The present study was conducted to evaluate eating habits and their related factors in elderly of Yazd city, which is located in central Iran.

Methods

Subjects

This study used Yazd Health Study (YAHS) data. YAHS is a large cohort study on 10000 residents of Yazd city. The recruitment phase of the study conducted from September 2014 to March 2016.Using cluster sampling method, 10,000 participants 20-70 years old (25 males and 25 females) from 200 clusters, were randomly selected from Yazd population according to residential postal codes in 2014. Of these, 1628 persons were elderly people, 60-70 years old, whose data were used for the present analysis. Socio-demographic characteristics as well as education, marital status, employment status, physical activity, history of chronic illnesses, tobacco use, addiction and also dietary habits were collected through the use of a validated questionnaire filled by trained interviewers. The questionnaire has been piloted and validated on 50 participants before conducting the study. Face validity was achieved by consulting experts in each domain of the questionnaire. Reliability and validity of the tool was investigated by piloting. The Cronbach's alpha for the questionnaire was 0.89%; therefore, it was considered to be reliable. YAHS study was approved by the Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran. Informed consents were obtained from all participants.

Dietary habits assessment

Dietary habits were assessed by questions about drinking habits, cooking habits and consumption of fast foods, processed and canned foods, fruits and vegetables, snacks (e.g. potato chips, cheese puffs, crunchy) and also food intake frequency and use of various supplements.

Anthropometric measurements

Anthropometrics were measured when the participants answered the first 100 questions of the questionnaire. Participants were weighed using Omron BF511 portable digital scale and body analyzer (Omron Inc. Osaka, Japan) with accuracy of 0.1 kg, while standing in the middle of the scale, without assistance and with the minimum possible clothes. Height was measured in a standing position using a Stadiometer fixed on a straight wall to the nearest centimeter. To measure height, participants

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were barefoot and their heads (placed in the Frankfurt position), shoulder blades, buttocks and heels were touching the wall, to which the tape was fixed (19). Body mass index (BMI) was also calculated using weight and height measurements using the following formula: weight (kg) divided by squared height (m^2).

Blood pressure measurement

Blood pressure was measured while sitting at least for ten minutes rest, and answered the second 100 questions of the questionnaire, using a digital arm sphygmomanometer (Riester ri-champion N Digital Sphyg. Model: 1725-147, Riester GmbH, Jungingen Germany). Blood pressure measurements were repeated for three times and the mean of the second and third measurements was recorded. Systolic blood pressure (SBP) was considered normal if it was lower than 120 mmHg and participants were categorized in prehypertension, stage 1 hypertension and stage 2 hypertension if their SBP was 120-139 mmHg, 140-159 mmHg and more than 160 mmHg, respectively. Normal, prehypertension, hypertension stage 1 and stage 2 hypertension based on diastolic blood pressure were defined as lower than 80 mmHg, 80-99 mmHg, 100-109 mm Hg and 110 mmHg or more, respectively.

Statistical analysis

Totally, 1684 participants aged 60-70 years old had valid questionnaires data and were included in our analysis. Dietary habits in total population subdivided according to age, sex, education, socio-economic and marital status. All statistical analyses conducted using SPSS version 20.0. P-value less than 0.05 was considered as statistically significant.

Results

The present cross-sectional study was conducted on 1684 residents of Yazd city aged over 60 years including 843 men (49.7%) and 841 women (49.6%). Table 1 shows the demographic characteristics and health status of the participants. There was a significant difference in educational levels between men and women so that men were more educated than females. More men were also married, employed, wealthy, physically active and hypertensive compared to women counterparts ($p < 0.05$). Tobacco consumption and drug addiction were more prevalent in males than females, too (Table 1). On the other hand, women were more obese and diabetics compared to men. There was no difference between males and females in other characteristic (Table 1).

The consumption of different food groups including fruits, vegetables, dairy, meat, poultry, beans, sugar and junk foods were reported in Table 2. Only three percent of participants reported that they consume more than three servings of vegetables daily and this was about 9.8 percent for fruits. About 3.4% of the elderly did not consume dairy products and 52.6% had dairy for less than one serving per day and only 1.2% took 2 to 3 servings/day of dairy products. Furthermore, 3.7% of the elderly did not use meat during the week while 22% consumed one serving of meat per week. Our analysis revealed that 2.5% of the elderly did not use poultry during week, while 26.8% had poultry once a week. A majority (73.7%) of the participants consumed legumes four times or more per week. 25% of the participants never used sugars and 22.9% consumed sugar five times or more. Our analysis showed that 87.6% of people did not consume junk foods during the week. Except for junk food consumption ($p = 0.89$) men significantly consumed more fruits, dairy, poultry, and red meat compared to women.

Table 3 shows the dietary habits of the elderly in both sexes. Approximately 27.5 percent of Yazd elders ate fast food at least once a week. A large number of participants did not consume canned foods (52.2%). A majority of the elders ate breakfast at least five days a week (86.3%), 18.9% used hydrogenated vegetable oils for cooking, 7.5% saturated oils (butter, etc.) and 73.6% used vegetable oils. 75.4% of the elderly used boiling and steaming as the primary cooking methods and 24.6% preferred frying and grilling methods. More than half of the elders (52.8%) tried to separate all visible fats from red meat during cooking while 24.3% did not separate fat and 93.7% of them removed poultry skin during the cooking while 6.3% did not. Furthermore, 65.8% used high-fat dairy and 36.2% preferred low-fat dairy products. Our data showed that 32.4% of the elders put salt on the table and42.6% of them drank less than three glasses of fluids per day. Men consumed more fast food, canned foods, preferred frying or barbequing and also drank more water ($p < 0.05$). In contrast, fewer number of women removed skin while cooking poultry ($p < 0.05$).

Discussion

The aim of this study was to assess the dietary habits of the elderly population residing in Yazd city, Iran. Food habits assessment is of great importance for elderly people as a group at risk of malnutrition and its association with quality of life, obesity and several life threatening chronic diseases. To the best of our knowledge this is the first large scale population based study trying to assess the dietary habits among elderly in the Middle East. Amirzadeh et al. study on the dietary pattern of 432 urban and rural elders in Urmia, Iran revealed that the most nutritional inadequacies are vitamins A, B2, B6, B12, C deficiencies and the average intake of vitamin B12 and calcium was significant different between urban and rural dwellers (19).

Masumi et al. examined the nutritional status of 194 elders in Rasht, Iran and showed that only 1% of elderly people were normal, 4% malnutrition and 12.9% possible malnutrition.

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Table1. Characteristics of study participants

Variables			Males	Females	Total	p [1]
Education (%)	Lower than high school		49.8	73	61.4	< 0.001
	High school		44	25.5	34.8	
	University		6.2	1.4	3.8	
Marital status (%)	Single or widowed		3	22.4	12.7	< 0.001
	Married		97	77.6	87.3	
Weight status (%)	Normal		35.9	18.1	27	< 0.001
	Overweight		43.7	36.5	40.1	
	Obese		20.4	45.3	32.9	
Systolic blood pressure (%)	Normal		12.7	11.8	12.2	0.05
	Prehypertension		42	43.1	42.5	
	Hypertension stage 1		27.6	29.7	28.7	
	Hypertension stage 2		17.7	15.5	16.6	
Diastolic blood pressure (%)	Normal		33.5	40.6	37.1	0.02
	Pre hypertension		38.2	33.6	35.9	
	Hypertension stage 1		20.2	19	19.6	
	Hypertension stage 2		8	6.8	7.4	
Physical activity (%)	Low		28.2	38.4	33.3	< 0.001
	Moderate		31.9	34.9	33.4	
	Vigorous		39.9	26.7	33.3	
Economic status (%)	Low		33.6	36.2	34.9	0.01
	Middle		32.3	36.3	34.3	
	High		34.1	27.4	30.8	
Employment status (%)	Currently employed		28.	3.1	83.9	< 0.001
	Currently not employed		71.1	96.9	16.1	
Disease history (%)	Heart disease	No	79.4	79.6	79.5	0.89
		Yes	20.6	20.4	20.5	
	Hypertension	No	62.8	45.9	54.4	< 0.001
		Yes	37.2	54.1	45.6	
	Cerebral disease	No	94	97.1	95.6	0.003
		Yes	6	2.9	4.4	
	Diabetes mellitus	No	69.4	63.2	66.3	0.007
		Yes	30.6	36.8	33.7	
Tobacco use (%)	Never		73.1	96.2	84.6	< 0.001
	Ex-smoker		6.1	0.4	3.3	
	Current smoker		20.8	3.5	12.25	
Drug addiction (%)	Yes		7.1	1.2	4.2	< 0.001
	No		92.9	98.8	95.8	

[1] Chi-square test

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Table2. Food groups consumption according to gender as well as total population

Food groups		Males	Females	Total	p [1]
Vegetables (servings/day) (%)	Never	22.8	26.9	24.7	0.1
	1	51	51.3	51.3	
	2-3	22.9	19.2	21	
	>3	3.3	2.6	3	
Fruits (servings/day) (%)	Never	6.8	12.5	9.6	<0.001
	1	41.2	44.2	42.7	
	2-3	41	34.7	37.9	
	>3	11	8.6	9.8	
Dairy products (servings/day) (%)	Never	2.5	4.4	3.4	0.008
	Lower than 1	49.9	55.2	52.6	
	1-2	46.4	39.2	42.8	
	2-3	1.2	1.2	1.2	
Red meat (%)	Never	3.4	3.9	3.7	0.5
	Once a week	20.9	23	22	
	2-3 times per week	56.2	55.9	56	
	4 times or more per week	19.5	17.2	18.3	
Poultry (%)	Never	2	3	2.5	0.01
	Once a week	24.1	29.5	26.8	
	2-3 times per week	57.4	54.8	56.1	
	4 times or more per week	16.4	12.7	14.6	
Legume (%)	Never	3.8	4.8	4.3	0.004
	Once a week	18.7	25.4	22.1	
	2-3 times per week	53.2	49.4	51.3	
	4 times or more per week	24.3	20.4	22.4	
Simple sugar (%)	Never	23	26.9	25	
	Once a week	24.1	29.3	26.7	<0.001
	3-4 per day	24.4	26.5	25.4	
	5 or more per day	28.5	17.3	22.9	
Junk foods (%)	Never	87.9	87.3	87.6	0.89
	Lower than once a week	8.6	9.2	8.9	
	More than once a week	3.6	3.5	3.5	

[1] Chi-square test

Economic conditions affect the status of intake of some foods in elderly, including fish, meat and dairy products. Dietary intake was different among elderly according to their sex (17).

After comparing the dietary intake with recommended amounts, elderly food pyramid and healthy eating index, we showed that only 1.2% of individuals used more than two servings of dairy products. Furthermore, the amount of fruits and vegetables consumption is very low in Yazdi elders. Low fruits, vegetables and dairy consumption among elderly might affect their health and lead to several chronic diseases including obesity, type 2 diabetes, cardiovascular diseases (CVDs) and also various cancers. Considering protective effect of legumes consumption on cancer, only less than one quarter (22.5%) of our participants consumed enough. 22.9% of elderly people used sugar more than five servings per day. The increase in sugar consumption may lead to insulin resistance, abdominal obesity, type 2 diabetes and cardiovascular diseases (23).Our data showed that only 23% the elderly do not use fast food on a weekly basis. Increased fast food intake is associated with weight gain, central obesity, impaired glucose, serum insulin, lipids homeostasis and induced inflammatory and antioxidant system (24).

Nineteen percent of Yazdi elders used hydrogenated fat in cooking. Hydrogenated fats are supposed to be associated with type 2 diabetes, cardiovascular diseases and cancers; therefore should be avoided as much as possible. About 52.8% the elderly did not separate visible fats from red meat when cooking and 65.8% of them preferred high-fat dairy products in their diet. Yazdi elders should be encouraged to change these habits because of the adverse effect of high saturated and trans fats on health. Furthermore, 32.4% of people used salt shaker on the table at the time of eating foods which is a predictor of high prevalence of hypertension in elders (25). Evaluation of some dietary behaviors, demographic characteristics and health conditions of a large sample of elderly people might be the strength of our study.

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Table 3. **Dietary food habits according in male and female participants as well as the total population**

Dietary habits		Males	Females	Total	p [1]
Fast food consumption (%)	Never	21.1	24.9	23	0.07
	Lower than once	49.3	49.6	49.5	
	1-2 times per week	15.7	15.1	15.4	
	More than twice a week	13.9	10.3	12.1	
Canned foods consumption (%)	Never	47.5	56.9	52.2	<0.001
	Lower than once a week	52.5	43.1	47.8	
Eating breakfast (%)	Lower than twice a week	4.9	5.6	5.3	0.58
	2-5 per week	8	9	8.5	
	More than 5 days per week	87.1	85.4	86.3	
Oils used in cooking (%)	Hydrogenated vegetable oil	17.6	20.3	18.9	0.47
	Animal fat or butter	7.6	7.4	7.5	
	Vegetable oil	74.9	72.3	73.6	
Cooking method (%)	Boiling or steaming	72.8	78	75.4	0.03
	Frying or barbequing	27.2	22	24.6	
Removing fat from red meat (%)	Removing all the visible fat	50.2	55.4	52.8	0.04
	Mostly removing visible fat	23.2	22.7	22.9	
	Seldom or never removing visible fat	26.6	21.9	24.3	
Removing skin from poultry (%)	Sometimes or never removing the skin	7	5.5	6.3	0.20
	Usually removing the skin	93	94.5	93.7	
Preferred dairy products (%)	Full or high fat	64.3	67.4	65.8	0.20
	Low fat	35.7	32.6	34.2	
Putting salt shaker on the table	Yes	34.2	30.6	32.4	0.11
	No	65.8	69.4	67.6	
Daily water drinking (%)	Lower than 3 cups per day	36.2	49	42.6	<0.001
	4-6 cups per day	38.8	34.1	36.4	

[1] Chi-square test

Study limitations

This study has several limitations. First, were unable to assess dietary macro- and micro-nutrients consumption in the elderly because detailed dietary assessment was not performed in YAHS. Second, elderly may have mild dementia which may limit their ability to answer our questions accurately. However, other studies used the same method in investigation of dietary habits of the elderly

Conclusion

In conclusion, this study revealed that the harmful dietary habits particularly low dairy, fruits and vegetables consumption are highly prevalent among Yazd elderly .Immediate community-based interventions targeting dietary intakes of elderly people are needed to make the dietary habits more healthy.

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Conflict of interest

The authors have no conflicts of interest.

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