ORIGINAL ARTICLE

Assessment of the dietary pattern of dormitory students in Kerman, Iran

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Abstract

Objective: Nowadays it is known that dietary imbalances are associated with non-communicable diseases which would be a major cause of worldwide deaths in 2020. This study was conducted to assess the dietary pattern of students who live in a dormitory in Kerman, Iran, based on Healthy Eating Index-2005 (HEI-2005).

Methods: This cross-sectional study was conducted on 229 students who lived in the dormitory of Kerman University of Medical Science. The participants were recruited by multistage sampling. Their usual dietary intake was collected by using a valid food frequency questionnaire. The diet quality was calculated via HEI-2005. The HEI-2005 score was categorized into three groups: less than 50 (poor diet), between 50-70 (needs improvement) and more than 70 (good diet).

Results: The mean score of HEI-2005 in the present study was 64.22±8.98. 8.1% of the participants had poor diet, 63.4% had to improve their diet, and 28.5% enjoyed a good diet. The percent of energy intake from total fat, saturated fatty acid, solid fat and added sugar, and also sodium were significantly lower in the highest category of HEI-2005 than the lowest category. There was no significant difference in the intake of cholesterol, total vegetable and dairy products between the highest and lowest quartile categories.

Conclusion: Majority of the participants need to improve their diet.Policy revisions and dietary interventions would require to promote diet quality and prevent non-communicable diseases in the future.

Keywords: Diet, Quality, Improvement, Students, University, Iran. (JPMA 66: 1054; 2016)

Introduction

The promotion and maintenance of good health through life is dependent on the balanced diet and nutrition of an individual.[1] It is now well demonstrated that dietary imbalances are associated with non-communicable diseases, such as obesity, cardiovascular diseases, diabetes and cancers.[2] Cardiovascular diseases will continues to be a major cause of death worldwide in 2020.[3] Current evidences suggest an increasing trend in the prevalence of non-communicable diseases and subsequent mortality rate in Middle Eastern countries, such as Iran.[4]

Over the past several decades, researchers have attempted to define healthy diets among the populations.[2] The US Departments of Agriculture and Health and Human Services has issued dietary recommendations, the Dietary Guidelines for Americans (DGA), to reduce the risk of cardiovascular and other chronic diseases.[5] Healthy Eating Index-2005 (HEI-2005) was measured overall diet quality and developed according to the sixth version of Dietary Guidelines for Americans -2005 (DGA-2005).[5] The HEI-2005 is emphasizing on the important aspects of diet quality including whole grain, various types of vegetables, specific types of fats; and introducing the new concept of "discretionary calories".[5] This index assessed intakes of food groups and nutrients per 1000 kcal energy intake. Although, this approach results in balance among food groups intakes, it does not consider each individual's needs for energy and extra energy consumption.[5] Thus, the HEI-2005 assessed the quality of the relative proportion of consumed foods rather than the quantity of consumed foods.[5]

The assessment of diet quality is an important factor in policy-making, monitoring service outcomes, and designing research interventions. Quality assessment is also used for epidemiological research to monitor a population's diet and to evaluate nutrition interventions.[6]

Several studies have investigated the dietary pattern of adults based on HEI. It has been shown that among American adults all HEI-2005 component scores were below the maximum standard, except for total grains, and meat and beans. It has been found that socio-demographic characteristics affect their food choices and overall diet quality.[7] In addition, it has been reported that the diets of most adults in Tehran were in needed of improvement; and a relationship was found among nutrient intakes, the number of servings from each group and the number of food items consumed.[8]

Since, Iran is experiencing a rapid nutrition transition and because standard quantitative dietary guideline is not available in this country; it seems that the use of HEI-2005 can

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be useful for nutritional assessment. Most of the college student do not pay enough attention to their diet for reasons, such as lack of time, lack of motivation, stress, taste preference, lack of accessibility to fresh foods and financial reasons.[2] Based on our knowledge, no study has so far assessed the dietary patterns of Iranian dormitory students. This study was conducted to evaluate dietary pattern of Students who lived in a dormitory in Kerman, Iran, based on Healthy Eating Index-2005.

Subject and Methods

A cross-sectional study was conducted on college students who lived in dormitory of Kerman University of Medical Science, Kerman, Iran from December 2013 to June 2014.

The sample size of the present study was obtained with 80% power and a significance level of alpha was 0.05. In addition, according to the previous study standard deviation was considered 8.6.[9] Study participants were selected using multistage sampling technique. First, total number of students who lived in dormitory of Kerman University of Medical Science were identified based on fields of study. Then the sample size of each field was determined. For each field, a list that including all the students name was taken and the number of male and female students were determined. Afterwards, based on the ratio of girls and boys in lists, some of students were selected randomly. Participants with special diets, receiving any special medication and over- and under reporters of energy were excluded from the study. Finally, the data for 229 students which included 151 females and 78 males were analyzed.

The usual dietary data was collected using a valid and reliable semi-quantitative Food Frequency Questionnaire (FFQ), which contained 168 food items.[10,11] The trained dietitians completed the FFQ during face-to-face interviews, asking participants to report their frequency of consumption of each food item, during the past year on a daily, weekly or monthly basis. These reports were converted to daily intake. To help the participants to remind the amount of food intake, food album was used.[12] Since the Iranian Food Composition Table (FCT) is incomplete due to the limited data on nutrient content of raw food and beverages,[13] we used the FCT of the US Department of Agriculture (USDA)[14] in our study. HEI-2005 has been used to evaluate diet quality.[5] HEI-2005 evaluates two major concepts (adequacy and moderation) of the usual diet through 12 components. The maximum possible score for HEI-2005 is 100 and higher scores signify a better diet quality.

Since alcohol consumption has been prohibited in Iran and participants would refrain from reporting their consumption, and we were unable to measure the alcoholic beverage intake, therefore, the percentage of calorie intake from alcohol was excluded from the last component of this index and only the percentage of calorie intake from solid fats and added sugars was calculated as SoFAAS (percent of calorie intake from Solid Fats, Alcoholic beverages, and Added Sugars).

The statistical analysis was performed using Statistical Package for Social Science (version 18.0; SPSS Inc). P-value < 0.05 was considered significant. All variables were shown to have a normal distribution. The descriptive statistics of the baseline demographic and healthy diet characteristics of the participants were described using mean and standard deviation (SD). The comparison of characteristics and dietary intakes of the participants was preformed between males and females by using independent sample t.test. Based on previous studies score of HEI-2005 was categorized into three groups: less than 50 (poor diet), between 50-70 (needs improvement) and more than 70 (good diet).[3,15] To compare the characteristics and dietary intakes of participants across the three categories of HEI-2005, analysis of covariance was delivered. To determine P trend within the three categories of this index, linear regression coefficient was used.

Ethical Issues

Informed consent containing the information regarding the research objectives was obtained from all participants. The study protocol was approved by the ethics committee (Number K/93/565) and Deputy of Research and Technology of Kerman University of Medical Sciences (Number 92/590).

Results

From 229 college students 66% were females and 34% were

Table-1: Demographic Characteristics of Health Faculty college students of Kerman University of Medical Sciences in specified sex groups.*

	total (n=229)	Females (n=151)	Males (n=78)	P value
Age (year)	21.8 ± 2.5	21.4±2.2	22.7±2.7	< 0.001
Weight (kg)	59.3 ± 11.2	55.2 ± 8.6	67.1 ± 11.5	< 0.001
Height (cm)	166.4 ± 10.3	162.0 ± 8.8	174.9 ± 7.1	< 0.001
BMI	21.4 ± 3.6	21.1 ± 3.5	21.9 ± 3.5	0.11
Waist Circumference (cm)	75.8 ± 9.1	73.7 ± 7.6	79.8 ± 10.4	< 0.001

*Values are determined using T-test.

Table-2: Mean±SD of total HEI -2005 and its components score in participants by specified sex groups.

	Total (n=229)	Females (n=151)	Males (n=78)	P value*
Total Fruit	4.59±0.82	4.69±0.77	4.40±0.90	0.02
Whole Fruit	4.93±0.39	4.93±0.44	4.94±0.27	0.84
Total Vegetables	4.40±0.86	4.55±0.77	4.12±0.97	0.001
Dark Green and Orange Vegetables and Legumes	2.66±1.17	2.73±1.20	2.53±1.12	0.23
Total Grains	4.19±0.91	4.04±0.96	4.48±0.70	<0.001
Whole Grains	2.61±1.63	2.41±1.49	2.99±1.84	0.02
Milk	4.24±1.83	4.18±1.79	4.34±1.91	0.54
Meat and Beans	8.36±1.88	8.26±1.93	8.57±1.76	0.25
Oils	5.32±2.51	5.64±2.45	4.69±2.52	0.008
Saturated Fat	7.72±2.17	7.74±1.99	7.69±2.50	0.85
Sodium	0.33±1.20	0.18±0.76	0.61±1.74	0.04
Calories from SoFAAS	14.82±4.83	14.83±4.82	14.81±4.87	0.98
Total score HEI -2005	64.22±8.98	64.22±9.24	64.21±8.50	0.99

*Values are determined using T-test.

Table-3: Adjusted mean (Standard Error) of participants characteristics and dietary intakes across three categories of Healthy Eating index 2005 (HEI-2005).*

Dietary intake	HEI-2005 Poor (<50) n=18 (8.1%)	Needs improvement (50-70) n=140 (63.4%)	Good (>70) n=63 (28.5%)	P value+
HEI-2005 score	43.9 (1.0)	62.3 (0.3)	73.3 (0.5)	
Age (year)	21.1 (0.54)	21.7 (0.19)	22.36 (0.30)	< 0.001
BMI	21.1 (0.82)	21.3 (0.29)	21.8 (0.45)	0.68
Waist Circumference (cm)	72.9 (2.0)	75.7 (0.7)	77.4 (1.1)	0.07
Energy (Kcal/day)	3069 (151)	2644 (54)	2333 (81)	< 0.001
Cholesterol (mg/day)	249 (21.13)	280 (7.43)	287 (11.36)	0.75
Fat (% of energy intake)	31.07 (1.09)	28.81 (0.38)	28.49 (0.58)	0.005
Saturated Fat (% of energy intake)	11.03 (0.46)	9.71 (0.16)	8.54 (0.25)	< 0.001
Total Fruit (cup eq/day)	2.48 (0.42)	3.16 (0.15)	3.36 (0.23)	0.04
Whole Fruit (cup eq/day)	2.36 (0.42)	3.05 (0.15)	3.27 (0.23)	0.04
Total Vegetables++(cup eq/day)	2.83 (0.27)	2.89 (0.09)	3.18 (0.14)	0.21
Dark Green and Orange Vegetables and Legumes (cup eq/day)	0.34 (0.08)	0.53 (0.02)	0.76 (0.04_	< 0.001
Total Grains (oz eq/day)	3.39 (4.44)	9.58 (1.56)	8.96 (2.38)	0.04
Whole Grains (oz eq/day)	0.69 (0.56)	2.40 (0.19)	3.33 (0.30)	< 0.001
Dairy products(cup eq/day)	1.11 (0.15)	1.44 (0.05)	1.42 (0.08)	0.28
Meat and Beans†(oz eq/day)	4.19 (0.58)	6.05 (0.20)	7.23 (0.31)	< 0.001
Oils** (gr/day)	9.70 (1.98)	15.61 (0.69)	21.08 (1.06)	< 0.001
Sodium (mg/day)	16141 (167)	9977 (589)	10876 (901)	0.04
Calories from SoFAAS (% of energy intake)	40.31 (1.64)	28.48 (0.57)	20/70 (0.88)	< 0.001

* Values are determined using ANCOVA after adjustment for age, sex and energy intake

+ P for trend was determined using linear regression

++d Including vegetables and legumes

† According to the dietary guidelines for Americans recommendations, legumes were assigned to the meat group for those who have not achieved maximum points of meats, and if the meat point was maximized an extra amount was counted in the vegetable group

** Including fat from plant and fish source.

males, with the mean age of 21.4±2.2 and 22.7±2.7 years, respectively. Baseline characteristics of the participants in the specified sex groups are shown in Table-1. There was no significant difference of body mass index between the two genders.

The mean score of HEI-2005 in the present study was 64.22±8.98. In Table-2, the participant's total HEI-2005 and its components scores are shown. The total intakes of fruit, total vegetables and oils were significantly higher in the females than males (P=0.02, P=0.001 and P=0.008

respectively). In contrast, the males; total intake of grains, whole grains and sodium were more than the females (P=0.001, P=0.02 and P=0.008 respectively). There was no significant difference between the two sexes in the intake of other components of HEI-2005.

Table-3 shows the dietary intake of the participants across the three categories of HEI-2005. Generally, from HEI-2005 8.1% of the participants got less than 50 score, 63.3% got 50 to 70 and the score of 28.5% was more than 70. By increasing the score of HEI-2005 across the three categories of HEI-2005, no significant difference was observed in BMI and waist circumference. In addition, after the adjustment of sex, age and energy intake, in the highest category of HEI-2005 the total energy intake, the percentage of energy intake from total fat, saturated fatty acid, solid fat and added sugar (SoFAAS) and also sodium were significantly lower than those in the lowest category. There was no significant difference in intake of cholesterol, total vegetable and dairy products between the highest and lowest quartile categories.

Discussion

In this population-based study, we evaluated the diet quality of students who lived in the dormitory of Kerman University of Medical Science, Kerman, Iran, based on HEI-2005. The results of this study showed that the diets of most students in Kerman needed improvement and there was no significant difference in HEI-2005 total score between the males and females. Azadbakht et al analyzed adults in Tehran and found similar results.[8] Nevertheless, total HEI-2005 score in our population was seven points higher than the HEI-2005 total score of American adults aged 20 and above.[7]

The total HEI-2005 score provides an overall picture of diet quality while the component scores used to calculate the total HEI-5005 score offer an opportunity to study the important components of dietary intake.[15] Our findings showed that among HEI-2005 components scores "Sodium" had the lowest score. This means that the participants' sodium intake was much higher than the recommended amount. In addition, the participants received approximately about half of the maximum score of "Dark Green and Orange Vegetables and Legumes", "Whole Grains", "Milk" and "Oils" items; this indicates that receiving these food items should be taken in to consideration. Moreover, the females had slightly higher intakes than the males with respect to total intake of fruit, vegetables, and oils, and slightly lower regarding sodium intake. Since most of the students do not have enough time, motivation, accessibility and money to prepare and cook many types of foods,[2] thus the foods which are already prepared and given to students in dormitories and universities should possess appropriate quality. It is recommended that more "dark green and orange vegetables and legumes", "dairy" and "oil" be used in students' diet.

Our results for the individual HEI-2005 components can be compared to the findings of the HEI-2005 assessment of Americans adults. Similar to our report, those findings showed that Americans needed to eat less sodium, and more Dark Green and Orange Vegetables and Legumes, whole grains and milk. They also found low scores for calories from SoFAAS.[7,16] In contrast, the score of calories from SoFAAS in our research was acceptable. Furthermore, the mean scores of vegetables and fruits were much higher in Kerman and Tehran adults than their American peers.[7,8,16] This result may be attributed to the higher amount of fruit and vegetables consumed by Iranian adults.

Considering the fact that healthy diets contain more fiber, fruit, vegetables (source of potassium) and dairy products (source of calcium) and becasue there is a correlation between diet quality and these nutrients, higher HEI-2005 total score could be used as a sign of meeting these nutrient requirements.[8] Moreover, paying attention to each component of this index is also important.

Previous studies showed that the higher diet quality scores were associated with improved biomarker profiles and reduced chronic disease risk. Tande et al, found that HEI was associated with a lower risk of abdominal obesity in Americans.[15] Also, it was observed that higher HEI score was associated with lower BMI and blood pressure in French men.[17] In addition, in Americans close concordance with DGA were associated with favourable changes in HDL cholesterol and blood pressure,[18] lower prevalence of metabolic syndrome[19] and limit insulin resistance.[20] In Iranian population, more compliance with the DGA is associated with the lower prevalence of metabolic syndrome, hyperglycaemia and low HDL.[21]

Obesity, metabolic syndrome, type 2 diabetes and cardiovascular disease have emerged as epidemiologic public health problems.[22] Among the risk factors of these disease, special attention should be paid to diet, as a controllable environmental factor.[9] Therefore, inappropriate diet quality of students is of great of concern, and the policies adopted by the authorities should be revised in order to perform the required interventions (especially with respect to foods given to students at the university and dormitory). Nutrition education for students may also be needed to highlight the importance of dairy products and its substitutes, oils,

sodium and good scores for grains and vegetables.

One strength of our study was that it was conducted in a developing country under nutrition transition. To the best of our knowledge, this is the first study that evaluates the diet quality in dormitory students in Iran. Another strength was assessing separately each component of the HEI-2005 in men and women. However, not having a standard quantitative dietary index for the Iranian populations was a major limitation. American dietary indices (eg HEI-2005) have been previously used in different countries,[17,23] because dietary indices are created based on the previous knowledge of healthful diets and they are applicable to different ethnic groups. The second limitation was the inability to measure the alcoholic beverage intakes as a HEI-2005 component; thus, this item was eliminated from the last component. Moreover, because the Iranian FCT is incomplete and provides limited data on nutrient content of raw foods and beverages, the American FCT was used for analyzing the Iranian diet.

Conclusion

The results of the present study revealed that the dietary patterns of most dormitory students in Kerman were not in accordance with the recommendations of the HEI-2005 as evident from the finding that indicated around two-thirds of this population needs diet quality improvement. The higher compliance with these dietary guidelines was positively associated with healthy lifestyle and better quality of diet in the students in Kerman. The unbalanced dietary pattern of the students is a major concern, requiring prompt policy revisions and dietary interventions (especially in foods that are given to students at the university and dormitory) to promote diet quality and prevent non-communicable diseases in the future. It seems that nutrition education courses with an emphasis on how to use dairy products, whole grains, oils and sodium to students can help.

Strength and Limitation

One strength of our study was that is was conducted in a developing country under nutrition transition. To the best of our knowledge, this is the first study that evaluates the diet quality in dormitory students in Iran. Another strength was assessing separately each component of the HEI-2005 in men and women. However, not having a standard quantitative dietary index for the Iranian populations was a major limitation. American dietary indices (eg HEI-2005) have been previously used in different countries,[17,23] because dietary indices are created based on the previous knowledge of healthful diets and they are applicable to different ethnic groups. The second limitation was the inability to measure the alcoholic beverage intakes as a HEI-2005 component; thus, this item was eliminated from the last component.

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