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Evaluation of Food Consumption, Dietary and Lifestyle Habits in a Sample of Jordanian Adults in Al-Zarqa City

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ABSTRACT

Healthy eating habits should include the right amount of food consumed daily to meet the needs for different nutrients. The aim of this study is to determine the indexes of healthy nutrition in a sample of Jordanian university students aged 18–25 years and to compare them with the Healthy Eating Index (HEI). This descriptive cross-sectional design study was conducted among Zarqa University students over a period of six months. The study included 332 participants (150 males and 182 females). Energy and nutrients were calculated from dietary data by using a single 24-hour dietary recall. The mean daily intake was compared with the Dietary Recommended Intake (DRI). Energy intake was less than 1500 kcal in both genders, and dietary fiber intake was less than the recommendations. The mean score of the HEI in the whole sample is 57.4. The majority of students (65.1% of the whole sample) have diets rated in the "Needs Improvement" category. The mean HEI values for each BMI category among the underweight, normal, overweight, and obese males and females were 53.7, 58.3, 57.3, and 56.5, respectively. The mean HEI score of grains was 7.72, vegetables 3.07, fruits 4.44, milk 1.49, meat 6.39, total fat 6.04, saturated fat 7.00, cholesterol 7.72, sodium 7.83, and variety 6.59 in the whole sample. The results show that students need to increase their intake of fruits, vegetables, and dairy products. The results could provide a basis for developing suitable intervention programs to encourage healthy eating in this age group.

Keywords: Healthy Eating Index (HEI), diet quality, Jordan, obesity, BMI

Introduction

Bad food habits and insufficient physical activity may lead to many chronic diseases, such as diabetes, obesity, and cardiovascular disease. The increasing level of overweight and obesity worldwide highlights the need for the implementation of effective plans in order to reverse this trend. Based on Ministry of Health reports, the prevalence of overweight in Jordan is high. The prevalence among Jordanian adults revealed that 33.7% are overweight and 42.5% are obese.[1]

Worldwide, obesity is rising at an alarming rate. It is classified as a chronic disease with a high prevalence.[2,3] It is of concern for both developed and developing countries. Several studies have been conducted in Jordan to determine the prevalence of overweight and obesity. Most of these studies confirmed that the incidence of obesity and overweight ranged from 39.8% to 80.8%.[4,5]

Based on international reports, there are millions of obese and overweight adults worldwide.[6] It is well known that diet, eating patterns, and behavior are among the causes of this health problem.

The healthy eating index is a tool for evaluating how well people conform to dietary guidelines and the food pyramid. [7] Globally, the trend of fast food intake among young adults is increasing. [8,9] In Arabic-speaking countries, including Jordan, few studies regarding the healthy eating index are available.

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Moreover, there is little data about the nutritional status, including food habits, in Al-Zarqa. To the best of our knowledge, there were no studies in Jordan on HEI, particularly among university students. Therefore, this study aimed to determine the indexes of healthy nutrition in a sample of Jordanian adults, particularly among university students aged 18–25 years, living in Al-Zarqa city, and to compare them with the HEI.

Materials and Methods

The study protocol was approved by Al-Balqa Applied University, Faculty of Agricultural Technology, and has been appropriately performed following the Declaration of Helsinki.

Participants and sources of data

A cross-sectional survey was performed among Zarqa University students between September 2021 and February 2022. A sample of 332 students aged between 18 and 25 was selected randomly. The selection of the participants was carried out representatively across all university faculties. The study aimed to determine the indexes of healthy nutrition in the sample and compare them with the HEI. In addition, dietary habits and daily food intake were evaluated.

Data collection

Data collection was carried out using the 24-hour dietary recall method (one recall per participant) following a standard manual of procedures. [10] Students were asked questions about their dietary habits.[11] A self-administered questionnaire was used for data collection. [12] The questionnaire includes questions such as physical activity, fast food eating, having breakfast, and vitamin and mineral supplement use.

Self-reported weight and height were used to calculate the body mass index (BMI). Normal students had a BMI between 18.5 and 24.9, underweight students had a BMI between 18.5 and 24.9, overweight students had a BMI between 25-29.9, and obese students had a BMI of 30 or higher.[13]

Physical activity (PA) was classified into three categories: light, moderate, and vigorous. Participants met the requirements if they

reported 150 minutes of moderate intensity and 75 minutes of vigorous intensity (PA) weekly, or an equivalent combination.[14] Participants were classified according to their fast-food intake, using the value "once per week" or "once per week."[15]

Dietary assessment

To determine energy and nutrient intake, a 24-hour dietary recall method was followed. [16] Foods were reported in household measures, and then they were converted to grams of food per day. The energy and nutrient values of the participants' consumed foods were estimated using the program "EISHA."[17] The mean daily intake of each nutrient was compared with the DRI).[18]

HEI

In this study, we used the HEI developed by the USDA, as shown in Table 1.[19,] Briefly, the HEI index is a total of 10 degrees, containing ten items: Items 1 to 5 measure the degree of adherence to a person's diet following the recommendations of the USDA Food Guide Pyramid (FGP) for the five main food groups: cereals, vegetables, fruits, dairy products, and meat. Ingredients from 6 to 9 assess compliance with recommendations on saturated fat, total fat, sodium, and cholesterol intakes. The last item is checking the variety of foods in the diet. Each item is recorded from 0 (for non-compliance) to 10 (for full compliance), and the average score is calculated to indicate compliance with dietary recommendations. The total HEI score ranges from 0 (worst) to 100 (best). The grading scale used to classify HEI scores was as follows: greater than 80 (rating good), between 51 and 80 (rating needs improvement), and less than 51 (rating poor). [20]

Statistical analyses

The results were analyzed statistically using SAS version 9 (USA). Data were presented as means standard deviation, with significant differences between means defined as P 0.05.

Table 1: Components of the (HEI) and scoring system

Items	Score ranges[1]	Criteria for a maximum score (10)	Criteria for a minimum score (0)
Grains	0 - 10	6 - 11 servings[2]	0 servings
Vegetables	0 - 10	3 - 5 servings[2]	0 servings
Fruit	0 - 10	2 - 4 servings[2]	0 servings
Milk	0 - 10	2 - 3 servings[2]	0 servings
Meat	0 - 10	2 - 3 servings[2]	0 servings
Total Fat (g)	0 - 10	30% or less energy from fat	45% or more energy from fat
Saturated Fat (g)	0 - 10	Less than 10% energy from saturated fat	15% or more energy from saturated fat
Cholesterol (mg)	0 - 10	300 mg or less	450 mg or more
Sodium (mg)	0 - 10	2400 mg or less	4800 mg or more
Variety	0 - 10	8 or more different items in a day	3 or fewer different items in a day

Recommended number of (FGP) servings per day, by age/gender categories

Age/gender category	Energy (kilocalories)*	Grains	Vegetables	Fruit	Milk	Meat**
Females, 11-24 y	2200	9	4	3	3	2.4
Males, 19-24 y	2900	11	5	4	3	2.8

[1]People with intakes between the minimum and maximum ranges were given scores proportionately.
[2]All amounts are on a per-day basis. *Recommended number of servings per day at food energy levels specified in the (FGP) (USDA, 1996). **One serving of meat equals 2.5 about 70 grams of lean meat.

Results and Discussion

The mean age of the male students was 21.2 vs. 20.7 years for the female students. Anthropometric measurements and BMI categories are shown in Table 2. About 60% of the whole sample was within the normal weight category. The mean BMI among the male group was 23.59 whereas, the mean BMI was 22.51 among the female group. However, there is no significant difference between participants by BMI (p>0.05). The prevalence of obesity and overweight was higher among males than females (36.0% vs. 23.1%).

A healthy diet can reduce major risk factors for several chronic diseases. Specific poor food patterns are associated with many causes of death, such as cardiovascular diseases, cancer, and diabetes mellitus.[21]

In this study, 332 healthy female and male students (aged 18-25 years,males:150 and females:182) were purposively selected as the sample population. Our study showed that obesity and overweight percentages were higher in males than in females (36.0% vs. 23.1%, respectively) (Table 2). These results are in harmony with reported studies conducted on Jordanian students.[14,22] These findings might be related to an increased fear of being obese among our females.[23]

As shown in Table 3, there was a significant effect of gender (p<0.05) on fast food eating, The percentage of males who reported fast food intake was higher than females. Gender also significantly affected physical activity (p<0.05), as females were less physically active than males. There was no significant difference between males and females in having breakfast and using vitamins and minerals supplements (p>0.05).

More than one quarter of our sample did not have breakfast regularly. These results agree with Lesani *et al.*[24] and Mansouri *et al.*[25], who reported that skipping breakfast was common among university students.[24,25]

The mean daily intake of energy, macronutrient, and some micronutrients is shown in Table 4. Energy intake was less than 1500 Kcal in both genders, and dietary fiber intake was less than the recommendations. Moreover, the mean daily intake of sodium exceeded the DRI. Carbohydrate, protein and fat contributions of the total energy in males and females were in line with the DRI and within the acceptable macronutrient distribution range (AMDR).

The obtained results showed that the students' diet is characterized by unhealthy practices such as low consumption of dietary fiber, milk, fruits, and vegetables. As well as a high intake of sodium, cholesterol, fats, and saturated fat (Table 4).

The grading scale used to classify Index scores is presented in Table 5, along with the percentage of individuals receiving a particular rating. The Average Score of the Healthy Eating Index is 57.4. Most students fall in the middle range between 51 and 80. The majority of students, 65.1% of the whole sample, have diets rated in the "Needs

Improvement" category. Smaller percentages fall in the "Good category, " whereas 29.5 percent have diets rated as "Poor."

The Mean Score compared with a total score of 100 for the whole sample is presented in Figure 1 underweight students have the lowest HEI scores (53.7) out of the total score (100) whereas students falling within the normal weight category have the highest score (58.3) followed by overweight and obese students, 57.3 and 56.5, respectively. As shown in Figure 2, males have the highest score in all HEI components, except for the consumption of vegetables, milk, and a variety of foods.

The evaluation of components of the HEI index has declined tendency in the following order: sodium > grains >cholesterol > saturated fats > diet variety > meat > total fat > fruit >vegetable > milk (Figure 3). The highest score were achieved for the sodium intake (7.83 points) cholesterol intake (7.72 points) and grain consumption (7.72 points). On the other hand, the lowest score had milk (1.49 points).

Several studies have shown insufficient intake of vegetables and fruits among university students,[14,24] with increasing fast food intake,[26] which was also observed in this study. Our findings were consistent with several studies that revealed an increased intake of fast food among males and an increased intake of vegetables and fruits among female university students.[26,27] Fast food consumption was one of the main risk factors for obesity,[28] while vegetable and fruit intake were associated with lower BMI in males and females.[29] Thus, the dietary choices among our sample may explain the higher proportion of obesity and overweight in males compared to females. The consumption of the recommended amounts of vegetables, fruits, and whole grains helps reduce the risk of developing diabetes mellitus, obesity, cardiovascular disease, hypertension, and cancer.[30] Moreover, calories from solid fats, saturated fat, and sodium should be consumed moderately.[31]

Table 2: Anthropometric measurements and BMI categories of study participants (N= 332)

	Males (n = 150)		**Females (n = 182)**	
Variables	**Mean ± SD**	**(minimum-maximum)**	**Mean ± SD**	**minimum-maximum)**
Weight (kg)	74.16±14.48	(44-120)	59.31±12.28	(18-90)
Height (cm)	177.23±7.13	(158-191)	162.25±6.38	(149-179)
BMI (kg/m^2)	23.59	(17-37)	22.51±4.42	(7-35)
Categories of BMI (kg/m^2):	**n**	**%**	**n**	**%**
Underweight (<18.5)	10	6.7	30	16.5
Normal range (18.5–24.9)	86	57.3	110	60.4
Overweight (25.0–29.9)	36	24	32	17.6
Obese (≥30)	18	12	10	5.5

Table 3: Physical activity and Food Habits (%)

Variables		**Males (n = 150)**	**Females (n = 182)**	**P**
Physical activity**	Yes	53	41	*
	No	47	59	p<0.05
Having breakfast	Yes	57	49	*p*>0.05
	No	43	51	
Vitamins and minerals supplements use	Yes	18	21	*p*>0.05
	No	82	79	
Fast food eating	Yes	72	35	*
	No	28	65	p<0.05

*Significant differences between males and females (p<0.05), ** self-reported.

Table 4: Mean intake of energy, macronutrients, and some micronutrients (Mean ± SE)

Nutrients	**Males (n = 150)**	**Females (n = 182)**	**All (n = 332)**
Total energy(K.cal)	1441.7 ± 91.3	1453.4 ± 86.0	1448.1± 62.5
Total Protein (g)	68.5 ± 6.2	59.9± 3.4	63.8 ± 3.4
Total CHO (g)	174.9 ± 12.1	173.2 ± 12.0	174.0± 8.5
Total Fat (g)	54.1 ± 0.8	58.8± 0.8	56.7 ± 0.6
Saturated Fat (g)	15.6 ± 1.6	17.1 ± 1.2	16.4± 1.0
Cholesterol (mg)	239.4±31.4	257.7± 21.1	249.5± 18.3
Sodium (mg)	2578.7 ± 282.8	2590.7± 224.8	2585.3± 177
Sugar (g)	57.4 ± 4.8	57.4± 4.8	57.4± 3.4
Fiber	12.8± 1.2	15.4± 1.6	14.2± 1.0

There is paucity of data concerning HEI in Jordan, so this is the first time this research has been conducted among college students. Hence, we made an attempt to fit this index based on available dietary data. Several studies were conducted in numerous countries, including Saudi Arabia, Iran, the USA, Romania, Slovakia, and others. [32-38]

A study conducted among female university students in Saudi Arabia found that the mean HEI score was 62.7, indicating poor diet quality.[32] A study conducted in Iran found that the mean HEI score was 64 for men and 66 for women.[33] The HEI Index of the Romanian population's diet, ranges between 51 and 80, meaning that their diet requires improvements.[34]

Based on the HEI results, Bowman et al.[35] found that most of the American population showed a low intake of fruits and milk groups. Another study by Kennedy et al.[36], found that the average score of 2 to 3% of the American sample was less than 40, and of 11 to 12%, above 80. The total HEI-2015 score for Americans was 59 out of 100 points.[37] The HEI among Slovak adult females was evaluated, and the mean HEI index reached 53.0 points.[38]

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Table 5: Distribution of Individuals by (HEI) Level

Levels of Index	Males		Females		All	
	#	%	#	%	#	%
0-40	7	9.3	16	17.6	23	13.9
41-50	14	18.7	12	13.2	26	15.7
51-60	22	29.3	26	28.6	48	28.9
61-70	17	22.7	18	19.8	35	21.1
71-80	12	16.0	13	14.3	29	17.5
81-90	3	4.0	6	6.6	9	5.4
91-100	0	0	0	0	0	0
Mean	57.3		57.4		57.4	
Sample size	150		182		332	

Healthy Eating Index Grading Scale

HEI Scores	Rating	% of Males	% of Females	% of the whole sample
More than 80	Good	4.0	6.6	5.4
51 – 80	Needs Improvement	68.0	62.6	65.1
Less than 51	Poor	28.0	30.8	29.5

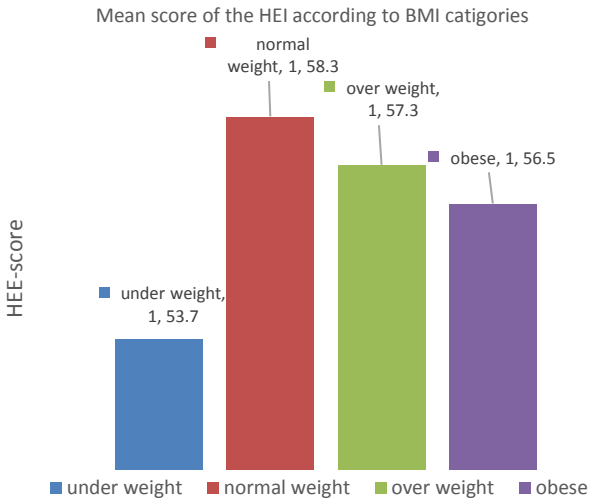

Figure 1: Total score of the Healthy Eating Index according to BMI categories

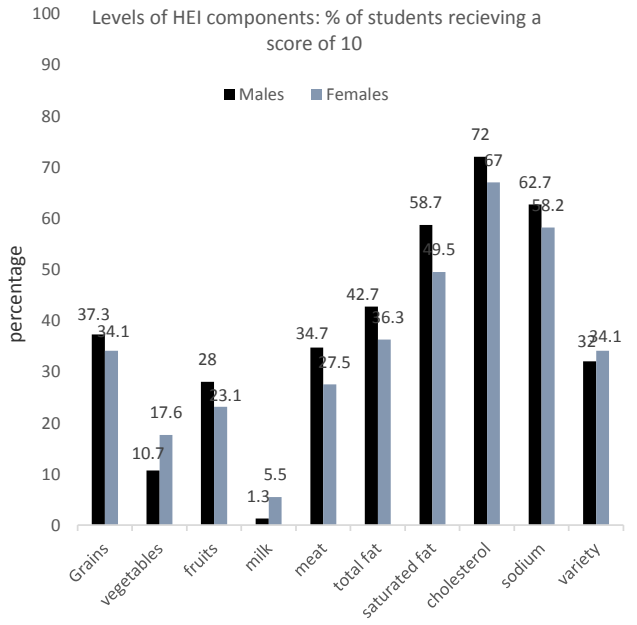

Figure 2: Levels of (HEI) components: % of students receiving a score of 10

The results showed that students do worst in consuming vegetables, fruits, and milk. These are the areas that need improvement. High component scores are indicative of intakes within recommended ranges. Mean scores for the different components range from 1.49 to 7.83. Milk (1.49), vegetables (3.07), and fruits (4.44) had the lowest mean component scores (Figure 3), indicating they are the areas needing more improvement.

Jordan is part of the Middle East region, which is classified as a region in a nutritional transition stage. Several studies correlate the preventive role of the Mediterranean diet on obesity.[39] This dietary pattern may lower the occurrence of cardiovascular diseases and cancer. [9] Mediterranean behaviors represent a good protective policy.[9]

In addition to regular eating breakfast, the content of breakfast impacts students' cognitive capacity and learning attitude. Breakfast foods that do not produce high blood glucose levels after meals are preferred to improve students' cognitive performance.[40]

Changes in the diet may negatively or positively affect health at all stages of life. Unfortunately, many developing countries focus only on nutritional deficiencies and do not focus on the concept of preventing chronic diseases by modifying food systems.[40]

Conclusion

Only 5.4 percent of the whole sample had scores on the HEI that were 80 or above, and about one-third of the sample had scores less than 51. Students were most likely to under-consume the fruit, vegetable, and milk groups. The results could provide a basis for developing suitable intervention programs to encourage healthy eating for this age group. The outcomes of the current study could be taken into account in the design of public health interventions in Jordan.

Conflict of Interest

The authors declare no conflict of interest.

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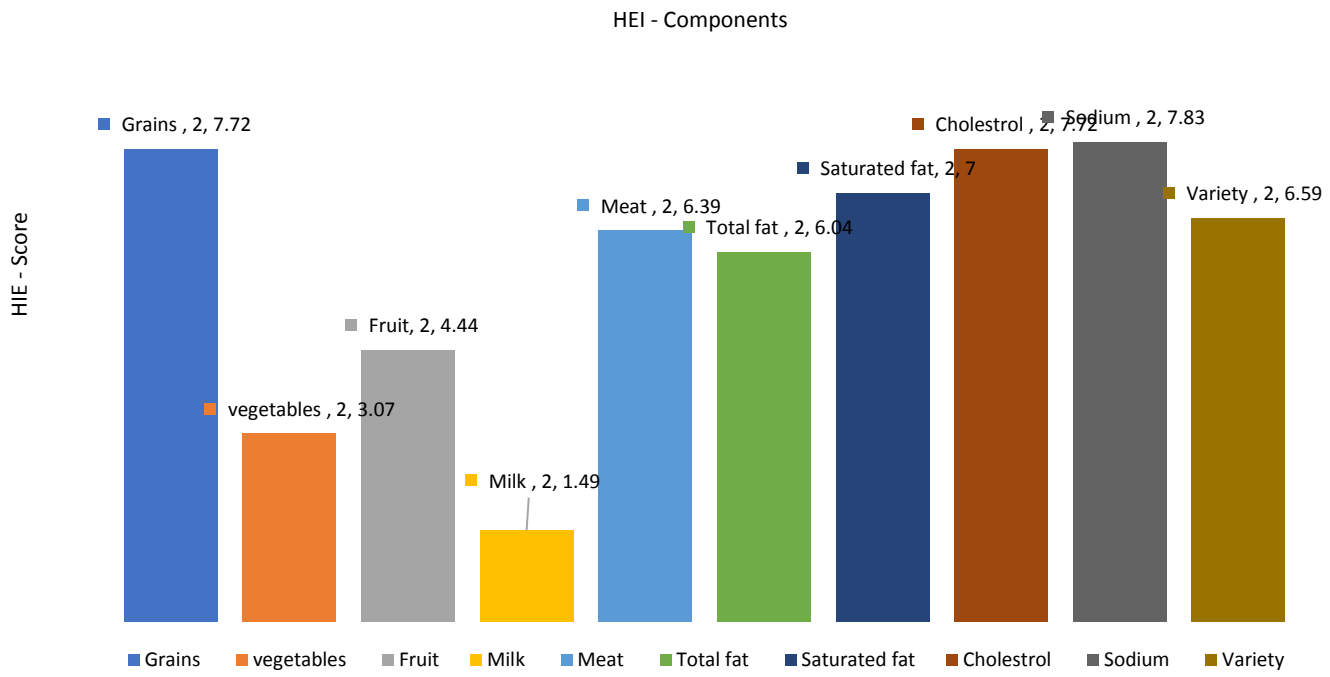

Figure 3: The (HEI) index components (Males and Females)

Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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