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Comparison of Fat and Sodium Intake among Female Students of Shiraz University of Medical Sciences Living at Home or Dormitories

Maryam Ghaseminasab Parizi[1], Mohammad Fararouei[2], Fatemeh Jafarian[1], Maryam Riasatian[1], Hadith Tangestani[1], Seyed Mohammad Mazloomi[3,4*]

1. Nutrition Research Center, Department of Clinical Nutrition, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran
2. Department of Epidemiology, School of Public Health, Shiraz University of Medical Sciences, Shiraz, Iran
3. Department of Food Hygiene and Quality Control, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran
4. Food and Supplements Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

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**Corresponding author:*
Seyed Mohammad Mazloomi,
Department of Food Hygiene and Quality Control,
School of Nutrition and Food Sciences, Shiraz University of Medical Sciences,
Shiraz, Iran.
Tel: +98-71-3725001
Email: smmazloomi@gmail.com
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ABSTRACT

Background: High sodium intake and high fat diets can play an important role as the risk factors of hypertension and cardiovascular diseases, while the prevalence of hypertension is increasing in all countries, especially in Iran. This study evaluated the sodium and fat intake among female students of Shiraz University of Medical Sciences at dormitories or home.

Methods: During 2015 by using a random sampling method, 67 female students of Shiraz University of Medical Sciences living at home or dormitories were enrolled. The demographic data included age, entrance year to university, and educational level that were recorded using a questionnaire. The body mass index (BMI) was determined and sodium and fat intake were assessed by 3-day food duplicate samples method in combination with chemical analysis. The relationship between sodium and fat intake, place of residence, blood pressure and anthropometric indices were evaluated.

Results: There were not any significant relationship between residence and sodium and fat intake. Sodium intake was shown to be higher than recommended daily intake among students living at home or dormitory in Shiraz University of Medical Sciences.

Conclusion: It seems that a proper diet instruction is necessary to be incorporated into students' educational contexts to reduce the risk of chronic diseases among this population.

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Introduction

Having a healthy nutrition is a key base for productive populations and decreases the risk of several diseases and probable mortalities. The food quality can be influenced by socioeconomic status, race, and culture, while people with various cultures were shown to consume different types and amounts of foods. From 1990 to 2020, an increase of 77% was noted for mortalities from non-communicable diseases, mostly in developing countries. By a reduction in risk factors

such as obesity, hypertension, hypercholesterolemia and diabetes, the mortality from non-communicable and cardiovascular diseases can be significantly lowered (1).

A high sodium intake can cause an increase in risk of hypertension, and a high intake of saturated and trans-fats can lead to cardiovascular diseases (2). More than half of adults between the ages of 18 and 24 years were shown to have at least one of the risk factors and about a quarter of them would suffer from cardiovascular diseases (3). Also, annually, about 17.9 million people were reported to die from these diseases (4). Atherosclerosis is directly related to several risk factors. Unhealthy dietary choices can lead to an overweight condition and dyslipidemia, and the risk would be higher in younger ages (3).

Despite the presence of risk factors and pathological changes, the risk assessment of the disease in this group is low and young people can be unaware of the risks (3). Regarding the high prevalence of hypertension, preventive measures seem to be necessary at the young age, as early diagnosis and appropriate treatment are the concerns of today's world (5). The Dietary Approaches to Stop Hypertension (DASH) study indicated that a low sodium diet can effectively lower blood pressure in non-obese patients (6).

In addition, it has been revealed that an increased sodium intake can significantly lead to a high blood pressure (7). Hypertension has been the third leading cause of death worldwide (8) with an increasing trend in Iran. Regarding the prevalence of hypertension in Iran, in Gonabad, the prevalence of hypertension was shown to be 20.9%; in Kermanshah, 14%; in Tabriz, 20.8%; and in Tehran, 32. The main reasons for this increasing trend were the population growth and rapid social changes such as urbanization, changes in people's lifestyles, and increased survival rate of patients due to a rise in medical knowledge and control measures undertaken by people (9).

It was demonstrated that the type and amount of consumed fat can play a major role in the prevalence of cardiovascular diseases and stroke (10). It was illustrated that reduction in sodium intake in the diet at the level of primary prevention can significantly decrease cardiovascular problems as well as medical costs (11). Therefore, World Health Organization (WHO) recommended a reduction in salt intake to five g per day (12). This study was conducted to compare fat and sodium intake among female students of Shiraz University of Medical Sciences living at home or dormitories in Iran.

Materials and Methods

During 2015 in a cross-sectional study, 67 female students of Shiraz University of Medical Sciences in Shiraz, southern Iran were enrolled using a random sampling method. The age range was 20-30 years and the inclusion criteria were having a regular diet, taking no medication, no intake of dietary supplements, absence of pregnancy and acute and infectious diseases, and not refusing to participate and continue the study as described before (13). Demographic information (age, year of entry, educational degree) were collected using a questionnaire and weight was measured using the Fresh Life Scale Model (CBF-1620) with an accuracy of ±100 g and the height was measured by Seca scale Model (SECA-206) with a precision of ±0.5 cm. Body mass index (BMI) [weight (kg)/ height squared (m^2)] was classified into 4 subgroups of underweight (<18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2) and obesity (≥30 kg/m^2). This study was approved by the Local Ethics Committee. All the study steps were performed in accordance with the Helsinki Declaration.

Participants were instructed on how to separate and store their second meal (except tea and drinking water) using a picture and brochure during a consecutive day (n=201). All samples were kept at refrigerator, weighed and later blended in a kitchen blender (JTC Electronics Corp., Omni Blend I series, Model TM-767, Guangdong, China). The homogenized daily meals were stored at -20°C until analysis. In order to determine the fat and sodium content of the samples, the total amount of food consumed per day was determined by homogenizing in the Enzo Teflon (8608 mixer), and addition of 200 g of the homogenate sample into the Falcon tubes and immediately freezing at -20°C.

The moisture content of the samples was measured at 105±1°C by oven-drying (Memmert, Schwabach, Germany). The homogenized samples were further used to measure the fat and sodium content. The Fat content was assessed using Soxhlet method (14) and the atomic absorption spectroscopy (AAS) method was applied to evaluate the sodium content as described before (13). To measure the amount of fat in the food, 3-5 g of dried homogenized sample were weighed on a filter paper, the filter paper was wrapped and transferred in a cellulose-extraction thimble, which was covered with cotton wool and was inserted into the extraction vessel in the Soxhlet machine (Soxtherm unit pecofood, Iran). After separation of the solvent, the percentage of fat in the sample was calculated by subtracting the weight of the balloon with fat from the balloon weight alone and use of initial weight of the sample. The percentage of fat present in the sample was later determined.

Table 1: Characteristics of the female students (N=66).

Variable	Mean±SE
Age (year)	23.4±3.3
Height (cm)	160.7±5
Weight (kg)	56.2±9.3
BMI (kg/m^2)	21.8±3.4
Slim (<18.5)	11.9%
Normal (18.5-24.9)	74.6%
Overweight (25-29.9)	11.9%
Obese (≥30)	1.7%

SE: Standard error, BMI: Body Mass Index

Data were analyzed using SPSS software (Version 21.0 statistical software, Chicago, IL, USA). Kolmogorov-Smirnov test was used to investigate the normal distribution of the data. One-way ANOVA test, t-test, and Pearson or Spearman correlation coefficients were used to explore the relationship between the data.

Results

One participant did not complete the experiments and was excluded from the study. This study was conducted with a sample size of 66 and demographic data were recorded based on a previous study (Table 1). The mean and standard deviation of systolic blood pressure among dormitory resident students and home resident students were 114.37±10.30 and 116.15±10.56 mmHg, respectively. There was no significant relationship between place of residence and systolic blood pressure.

The sodium and fat intake were calculated based on place of residence by DPS and instrumental analysis. There were not any significant relationship between residence and sodium and fat intake (Table 2).

Table 3 denotes to the relationship between various variables among students living at home and in dormitories. There were not any significant correlation between fat and sodium intakes and weight, BMI and SBP in dormitories residents and home resident students. Also, there was a significant relationship between age and fat intake in dormitory residents (P=0.005).

Discussion

Students are considered to be one of the most sensitive and the most powerful strata of the society that can be influenced by several factors due to their physiological, age, and psychological characteristics. The present study showed that the rate of sodium intake using the duplicate portion sampling method is higher than the needed and adequate intake (AI). It was shown that the body need for sodium is less than 2300 mg per day, while many people use 3600-4800 mg sodium per day (15).

In the most countries, sodium intake was demonstrated to be higher than the recommended amount of sodium intake observed in Western countries (12). In this study, sodium consumption using the DPS method was 3.36mg for students living in dormitory, and 3.49mg for those who were resident at home. In this regard, Al Khathaami *et al.* showed that the mean sodium intake was 2.7 g per day among university students (5), which is similar to the mean sodium intake (2.71 g per day) reported in the eastern region of Saudi Arabia (16). Mean sodium intake has been reported more than 5 g per day in India (17) and

Table 2: Sodium (mg) and fat (g) intake among students living at home and dormitories by duplicate portion sampling method.

Variable	Dormitory resident (Mean±SE)	Home resident (Mean±SE)
Sodium (mg/day)	3365.4±150.65	3491.2±195.10
Fat (g/day)	28.79±2.74	29.80±2.26

SE: Standard Error

Table 3: Relationship between various variables among students living at home and dormitories.

	Fat, DPS				Sodium, DPS			
	Home resident (n=32)		Dormitory resident (n=34)		Home resident (n=32)		Dormitory resident (n=34)	
	R	*p*-value	R	*p*-value	R	*p*-value	R	*p*-value
WC (m)	0.03	0.83	-0.65	0.72	-0.18	0.14	0.27	0.02*
Age (years)	-0.23	0.19	0.97	**0.005***	0.04	0.72	0.02	0.86
Weight (kg)	0.07	0.67	0.05	0.76	-0.28	0.02*	0.09	0.47
BMI (kg/m^2)	-0.09	0.60	0.00	0.99	-0.22	0.09	0.07	0.59
SBP (mmHg)	-0.07	0.70	0.00	0.98	-0.007	0.95	-0.20	0.08

Abbreviations: WC: Waist Circumference; BMI: Body Mass Index; SBP: Systolic Blood Pressure; R: Correlation Coefficient; DPS: Duplicate Portion Sampling.***p*** value <0.05

less than sodium intake reported in Australia (3.2-3.6 g per day), in Italy (3.32-4 g per day) and in the Czech Republic (2-4 g per day) (18). In developing countries, most of dietary sodium intakes are during food preparation. Several countries have planned to reduce sodium intake in processed foods, while this method can be time-consuming (19).

This study revealed that there was no relationship between the place of residence and blood pressure, so that the mean and standard deviation of systolic blood pressure of students residing in dormitory and at home were 114.37±10.30 and 116.15±10.56 mmHg, respectively. In a study by Cheikh Ismail *et al*., who assessed the salt intake among college students in 2019, they confirmed a link between salt intake and high blood pressure, and reported that only 21.2% of the students were satisfied with their salt intake; because other students believed that the salt intake was adequate despite their high blood pressure (20). They found that 7.3% of students reported "low sodium" or "no added sodium" food choices, based on the nutrition label printed on the food package. These researchers showed that students' information about salt and sodium intake were relatively low and a small percentage of students considered implementing measures to reduce salt/sodium in their diet (20). In another study by Nasreddine *et al.* in Lebanon, people were shown to be unaware of the relationship between high sodium intake and high blood pressure (21). Also, the results of a study by Rafiei *et al.* on students in Shahrekord University of Medical Sciences in Iran, a positive and significant correlation was reported between BMI and hypertension (22). In the study of Salem *et al.* in Rafsanjan University of Medical Sciences in Iran, 27.4% of the students suffered from abnormal systolic blood pressure (more than 120 mmHg) and 28% had abnormal diastolic blood pressure (more than 90 mmHg), while a significant relationship was noted between BMI and hypertension (23).

The present study showed that sodium intake and BMI were not correlated with the students' place of residence however the students living in dormitories had lower sodium intake and lower BMI in comparison to students who lived at home, due to consumption of food stuffs in the university cafeteria and self-services. Mortazavi and colleagues conducted a study at Zahedan University of Medical Sciences in Iran on urban students and reported the prevalence of overweight and obesity to be 12.9% and 3.1%, respectively (24). This study used quantitative methods for food survey, and students were studied based on their place of residence (dormitory or home). So far, no studies have quantitatively assessed the foods consumed based on the student's place of residence, even our study had the limitation of a small sample size.

Conclusion

Sodium intake was shown to be higher than recommended daily intake among students living at home or dormitory in Shiraz University of Medical Sciences. Therefore, a proper diet instruction is recommended to be incorporated in students' educational contexts for reduction of complications of chronic diseases before reaching the middle age.

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Conflict of Interest

None declared.

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