

ORIGINAL ARTICLE

# Comparison of Dietary Patterns and Nutritional Behaviors among Female Students in Shiraz University and Shiraz University of Medical Sciences

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## ABSTRACT

**Background:** Adequate nutritional knowledge is necessary for healthy dietary behaviors. The present study was conducted to compare dietary behaviors among female students in Shiraz University (SU) and Shiraz University of Medical Sciences (SUMS).

**Methods:** In a cross-sectional study using multi-stage sampling method, 150 female students (75 from SU and 75 from SUMS) living in the university residences were enrolled. Demographic and anthropometric data on food consumption were collected by trained dietitians. Dietary information was extracted by Nutritionist 4 software and data analysis was performed by SPSS software.

**Results:** The average consumption of carbohydrates, proteins, fats, and energy did not significantly differ between both groups. Contribution of carbohydrates to daily energy intake was significantly more appropriate in SUMS rather than SU students ( $p=0.03$ ). Both SU and SUMS students consumed fruit, vegetables, dairy, and meat in appropriate amounts; however, fruit consumption was significantly higher in SUMS students ( $p=0.004$ ). No difference was observed between the two groups regarding number of meals and snacks, and the habit of skipping meals ( $p=0.06$ ).

**Conclusion:** SUMS students seemed to have better dietary patterns than SU students probably partly due to their higher level of information about their nutrition.

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## Introduction

Dietary habits during youth are important determinants of nutritional and consequently health

status later in life. In this context, more focus should be directed towards young females who will be future mothers that will play a critical role in

nutritional behaviors of their children and dietary habits of their families (1). Adequate nutritional knowledge is considered as a prerequisite of proper nutritional behavior (2). In medical science universities, students usually take at least a 2-credit nutrition course in their curriculum, while taking such courses would increase the students' nutritional knowledge and help them to make better selections on foods and diets. On the other hand, the nature of medical and para-medical disciplines makes students concerned about adverse effects of unhealthy diet on the health status and well-being. Accordingly, students in such disciplines should be more eager to gain information about nutrition and to follow recommendations of a healthy diet (2).

A number of previous studies have shown that nutrition educational programs lead to significant improvements in dietary habits of college students (2). Education about nutrition was shown to affect the students' body composition. For instance, a course-work based nutrition education was demonstrated to play the role of a time- and cost-effective method for improving body composition and nutritional behaviors in general college students (3). Likewise, body fat consumption of students who took a nutrition course decreased when compared to those who did not take the course (4). There are also studies that have not shown such benefits from educational programs on nutrition. Strawson and colleagues reported that educational programs on nutrition alone may not be sufficient to ensure optimal dietary patterns among female university students (5).

To investigate if students of medical-related sciences have better dietary patterns and nutritional behaviors compared to those of other disciplines, a comparison was made on female students of two universities in Shiraz, i.e. Shiraz University (SU) and Shiraz University of Medical Sciences (SUMS). The results of this study may delineate, if there is a difference in the quality of diet and eating behaviors of students of the two universities and that if educational programs on nutrition are required for any improvement.

## Materials and Methods

This cross-sectional study was conducted on 75 female students from SUMS and 75 female students from SU. Participants were selected through multi-stage sampling method from university residences. After sampling, those students who were willing to take part in the study and were not either on a special diet or with major health problems affecting their diets were included in the study. A written consent was obtained from all the participants. The protocol of the study was approved by the

Ethics Committee of Shiraz University of Medical Sciences. All information was kept confidential and used for study purposes only.

Demographic information and dietary patterns were collected using a questionnaire. A 95-item Food Frequency Questionnaire (FFQ) was used for evaluation of dietary intake. The FFQ had previously been designed and validated by investigators of the School of Nutrition and Food Sciences at SUMS (6). Both questionnaires were completed by trained dietitians. Height was measured to the nearest 0.1 cm with a non-stretchable tape while the participants were standing with their head, shoulders, buttocks, and heels touching the wall. Weight was measured with minimal clothing without shoes to the nearest 0.1 kg using a Seca scale. Body mass index (BMI) was calculated as weight in kilograms divided by height squared in meters.

Consumed energy and macronutrients were analyzed by Nutritionist IV (version 3.5.2). Statistical analysis was performed using SPSS software (Version 16, Chicago, IL, USA). Normality of the distribution of the data was examined by Kolmogorov-Smirnov test. Independent *t*-test was used to compare the intake of energy and macronutrients and Mann-Whitney test was performed to compare the consumption of food groups between SU and SUMS students.

For comparison of different levels of macronutrient consumption, meal skipping, and the number of daily meals and snacks between SU and SUMS students, Chi-square test was used. Non-parametric tests were used where the data had abnormal distribution. A *p* value less than 0.05 was considered as significant. Data are presented as the number of exchanges consumed from each food group and Bars represent means $\pm$ SEM. Independent *t*-test was performed for comparing consumption of food groups between the two groups.

## Results

The participants' mean age was 21.8 $\pm$ 5.1 years and their BMI was 21.3 $\pm$ 3.4 kg/m<sup>2</sup>. There was no significant difference in the mean BMI of students between two universities (21.1 $\pm$ 5.2 kg/m<sup>2</sup> and 21.5 $\pm$ 5.3 kg/m<sup>2</sup> in SUMS and SU students, respectively). Overall, 16% of the students were underweight (BMI of <18.5 kg/m<sup>2</sup>), 76.4% in normal weight range (BMI of 18.5–24.9 kg/m<sup>2</sup>), 8.7% overweight (BMI of 25–29.9 kg/m<sup>2</sup>), and 0.7% were obese (BMI of  $\geq$ 30 kg/m<sup>2</sup>). There was no significant difference in the intake of energy and macronutrients between students of the two universities (Table 1). Contribution of each macronutrient in daily energy intake was also compared between students of the two universities.

**Table 1:** Intake of energy and macronutrients in SU and SUMS students.<sup>1</sup>

Macronutrients	SU	SUMS	p-value <sup>2</sup>
Energy (kcal)	2024±609	2043±519	0.83
Carbohydrate (g)	231±65	247±66	0.14
Protein (g)	73±21	77±21	0.23
Fat (g)	69±38	66±18	0.56

<sup>1</sup>Values are Means±SD. <sup>2</sup>Independent t-test was performed for comparisons between the two groups. SU: Shiraz University; SUMS: Shiraz University of Medical Sciences

Compared to SU students, SUMS students consumed carbohydrates, proteins, and fats in more appropriate proportions, although a significant difference only existed for carbohydrates (Table 2).

Compared to SU students, SUMS students consumed more fruit, vegetables, dairy, and meat more. Furthermore, less bread, fats, and sweets were consumed less by SUMS students in comparison to SU students, although the difference was only significant for consumption of fruit ( $p=0.004$ ) (Figure 1). Assessing the consumption of main meals revealed that SU students skipped breakfast and dinner more frequently than SUMS students ( $p=0.06$ )

(Table 3). None of the participants missed lunch and consumption of 3 meals per day was more common among SUMS students; while the difference did not reach a statistical significance (Table 4). Similarly, there was no significant difference in consuming snacks among students of two universities (Table 4).

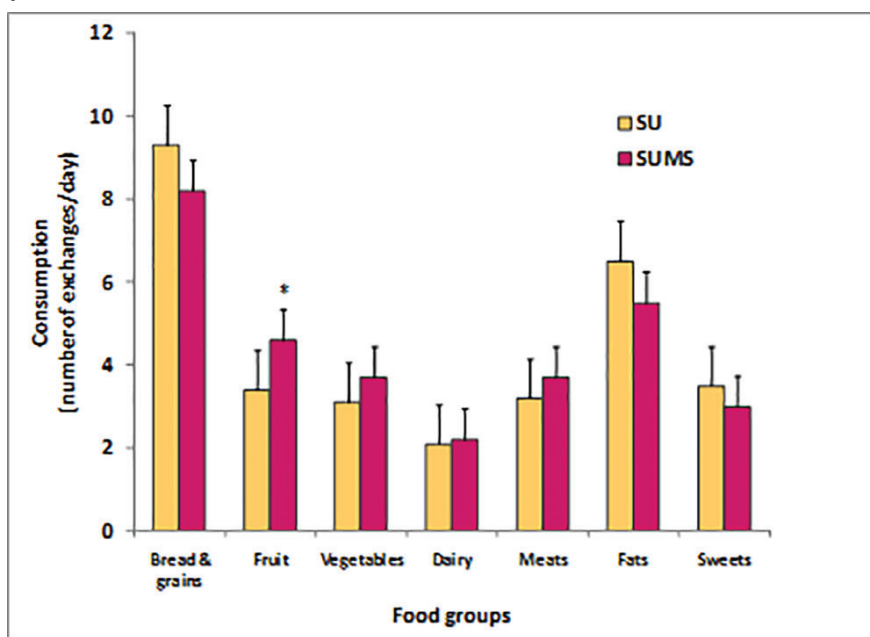
**Discussion**

Results of the present study showed that SUMS students had better nutritional patterns and healthier dietary habits than SU students. Compared to SU students, SUMS students consumed macronutrients especially carbohydrates in more appropriate

**Table 2:** Macronutrient consumption by SU and SUMS students.<sup>1</sup>

Level of Macro-nutrient → consumption	Carbohydrates			Proteins			Fats		
	Low (<45%)	Appropriate (45-65%)	High (>65%)	Low (<15%)	Appropriate (15-20%)	High (>20%)	Low (<20%)	Appropriate (20-35%)	High (>35%)
SU	31 (41.3)	42 (56)	2 (2.7)	40 (53.3)	35 (46.7)	0	4 (5.3)	61 (81.3%)	10 (13.3)
SUMS	16 (21.3)	57 (76)	2 (2.7)	32 (42.7)	43 (57.3)	0	1 (1.3)	69 (92%)	5 (6.7)
Total	47 (31.3)	99 (66)	4 (5.3)	72 (48)	78 (52)	0	5 (3.3)	130 (86.6%)	15 (10)
p-value <sup>2</sup>	0.03			0.19			0.14		

<sup>1</sup>Values are the frequency and the percentage. <sup>2</sup>p was evaluated by Chi-Square test. SU: Shiraz University; SUMS: Shiraz University of Medical Sciences



**Fig. 1:** Comparison of SU and SUMS students consuming various groups of foods.

**Table 3: Meal skipping in SU and SUMS students.<sup>1</sup>**

Main meals →	Skipping			Non-skipping N (%)	p-value <sup>2</sup>
	Breakfast N (%)	Lunch N (%)	Dinner N (%)		
SU	47 (62.7)	0	19 (25.3)	9 (12)	0.06
SUMS	42 (56)	0	13 (17.3)	20 (26.6)	
Total	89 (59)	0	32 (21.3)	29 (19.3)	

<sup>1</sup>Values are the frequency and percentages. <sup>2</sup>p evaluated by Chi-Square test. SU: Shiraz University; SUMS: Shiraz University of Medical Sciences

**Table 4: Number of meals and snacks consumed per day by SU and SUMS students.<sup>1</sup>**

	Number of main meals			Number of snacks					
	N (%)			N (%)					
	1	2	3	0	1	2	3	4	5
SU	1 (1.3)	30 (40)	44 (58.6)	5 (6.6)	25 (33)	18 (24)	17 (22.6)	6 (8)	4 (5.3)
SUMS	1 (1.3)	21 (28)	53 (70.7)	1 (1.3)	18 (24)	28 (37.3)	18 (24)	7 (9.3)	1 (1.3)
Total	2 (1.3)	51 (34)	97 (64.6)	6 (4.1)	43 (29.1)	46 (31.1)	35 (23.7)	13 (8.8)	5 (3.4)
p-value <sup>2</sup>	0.30			0.34					

<sup>1</sup>Values are the frequency and percentages. <sup>2</sup>p was evaluated by Chi-Square test. SU: Shiraz University; SUMS: Shiraz University of Medical Sciences

rates, skipped breakfast and dinner less frequently ( $p=0.06$ ), and consumed fruit more frequently. According to guidelines of the healthy diet; it was shown that 45-65%, 10-20%, and 20-35% of energy should be supplied from carbohydrates, proteins, and fats, respectively (7).

We defined three levels of consumption for these macronutrients, as low, moderate (optimal), and high, and evaluated the consumption of these macronutrients according to these levels. Compared to SU students, a higher number of SUMS students received carbohydrates, proteins, and fats in the recommended ranges, although the difference between the two groups was only statistically significant for carbohydrates. Overall, students of the two groups, who did not consume macronutrients in appropriate proportions, consumed carbohydrates and proteins in lower and fats in higher quantities than the recommended allowance.

Especially, the rate of low consumption of protein intake was more frequent as 53.3% for SU students and 42.7% for SUMS students who consumed proteins in quantities lower than those recommended. Food sources of proteins are usually expensive, so it is reasonable that students cannot consume them easily. High consumption of fats was non-significantly more prevalent among SU students than in SUMS students. Lower consumption of fats by SUMS students may have been due to their knowledge about disadvantages of fats in increasing risk of cardiovascular diseases (8). In agreement with our results, Emrich and Mazier reported that taking a nutrition course could decrease fat consumption in university students (4).

Students in both groups consumed fruit, vegetables,

dairy, and meat in adequate amounts; the average consumption in serving, for SU and SUMS students respectively, was  $3.4\pm 2.4$  and  $4.6\pm 2.5$  for fruit,  $3.1\pm 1.8$  and  $3.7\pm 2.3$  for vegetables,  $2.1\pm 1.1$  and  $2.2\pm 1.0$  for dairy, and  $3.2\pm 1.4$  and  $3.7\pm 1.5$  for meat. SUMS students consumed more fruit, vegetables, and meat than SU students, although the difference was only significant for fruit. A part of the difference in fruit consumption between SU and SUMS students may have resulted from the difference in food services provided by the two universities. In SUMS by regulations, students living in university residences receive one fruit per day, whereas, SU did not report such a regulation.

Although students in our investigation consumed fairly sufficient quantities of fruit and vegetables, previous studies have shown lower consumption of fruits among students. For instance, Talaei *et al.* reported that in 2007, female students of Arak Azad University consumed fruit and vegetables as few as  $1.4\pm 0.9$  and  $0.7\pm 0.4$  of servings, respectively (9). Similarly, Martinez and colleagues reported that consumption of fruit and vegetables by university graduates in Spain was relatively low (10). The reason of higher rate of fruit and vegetable consumption in our study could be cultural differences and availability of fruit and vegetables. For instance, Shiraz is located in central south of Iran, where consumption of dates is common. In some students of our investigation, dates contributed up to 50% of their daily fruit consumption, so dates could have increased the average consumption of fruits among students participating in our study.

It is expected that students who are living in university residences have lower fruit and vegetable

consumption compared to native students who live with their families. In this regard, Pouredal and colleagues showed that after entering the university; consumption of fruit and vegetables decreased particularly among students who studied in a university away from their home (11). Other studies have also supported this conclusion that students who live with their family have higher quality diets and that the intake of macro- and micro-nutrients improves when students who live in university residences return home (12).

Fifty-nine percent (63% in SU and 56% in SUMS) of all participants skipped breakfast. Similar to our results, skipping breakfast was estimated 52% in female students of Isfahan University of Medical Sciences (13). These rates are almost the same as those in other countries of the region like Lebanon with 53.3% (14) and Saudi Arabia with 41.2% (15) for skipping the breakfast. In contrast to students of a university in Poland with lunch as the most omitted meal (16), the most skipped meal in Iran and Arabic nations is breakfast. The cause of difference in the type of skipped meal between different countries may be cultural, lifestyle, and even university diversities.

Iran universities provide lunch for all students and at least two main meals (lunch and dinner) for students who are living in university residences, and the meals are generally offered in low and affordable costs. In addition, students usually do not skip lunch, because there is a break between classes during lunch time and students have enough time to eat their lunch at university food services. For breakfast, the condition is different and the students need to get up earlier and because most classes are held at 8 AM, they do not feel comfortable to eat breakfast and so easily prefer to lose it.

Skipping meals is an eating behavior associated with low quality nutrition and health status and poor scholastic performances (17). Previous studies have shown that meal skipping is associated with increased energy intake per meal, higher serum triglycerides, and enhanced visceral adipose tissue (18). Increased visceral adipose tissue and serum triglycerides may have resulted from de novo synthesis of lipids following increased energy intake per meal (19) and can predispose individuals to metabolic syndrome and cardiovascular diseases (20).

Skipping breakfast has shown to increase the feeling of hunger and provoke individuals to consume snacks before lunch (21). In turn, individuals who snack frequently are more likely to skip meals (22). In contrast to the above-mentioned risks following skipping meal, individuals at risk of malnutrition, such as children, adolescents, and elderly, may

encounter insufficient energy intake and negative protein balance upon skipping meals (23) Kral *et al.* reported that among 8-10-year old children, omitting breakfast did not affect energy intake in subsequent meals, but decreased the total daily energy intake (21).

Although results of previous studies may seem contradictory regarding the effects of meal skipping on energy intake, all of them confirmed that skipping meals especially breakfast is an unhealthy dietary behavior which can lead to an overweight condition. It is worth noting that although breakfast is the most emphasized meal, for the afore-mentioned reasons skipping other meals (or in other words consuming less than 3 meals a day) is also prohibited. In our study, there was no significant difference in the number of daily meals consumed by students of the two universities, but the number of students who took 3 meals per day was non-significantly more in SUMS than in SU.

A part of the comparably healthier dietary pattern that was observed in SUMS students may have resulted from their better knowledge about nutrition. Most of medical and para-medical students pass at least two credits of nutrition course in their curriculum, and so they are expected to have higher nutritional information and better dietary behaviors compared to students of other disciplines. Moreover, studying in medical and paramedical sciences makes students more concerned about their diet and believe in the effect of nutrition on the occurrence of diseases.

Furthermore, compared to SU, SUMS authorities are more informed about nutritional facts, students' nutritional needs, and healthy dietary patterns. Therefore, when planning food services, they consider the guidelines of a healthy diet more. Differences may also have partly resulted from food services presented in each university, regardless of the nutritional issues. For instance, in contrast to SUMS, SU authorities did not offer food services to students during weekends. Although SUMS students appeared to have better dietary behaviors, the difference between them and SU students did not reach statistical significance in most cases. This can have resulted from two possibilities. First, scholastic nutritional education may not have been very efficient in increasing the students' nutritional knowledge. Second, a larger sample size may be required to allow making stronger conclusions.

The limitation of our study may be absence of any assessment for socio-economic status and educational level of the parents, and the factors that may affect diet and nutritional habits of students. Our investigation was performed on female students, while in comparison to males, Iranian women are

usually more familiar and interested in issues related to foods and diets. Therefore, male students are expected to have less healthy nutritional behaviors than female ones.

Future studies may be directed toward evaluating students' dietary pattern in both genders. Also, to delineate the effect of studying dietary pattern and nutritional habits in a medicine-related discipline, future studies may be directed to evaluate dietary patterns among students who live with their families; because, the diet of students who live in university residences is largely influenced by university food services rather than dietary patterns of students.

### Conclusion

Overall, the results of the present study showed that SUMS students had relatively better nutritional pattern and healthier diet than SU students. Including nutritional courses in universities' curricula can improve nutritional knowledge and consequently dietary behaviors of students. It is recommended that more researches should be conducted in future on larger groups including both genders to clarify dietary patterns and educational on nutritional needs of students for more competent planning of universities' curricula.

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### Conflict of Interest

None declared.

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