Original Article

Assessment of Nutritional Status and Its Related Factors among Iranian University Students: A Cross-Sectional Study

Mehri Delvarianzadeh[1] **Saeed Saadat[2]*** Mohammad Hossein Ebrahimi[2]

1. School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran
2. School of Public Health, Shahroud University of Medical Sciences, Shahroud, Iran

*Correspondence to: Saeed Saadat
*delvarianzadeh.mehri@gmail.com

Abstract

***Background and purpose*:** Sufficient nutrition is the appropriate proportions of food required for physical development and maintenance as well as supplying energy to the body. This study aimed at assessing the nutritional status and its related factors among Iranian University Students.

***Materials and Methods*:** As a cross-sectional research, the present study was conducted with the participation of 1031 students in Shahroud, Iran. The relevant information was obtained through a 24-hour diet recall questionnaire. Also, the anthropometric measurements were taken for these students.

***Results*:** The students' mean BMI and energy intakes were 22.01±3.57 and 1974±750.35Kcal, respectively. Majority of the students (73.91%) were of normal Body Mass Index (BMI), but some cases of malnutrition including both underweight and overweight were also observed among the students. The findings showed that the mean daily intakes of fiber, phosphorous, calcium, iron, vitamins A, B6, and B12 were less than the RDA (Recommended Dietary Allowances) values. Hence, a significant relationship was observed between BMI and food consumption at each meal, type of snack, eating breakfast, number of snacks taken per day, speed of food consumption, adding butter or oil to the prepared food, the duration of daily activities, working with computer, and watching television ($p<0.001$).

***Conclusion*:** The results obtained through the methods of nutritional status revealed that due to BMI categories, some cases of malnutrition including both underweight and overweight were observed among the studied students. Examining the consumed food indicated qualitative and quantitative deficiencies as compared with standard recommendations, so that students were affected by hidden hunger resulting from micronutrients deficiency.

***Keywords*:** Body Mass Index; Nutritional assessment; Dietary intake; University student; Iran

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1. *Introduction*

Sufficient nutrition is the appropriate proportions of food required for physical development and maintenance as well as supplying energy to the body. The body mass index (BMI) is a tool for indicating an adult's proper weight, and is a criterion used for describing overweight and obesity. Anthropometric measurements are a common criterion used for nutritional assessments and a reliable tool for determining changes in nutritional status. Another nutritional assessment method is the dietary evaluation using a 24-hour diet recall where the energy intake by the individual and its relationship with their nutrition and BMI values are taken into account (1). Prevalence of malnutrition occurring in various forms (obesity and being overweight/underweight) in the world, particularly among adolescents and young people, is a cause for concern. Nearly 70% of children and adolescents suffering from malnutrition live in Asia (2) . In Africa, 49.7% of young people are either overweight or obese; however, at the University of Mutah, Malaysia, the percentage of overweight and obesity was reported to be 4.9% and 4.2% for female and male students, respectively (4). Prevalence of underweight in Venezuelan female and male students is 10.3% and 10.7%, respectively, in comparison with 14.5% and 14.9% obesity rates (5). Recent studies in Saudi Arabia showed that 22.8% of Saudi students were overweight and 15.7% suffered from obesity (6). The other main problem in the world is the foodstuff deficiency including micronutrients. Estimates show that more than 2 billion people around the world are affected by lack of essential vitamins and minerals, particularly vitamin A, iodine, and zinc. Nutrients deficiency is a risk factor leading to global burden of 10 diseases (7). It is generally believed that once individuals had access to adequate various foodstuffs, their main nutritional requirements are met. However, in addition to energy measurements and protein values of foodstuffs, micronutrients sufficiency must also be considered (8). Research shows that the high price of the foodstuffs containing micronutrients is a main reason for the deficiency of these nutrients (7), and that certain groups in any society, due to their adverse economic circumstances, are unable to afford such foodstuffs (8). In many studies conducted on socio-economic factors affecting nutrition, a significant association was observed between such factors as monthly income, mother's level of education, and household size and the following factors: nutritional status (9), micronutrients (Iron, Vitamin B12) deficiency (10-12), as well as ferritin and hemoglobin levels (13). Other studies conducted on students around the world pointed out micronutrient and macronutrient deficiencies in students' diets (14, 15) as well as inappropriate food group patterns in the meals they received (16, 17). Due consideration of the BMI variables, the foodstuffs received, as well as physical activity in the research conducted on students' nutrition reveals inadequacies in their nutrition (18-21). Therefore, investigating the nutritional status of public university students whose main source of food is the meals they receive at the university canteen, as well as studying the effective factors on their nutrition can help university authorities to improve the

students' nutrition and consequently, their general health. Since university students' nutrition is influenced by various socio-economic factors (22), which are seldom considered in the eating planning by university authorities, nutritional assessment can lead to due recommendations for alleviating malnutrition, i.e. improving nutrition (23). Due to the importance of nutrition in this age group and the fact that nutritional deficiency among adolescents and young people can be a great barrier in their social and economic development and, in the long run, affect their learning power as well as their health, it is particularly important to communicate to health managers the extent and spectrum of the existing nutritional deficiencies that affect young people. The costs expended for promoting health indexes are actually an investment for improving productivity in the society. The present study was conducted to investigate public university students' nutritional status and its relationship with eating habits and lifestyle among university students in northeastern Iran since no previous research had been conducted in this field in this particular area.

2. Materials and Methods

This was a cross-sectional study conducted on 1200 students at Shahroud Medical Sciences University in northeastern Iran. Ultimately, the relevant information was collected from 1031 students (65.86% females and 34.14% males) through a questionnaire. The reliability of the questionnaire was also obtained through Cronbach's alpha with an amount of $\alpha = 0.72$. To check the reliability, the questionnaires were studied and analyzed by a nutritionist and health specialist, and the anthropometric measurements were taken for these students. All the students consumed the meals were served twice a day (lunch and dinner) at the university canteen. Upon explaining the purpose of the study to the students, previous coordination with them, and obtaining their consent, their weights (with minimum clothing and no shoes) were measured within a ± 0.5kg tolerance by using a scale. After every 10 measurements, the accuracy of the scale was checked by recalibrating it with a standard weight. Height measurements were carried out with an accuracy of 0.5 ±cm with a non-flexible plastic measuring rod. For measuring their height, the students were asked to stand on a flat surface with their heads up, their shoes off, and their feet placed together so that their knees, pelvis, shoulders, and back would lie along a straight line. Upon measuring their weights and heights, the BMI number was obtained by dividing the student's weight (in kg) by the square of their height (in meters). The obtained BMI values were then classified according to the WHO classification criteria as underweight (BMI $\leq$18.5), normal (18.5<BMI$\leq$25), overweight (25<BMI$\leq$30), and obese (BMI >30). A measuring tape was also used to measure the students' waist circumference.

The information regarding the intake of energy as well as some of other nutrients was collected from the 24-hour diet recall (based on three consecutive days) and food frequency questionnaires. In the 24-hour diet recall questionnaire, the students were asked to recall and report their consumed food material during the previous 24 hours including drinks and

dietary complements. Since this questionnaire relies on the respondent's memory, the food frequency questionnaire was implemented to reduce the errors that might have arisen from the first questionnaire (24). The recall method for assessing food consumption was conducted by trained Applied Nutrition students in the following manner: upon obtaining the information from the students and with due consideration of the standard requirements for each student, the relevant values were calculated from the raw and cooked ingredients tables for Iranian dishes without using any software due to the specific nature of Iranian dishes (25). These tables present analyses of 100 gr samples for all nutritional compositions (raw and cooked) used in various Iranian dishes (26). To ensure reliability of these calculations, the authors had the obtained values examined by three different experts. Once the mean food intake values had been duly recorded, some items such as the amounts of food intake, i.e. carbohydrates, proteins, and other nutrients were calculated and compared with the recommended dietary allowance (RDA) values (27). None of the studied females were pregnant or breast feeding at the time of the study. At the same time, the students who had diseases such as diabetes, hypertension, gluten enteropathy, etc., and students who were dieting for weight reduction were excluded from the study. All the students stated that they neither drank nor smoked. SPSS (version 17.0; SPSS, Inc, Chicago) was used to analyze the data. The differences between means of age, weight, height, BMI, waist circumference (WC), and energy intake in females and males were tested for significance using Independent t-test. To know about the independency between categorized variables in table 2, Pearson's chi-squared test was also applied. In table 4, Correlation coefficients were obtained using Pearson's correlation. Meanwhile, all inferences were made on basis of $\alpha = 0.05$

3. Results

Overall, 1031 medical sciences students were studied. The anthropometric characteristics of students are shown in table 1. mean ± SD of age, height, weight, BMI, WC, and energy intake was 21.64 ± 2.54 year 165.82 ± 10.32 cm, 61.74 ± 10.32 kg, 22.01 ± 3.57, 70.91 ± 5.73 cm, and 1974 ± 750.35, respectively.

Table 1. Gender-specific anthropometric characteristics of participants

Variables (Mean ± SD)	Total (n=1031)	Female (n=679)	Male (n=352)	P-value
Age	21.64±2.45	21.82±2.68	21.21±1.77	=.001
Height	165.82±10.32	160.97±5.23	172.61±8.34	<0.001
Weight	61.74 ± 10.37	56.61 ± 8.55	68.43 ± 9.75	<0.001
BMI	22.01 ± 3.57	21.72 ± 3.31	22.96 ± 3.72	<0.001
WC	70.91 ± 5.73	68.25 ± 0.93	75.16 ± 1.04	<0.001
Energy Intake	1974 ± 750.35	1847 ± 629.44	2307 ± 743.21	<0.001

A significant difference was observed in height, weight, WC, BMI, and energy intake between male and female students (p<0.001). In contrast to the category of underweight, there were no significant difference in prevalence between (Table 2).

both sexes in normal and overweight categories (p<0.05). Also, the energy intakes for females and males in various groups of BMI were significantly different (p<0.01).

Table 2. Mean of energy intake, and percentual distribution of BMI by sex

		Percentual Distribution N (%)			**Energy Intake (Mean ± SD)**		
		Female	**Male**	**P-value**	**Female**	**Male**	**P-value**
BMI	< 18.5	114 (16.8%)	36 (10.2%)	< 0.05	1681.2 ± 231.31	2280.1 ± 110.31	<0.01
	18.5-24.9	493 (72.5%)	269 (76.4%)	0.17	1865.6 ± 316.45	2312.1 ± 431.42	<0.01
	≥ 25	72 (10.7%)	47 (13.4%)	0.13	1904.3 ± 103.12	2320.1 ± 203.51	<0.01

Table 3 presents the mean daily intake of macronutrients and some micronutrients. According to these findings, in both sexes, the mean daily consumption of carbohydrate was much more than the RDA values. The mean iron consumption in male students was more than RDA standard.

Table 3. Mean and SD of macronutrients and micronutrients intakes

Macronutrient	**Female**	**Standard for Female**	**Male**	**Standard for male**
Protein (g/d)	45.05 ± 27.70	46	50.12 ± 21.22	56
Fat (g/d)	45.32 ± 4.08	-	70.45 ± 10.71	-
Carbohydrate (g/d)	290 ± 37.23	130	360 ± 49.50	130
Fiber (g/d)	21.67 ± 10.87	28	32.55 ± 7.41	34
Micronutrient				
Phosphorus(mg/d)	347.56 ± 79.5	700	421.23 ± 102.78	700
Potassium (g/d)	355.09 ± 61.00	*	403.64 ± 92.96	*
Calcium (mg/d)	576.82 ± 110.40	1000	608.56 ± 204.67	1000
Iron	11.2±4	18	13.3±5	8
Vitamin A (µg/d)	284.39 ± 78.08	700	413.72 ± 220.04	900
Vitamin B6 (mg/d)	0.6 ± 0.24	1.3	0.4 ± 0.11	1.3
Vitamin B12 (µg/d)	0.91 ± 0.15	2.4	1.1± 0.25	2.4

The associations between BMI levels and some factors of socio-economic status, eating habits, and physical activity are presented in Table 4. As is shown in the table, a significant association was observed between BMI categories and all presented factors except mother's job status and father's education.

Table 4. Mean of BMI according to some characteristics of subjects and association between BMI categories and this characteristics

Characteristics		Mean of BMI	BMI categories			Total	p-value for association
			Underweight	Normal	Overweight & obese		
Socio-economic	household size						<0.001
	≤3	23.21	3 (0.29%)	90 (8.73%)	21 (2.04%)	114	
	4-6	21.95	95 (9.21%)	630 (61.11%)	97 (9.41%)	(11.06%)	
	≥7	21.01	52 (5.05%)	42 (4.07%)	1 (0.09%)	822	
	P-value	<0.001				(79.73%)	
						95 (9.21%)	
	Monthly income						<0.001
	low	17.03	63 (6.11%)	71 (6.89%)	1 (0.09%)	135	
	Medium	22.05	86 (8.34%)	655 (63.53%)	94 (9.12%)	(13.09%)	
	High	23.4	1 (0.09%)	36 (3.50%)	24 (2.33%)	835	
	P-value	<0.001				(80.99%)	
						61 (5.92%)	
	Mother Education						<0.001
	Illiterate	21.83	2 (0.19%)	6 (0.58%)	2 (0.19%)	10 (0.96%)	
	Elementary	22.15	37 (3.59%)	72 (6.98%)	33 (3.20%)	142	
	High school	21.98	97 (9.41%)	637 (61.79%)	57 (5.53%)	(13.77%)	
	University	22.42	14 (1.36%)	47 (4.56%)	27 (2.62%)	791	
	P-value	0.11				(76.73%)	
						88 (8.54%)	
	Mother's job status						0.14
	Having job	22.24	123	482 (46.75%)	97 (9.41%)	702	
	Jobless	21.66	(11.93%)	280 (27.16%)	22 (2.13%)	(68.09%)	
	P-value	0.12	27 (2.62%)			329	
						(31.91%)	
	Father Education						0.07
	Illiterate	-	-	-	-	-	
	Elementary	17.26	69 (6.69%)	93 (9.02%)	1 (0.09%)	163	
	Secondary	24.09	15 (1.45%)	169 (16.39%)	31 (3.01%)	(15.81%)	
	University	21.93	66 (6.40%)	500 (48.50%)	87 (8.44%)	215	
	P-value	<0.001				(20.85%)	
						653	
						(63.34%)	
	father's job status						<0.001
	Having job	22.09	126	751 (72.85%)	119 (11.54%)	996	
	Jobless	17.04	(12.22%)	11 (1.07%)	0 (0.0%)	(96.61%)	
	P-value	<0.001	24 (2.32%)			35 (3.39%)	

Eating Habits	Number of Meals						<0.001
	<3	22.31	49 (4.75%)	82 (7.95%)	56 (5.43%)	187 (18.13%)	
	=3	21.58	101 (9.80%)	669 (64.89%)	33 (3.20%)	803 (77.89%)	
	>3	26.95	0 (0.0%)	11 (1.07%)	30 (2.91%)	41 (3.98%)	
	P-value	<0.001					
	Eating Breakfast						<0.001
	Yes	21.06	73 (7.08%)	491(47.62%)	32 (3.10%)	596 (57.81%)	
	No	23.13	77 (7.47%)	271 (26.29%)	87 (8.44%)	435 (42.19%)	
	P-value	<0.001					
	Meal Alternative						<0.001
	Fast foods	22.87	98 (9.50%)	626 (60.72%)	99 (9.60%)	823 (79.82%)	
	Cheese and Eggs	19.11	36 (3.50%)	33 (3.20%)	2 (0.19%)	71 (6.89%)	
	Roasted Liver	21.72	16 (1.55%)	103 (10.0%)	18 (1.74%)	137(13.29%)	
	P-value	<0.001					
	Number of Snacks						<0.001
	<3	19.76	113	393 (38.12%)	12 (1.16%)	518 (50.24%)	
	=3	22.34	(10.96%)	303 (29.39%)	24 (2.32%)	361 (35.01%)	
	>3	25.97	34 (3.30%)	66 (6.41%)	83 (8.05%)	152 (14.75%)	
	P-value	<0.001	3 (0.29%)				
	kind of Snacks						<0.001
	Fruits and Juices	19.31	49 (4.75%)	102 (9.90%)	17 (1.65%)	168 (16.30%)	
	Non-alcohol drinks	22.90	51 (4.94%)	443 (42.97%)	42 (4.07%)	536 (51.98%)	
	Sweets and	23.02	23 (2.22%)	152 (14.75%)	49 (4.75%)	224 (21.72%)	
	Chocolates	21.11	27 (2.62%)	65 (6.31%)	11 (1.07%)	103 (10.0%)	
	Nuts	<0.001					
	P-value						
	Speed of eating						<0.001
	Slow	20.32	58 (5.62%)	145 (14.07%)	7 (0.68%)	210 (20.37%)	
	Moderate	22.69	79 (7.66%)	515 (49.95%)	48 (4.66%)	642 (62.27%)	
	Fast	23.18	13 (1.26%)	102 (9.90%)	64 (6.20%)	179 (17.36%)	
	P-value	<0.001					
	add butter / oil to						<0.001
	food	22.54	18 (1.75%)	359 (34.82%)	82 (7.95%)	459 (44.52%)	
	Yes	21.91	132	403 (39.09%)	37 (3.59%)	572 (55.48%)	
	No	0.09	(12.80%)				
	P-value						
Activity	Time for sport						<0.001
	(hour/day)	22.75	128	289 (28.03%)	103 (10.0%)	520 (50.44%)	
	<0.5	21.42	(12.41%)	322 (31.23%)	14 (1.36%)	351 (34.04%)	
	0.5-1.0	19.93	15 (1.45%)	119 (11.54%)	2 (0.19%)	127 (12.31%)	
	1.0-3.0	19.04	6 (0.58%)	32 (3.11%)	0 (0.0%)	33 (3.20%)	
	>3.0	<0.001	1 (0.09%)				
	P-value						
	Sedentary activities						<0.001
	(computer/ TV)(hour/day)						
	<1.0	21.39	42 (4.07%)	87 (8.44%)	14 (1.36%)	143 (13.87%)	
	1.0-2.0	21.33	44 (4.27%)	201 (19.50%)	13 (1.26%)	258 (25.03%)	
	2.0-5.0	23.46	63 (6.11%)	460 (44.62%)	83 (8.05%)	606 (58.78%)	
	>5.0	25.12	1 (0.09%)	14 (1.36%)	9 (0.87%)	24 (2.32%)	
	P-value	<0.001					

The correlations between energy intake and some factors of socio-economic status as well as eating habits are also shown in table 5. This data demonstrates inverse correlations of energy intake (K Cal) with father's education (- 0.04), and sport activity (-0.19).

Table 5. Correlation between Energy Intake and some subject's characteristics

	BMI	Monthly income	Father's education	Mother's education	Number of Meals	Number of Snacks	Speed of eating	Sport activities	Sedentary activities
Energy intake	0.23	0.22	-0.04	0.16	0.27	0.38	0.23	-0.19	0.18

4. Discussion

The present study made an assessment of the students' nutritional status at public universities in northeastern Iran and the factors influencing it. The anthropometric result showed that the percentage of underweight students in Iran was less than the 16.6% obtained for Chinese students (28). However, in comparison with the 5.3% female and 7.3% male reported for Malaysian students in the study by Al-Rewashdeh et al., the Iranian students exhibited a higher rate of underweight. Moreover, the percentages of overweight and obese students in Malaysia (4.2% male and 4.9% female) were less than the corresponding values obtained in the current study for Iranian students (4). In the study conducted on the female students of the University of Kuwait, the percentages of underweight, overweight, and obese students were reported to be 10.3%, 29.5%, and 12.7%, respectively (29). These show that, as compared with their Kuwaiti counterparts, female Iranian students exhibited a greater prevalence of underweight as well as lesser percentages for overweight and obesity. Among Saudi Arabian university students, 5% were underweight, 21.8% overweight, and 15.7% obese (6). Comparing these results with the corresponding values obtained for male Iranian students, i.e., 10.2% underweight and 13.4% overweight, Saudi Arabian male students were observed to be more inclined to become overweight and obese, which could also be similar to the reports provided from studies conducted in Lebanon (30) and USA (31). The study conducted by Nojumi (2005) in Tehran reported the percentages of underweight and overweight/obese students as 10% and 12.4%, respectively (32). These results showed a lower underweight percentage than that in the present study. However, unlike the present study, the BMI values obtained for female students in Nojumi's study was greater than that for male students. It seems the reason for this discrepancy can be attributed to Tehran's being the capital city where female students have more access to fast food and other restaurants; whereas regarding the female students in the current research, due to cultural limitations, would less frequently leave the campus, and, consequently, would consume less fast food. Also, it looked as if the female students were more inclined to lose weight and acquire ideal weight, and this trend has been on the increase particularly in the past few years as a result of which some cases of malnutrition are observed among Iranian university students. On the other hand, young demographic groups, due to their sufficient stamina as well as physiological adaptability, do not exhibit signs of nutritional deficiency or delay the occurrence of disorders. As a young demographic group busily involved in their educational concerns, students usually paid little attention to proper nutrition. The

results obtained in the current study showed that energy intake among female students was considerably less than that among male students. This was in agreement with the results obtained by Gunes et al. in Turkey. In Gunes's study, the greater intake of energy among boys was due to the fact that they drank alcohol, whereas the male students in our study did not use alcoholic drinks (33). Since females are afraid of gaining weight which consequently ruins their figures, leading to an undesirable status as compared to their peers, they make changes in their food intake which result in nutritional inadequacies. In contrast to female students, the energy intake among Iranian male students is greater than that of the same Malaysian group (4). Also, Iranian female students have a less intakes of vitamin A and calcium, but their fiber intake is greater (29). In female students in Iran and Sweden, the intake of fiber is approximately the same (34). This could be as a result of including rice in a daily basis in the students' weekly diet, in addition to various vegetables cutlets and stews, often served during a week, which could then maintain fiber consumption at the standard level (35). The results demonstrated that the main problem of daily diet was not with its quantity but with its quality and the deficiencies it had regarding the supply of micronutrients. In other words, the major nutritional problems were the imbalance, lack of variety, and some micronutrients deficiency. In the assessment made by Shimbo on Japanese students' diet, it was revealed that iron and calcium deficiency was the main nutritional problem among university students (36). Hence, the consumption of dairy products is of particular importance in this specific group. This fact is particularly important for Iranian females due to their dark outfits, and the fact that milk is not included in the university canteen food plan. As a result, they can be exposed to osteoporosis and osteomalacia. Moreover, in spite of enrichment of wheat flour with iron, some people are still prone to iron deficiency. For this reason, taking iron supplements is recommended as a national protocol.

As is shown in Table 4, there was a significant association between BMI and household size as well as monthly income, so that members of larger households are more prone to being underweight. Various studies conducted in Brazil showed that the mean BMI among adolescents coming from smaller households, who enjoyed special socio-economic privileges, was greater than that of the adolescents in large families who were deprived of such advantages (37). These results were in agreement with those in the present study. There was a direct relationship between the parents' level of education and monthly household income among adolescents in Ohio, United States (38). However, another study conducted on Polish students showed that more favorable socio-economic position resulted in underweight and overweight percentages of 15.3% and 3.5%, respectively, among girls (22). Also, white American adolescents whose parents were highly educated and earned large incomes demonstrated a lower prevalence of overweight as compared with African American adolescents (39). Unlike these studies, family size, monthly income, and father's education and occupation play an important role in developing countries like Iran, since large

families – particularly their adolescents due to their greater nutritional needs – in these countries cannot otherwise have access to sufficient food.

Numerous investigations pointed to a prominent change in the lifestyle of students during their academic activities, and the fact that their nutrition is also naturally influenced by these changes (17, 21). For example, Alizadeh observed that there was a significant relationship between students' physical activities and their consumption of healthy food (40). In the present study, with almost half of the students involved in daily sports activities for less than half an hour, there was also a significant relationship between daily sports activities and BMI, and this was in agreement with the results of a study by Alizadeh et al.. Regarding the consumption of breakfast, 57.80% of the studied students were also found to take breakfast, which was in agreement with the findings of the studies in Malaysian and Saudi Arabian contexts where more than half of the students had a regular breakfast consumption (6, 41). However, the results differ from those obtained in the studies in Lebanon and China where 1/3 and 2/3 of the studied students had breakfast on a regular basis (28, 30). At the same time, a study on Pakistani students revealed that skipping breakfast had actually led to obesity (18, 30). In contrast, in the current study, it was documented to lead to the students' being underweight. In the Pakistani study, it was argued that skipping breakfast might increase a person's appetite for the next meal which could contain high energy foods with little nutritional value. This weight loss among Iranian students was due to a constant amount of served lunch (according to the standard amount), so through skipping breakfast, they would receive less energy which can affect their BMI. This particular group is then recommended to consume breakfast, preferably the traditional breakfast containing ingredients like lentil which can also prevent anemia resulting from iron deficiency, since in a study conducted in India, Shill attributed iron-deficiency anemia to skipping breakfast (12).

5. *Conclusion*

Regarding BMI categories, some cases of malnutrition including both underweight and overweight were observed among the students. Therefore, both these cases are to be considered. Examining the consumed food indicated qualitative and quantitative deficiencies as compared with standard recommendations, so that students were affected by hidden hunger resulting from micronutrients deficiency. Due to the fact that students consume greater amounts of energy as compared with other age groups since they have higher brain activity, the authorities should take the necessary measures to improve the quality of nutrition for students. Other approaches for alleviating malnutrition include proper training and encouraging students to follow correct eating plans, as well as optimal use of such local nutrients as dates, walnuts, raisins, and apricots (based on the "thinking globally, acting locally" way of thinking).

The limitation of this study

No tests were conducted for the evaluation of micro-nutrients, such as iron, zinc, etc.

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Conflict of interest

The authors declare that they have no conflict of interests.

Authors' contributions

MD conceived and supervised the study, helped to gather data, draft the manuscript and interpret the results. MHE provided data and participated in Manuscript preparation. SS Participated in epidemiological work, helped to draft the manuscript, and performed statistical analysis. All authors read and approved the final manuscript.

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