Academixs Journal of
Nutrition & Food Science

Academixs
An Open Access Journals

Research Article

Energy and Nutrients Intake among University Students of Bangladesh

Abu Ansar Md. Rizwan[1*], Iffat Ara Begum[2], Md. Abdul Mazid Azad[3], Mohammad Shamsul Huda[1], Rifat Jahan Khan[4], Zannatul Raiyana[4], Jahir Uddin Md. Jaber[4]

[1]*Social Assistance & Rehabilitation for the Physically Vulnerable (SARPV), Dhaka, Bangladesh*

[2]*Friendship, Dhaka, Bangladesh*

[3]*Save the Children, Dhaka, Bangladesh*

[4]*International Centre for Diarrheal Disease Research, Bangladesh (icddr, b), Dhaka, Bangladesh*

Corresponding Author
Abu Ansar Md. Rizwan, Nutrition Expert, Health & Nutrition Department, Social Assistance & Rehabilitation for the Physically Vulnerable (SARPV), Link Road, SARPV Complex, Cox's Bazar, Bangladesh.

Received Date: 20-06-2021 **Accepted Date:** 25-06-2021 **Published Date:** 29-06-2021

Abstract
Adequate dietary intake and absorption is the key factor to maintain health and nutritional status of an individual. Students are the future of a generation and adequate nutrients consumption is very much important to maintain their wellbeing and nutrition. Thus, this study was conducted to identify the energy and nutrients intake among university students of Bangladesh. A randomized type of cross-sectional study was conducted with 300 randomly selected students of a public university situated in Dhaka, Bangladesh. The consumption of the animal and plant foods rich in macro and micro nutrients were obtained by using 24-hour recall method. Dietary history was recorded for one day using a semi-structured questionnaire. The 24-hour dietary recall information was used to calculate the nutrient intake of the respondents. This finding indicates that the contribution of energy from carbohydrate and protein is much higher than fat among both male and female students. The protein consumption was found higher than the RDA among the students. The average intake of calcium, iron, vitamin C, thiamin, riboflavin and niacin of both male and female students are lower than the RDA. This study findings raise concerns about the university students' dietary intake of the essential trace elements such as calcium, iron and vitamin c, which may result severe micronutrient deficiencies in their future life. Therefore, it can be recommended to disseminate nutritional knowledge to the students and conduct further research with similar population in broader spectrum to generalize the findings.

Introduction
Nutrition and food intake are closely linked to the nutritional status and health of the individual. Adequate amounts of nutrients in the form of daily diets are essential to maintain a healthy and disease-free life. Carbohydrates, proteins and lipids, by far, the most abundant nutrients in our diet. Minerals and vitamins are found in small amounts or even trace amounts. Protein, minerals and water contribute to the formation of body tissues. Vitamins and minerals are essential for normal growth and health. Some of these can be stored in the muscle tissues, but their main function is to regulate body processes [1]. Family's habit, environment, physical condition, attitude and community culture determine the diet pattern. It also depends on the family's' financial situation. In developing countries, the lack of diversity of nutritious foods especially protein, calorie and body protective foods, leads to deficiency diseases caused by malnutrition [2]. University and college students represent important segment of the human population in any country. Their physical and mental well-being is largely determining the quality of the next generations. Students studying at public universities come from a variety of backgrounds. The student community in any area forms a model average of adult population [3]. University students are often preoccupied with academic work, sports and are under a lot of emotional stress associated with unbalanced diets, which leads to poor health and malnutrition. Therefore, the importance of good nutrition is reflected in the maintenance of human health. Females may be at risk of malnutrition, which is

very worrying considering the potential for motherhood in near future. In addition, dormitory resident students get less nutritious food than the students who live at their home [4]. Therefore, this study was conducted to identify the energy and nutrients intake of a number of students of a public university of Bangladesh. This study also observed whether their nutritional needs were being met or not.

Methodology

Study design & subjects

A randomized type of cross-sectional study was conducted by enrolling 300 randomly selected students of a public university situated in Dhaka, Bangladesh. The sample size was determined by using appropriate statistical formula ($n=z^2pq/d^2$). The information was collected during January 2020 to February 2020. The study was conducted after proper ethical approval by the Ethical review Committee, Faculty of Biological Science of that university. The purpose and nature of the study was explained to each participant and after getting the written consent, they were recruited in the study. A semi-structured questionnaire was used to collect the data from the respondents.

Dietary assessment

The consumption of the animal and plant foods rich in macro and micro nutrients were obtained by using 24-hour recall method. Dietary history was recorded for one day using a semi-structured questionnaire. The questionnaire was pre-tested and validated. The usual intake of energy, macronutrients and micronutrients was calculated using the data of the mean 24-h dietary intake and "Food Composition Table for Bangladesh (FCTB)".

Nutrient intake

The 24-hour dietary recall information was used to calculate the nutrient intake of the respondents. After calculating the intake, the comparison was done with the Recommended Dietary Intake (RDA) of different nutrients suggested by National Institute of Nutrition, Hyderabad [5]. For this study, along with energy, some major macro and micronutrients consumption were calculated and those were- carbohydrate, protein, fat, calcium, iron, phosphorus, Vitamin C, thiamin, riboflavin and niacin.

Anthropometry

Anthropometric measurements were carried out in accordance with standard procedures as recommended by the WHO [6]. The Hanson HX6000 electronic scale was used for the measurement of body weight and a locally made, portable wooden height scale (SECA 206 body meter) was used to measure height. Body weight was measured to the nearest 100 g, and the height to the nearest 1 mm. BMI was calculated by using the formula weight (kg)/height^2 (m^2) to identify the nutritional status of the respondents. Respondents with a BMI of less than 18.5 kg/m^2 were considered to be underweight, with a BMI of 18.5-24.9 kg/m^2 were considered to be normal, and those with a BMI of 25.0-29.9 kg/m^2 were considered overweight and those with a BMI of ≥ 30.0 kg/m^2 were considered as obese [7].

Data management

Data was collected using a pretested semi-structured questionnaire. Questionnaires were checked each day after interviewing and again these were carefully checked after completion of all data collection and coded before entering into the computer. Data entry and analysis were done by using SPSS (Version 20.0) with statistical significance accepted at $P<0.05$ for all tests. The association was done by conducting chi-square test.

Results

Table 01 is showing the characteristics of the respondents. Among all the respondents, 57.0% respondents were male and 43.0% were female. The respondents were aged in between 18 to 26 years. Their mean age was 22.2 years with a standard deviation 1.42. Respondents' mean weight was 57.93 kg with a standard deviation 9.25 and mean height was 162.0 cm with a standard deviation 15.47. most of the respondents (73.0%) had normal nutritional status (BMI 18.5-24.9 kg/m^2), only 9.3% were undernourished (BMI <18.5 kg/m^2) whereas 11.0% were overweight (BMI 25.0-29.9 kg/m^2) and 6.7% respondents were obese (BMI ≥ 30.0 kg/m^2)

Table 01: Characteristics of the students

Sex of the respondents	**Male**	171 (57.0%)		
	Female	129 (43.0%)		
Age of the respondents	**Maximum**	26 years	**Minimum**	18 years
	Mean ± SD	22.2 ± 1.42		
Respondents' weight	**Maximum**	83.0 kg	**Minimum**	39.0 kg
	Mean ± SD	57.93 ± 9.25		
Respondents' height	**Maximum**	185 cm	**Minimum**	122 cm
	Mean ± SD	162.0 ± 15.47		
Nutritional status	**BMI**	**Number (%)**		
Underweight	<18.50	28 (9.3%)		
Normal	18.50-24.99	219 (73.0%)		
Overweight	25.00-29.99	33 (11.0%)		
Obese	≥30.00	20 (6.7%)		

The average energy intake of the male students was 1826.9 kcal/day which is 33% lower than the RDA whereas the average energy intake of the female students was 1812.3 kcal/day which is 19% lower than the RDA. Average carbohydrate intake of the male students was 275.40 g/day which is 27% lower than the RDA whereas the average carbohydrate intake of the female students was 270.22 g/day which is 12% lower than the RDA. Protein intake among both male and female students was found higher compared to RDA. Average protein intake of the male students was 56.42 g/day which is 13.27% higher than the RDA whereas the average protein intake of the female students was 56.26 g/day which is 23.37% higher than the RDA. Average fat intake of the male students was 55.26 g/day which is 9%lower than the RDA. However, the average fat intake of the female students was 57.31% g/day which is 15.77% higher than the RDA. The average intake of calcium, iron, vitamin C, thiamin, riboflavin and niacin of both male and female students are lower than the RDA. The average phosphorus intake of the male students was 593.71 mg/day which is 1.05%lower than the RDA, whereas the average phosphorus intake of the female students was 728.39 mg/day which is 21.38% higher than the RDA. (Table 02)

Table 02: Daily per capita intake of the nutrients by the respondents

	Male				Female			
	RDA	**Nutrient intake (Mean + SD)**	**% of RDA**	**Difference from RDA**	**RDA**	**Nutrient intake (Mean + SD)**	**% of RDA**	**Difference from RDA**
Average energy intake (Kcal/ person/day)	2730	1826.9 ± 165.05	67%	33% (903 kcal) Lower	2230	1812.3 ± 204.26	81%	19% (418 kcal) Lower
Average carbohydrate intake (gram/person/day)	375.4	73%	73%	27% (100 gram) Lower	270.22 ± 22.51	270.22 ± 22.51	88%	12% (36.4 gram) Lower
Average protein intake (gram/person/day)	49.8	56.42 ± 6.97	113.27%	13.27% Higher	45.6	56.26 ± 9.05	123.37%	23.37% Higher
Average fat intake (gram/ person/day)	60.8	55.26 ± 9.79	91%	9% (5.54 gram) Lower	49.5	57.31 ±16.52	115.77%	15.77% Higher
Average calcium intake (mg/person/day)	400	348.48 ± 134.53	87.10%	12.90% (51.6 mg) Lower	400	272.74 ± 147.05	68.18%	31.82% (127.3 mg) Lower
Average iron intake (mg/ person/day)	17	13.99 ± 4.29	82.29%	17.71% (4.01 mg) Lower	21	10.55 ± 2.96	50.23%	49.77% (10.45 mg) Lower
Average phosphorus intake (mg/person/day)	600	593.71 ± 87.32	98.95%	1.05% (6.3 mg) Lower	600	728.39 ± 194.53	121.38%	21.38% Higher
Average Vit- C intake (mg/ person/day)	40	22.74 ± 10.81	56.85%	43.15% (17.26 mg) Lower	40	39.38 ± 25.25	98.45%	1.55% (0.62 mg) Lower
Average Thiamin intake (mg/person/day)	1.4	0.8645 ± 0.114	61.71%	38.29% (0.536 mg) Lower	1.1	0.8113 ± 0.133	73.72%	26.28% (0.289 mg) Lower
Average Riboflavin intake (mg/person/day)	1.6	0.7036 ± 0.144	43.93%	56.07% (0.897 mg) Lower	1.3	0.6051 ± 0.120	46.53%	53.47% (0.695 mg) Lower
Average Niacin intake (mg/ person/day)	18	13.44 ± 2.34	74.67%	25.33% (4.56 mg) Lower	14	11.91 ± 1.91	85.07%	14.93% (2.09 mg) Lower

Table 03 is showing the comparison of daily per capita nutrient intake by the students and a correlation between the nutrient consumption of male and female students. In case of average carbohydrate, fat, calcium, iron, phosphorus, vitamin C, thiamin and riboflavin; significant association was found. No significant association was found in average energy, protein and niacin intake.

Table 03: Daily per capita nutrient intake, range and comparison of nutrient intake among the respondents

	Male		Female		P value	Level of significance
	Nutrient intake (Mean + SD)	Range	Nutrient intake (Mean + SD)	Range		
Average energy intake (Kcal/ person/day)	1826.9 ± 165.05	1403- 2343	1812.3 ± 204.26	1495- 2016	0.091	NS
Average carbohydrate intake (gram/person/day)	275.40 ± 22.74	201.42- 324.46	270.22 ± 22.51	221.43- 304.06	0.000	S
Average protein intake (gram/ person/day)	56.42 ± 6.97	32.64- 70.17	56.26 ± 9.05	27.13- 68.44	0.116	NS
Average fat intake (gram/person/ day)	55.26 ± 9.79	16.29- 87.19	57.31 ± 16.52	25.77- 76.75	0.002	S
Average calcium intake (mg/ person/day)	348.48 ± 134.53	105.5- 677.1	272.74 ± 147.05	77.6- 632.2	0.000	S
Average iron intake (mg/ person/ day)	13.99 ± 4.29	5.40- 19.11	10.55 ± 2.96	6.20- 19.10	0.011	S
Average phosphorus intake (mg/ person/day)	593.71 ± 87.32	432.6- 896.1	728.39 ± 194.53	430.7- 939.6	0.000	S
Average Vit- C intake (mg/ person/day)	22.74 ± 10.81	3.18- 56.10	39.38 ± 25.25	6.22- 72.27	0.000	S
Average Thiamin intake (mg/ person/day)	0.8645 ± 0.114	0.54- 1.01	0.8113 ± 0.133	0.56- 1.23	0.004	S
Average Riboflavin intake (mg/ person/day)	0.7036 ± 0.144	0.27- 1.04	0.6051 ± 0.120	0.45- 1.02	0.008	S
Average Niacin intake (mg/ person/day)	13.44 ± 2.34	8.55- 17.85	11.91 ± 1.91	8.55- 16.81	0.396	NS

Discussion

Bangladesh is a compactly populated country and malnutrition is a widespread and persistent problem here. To maintain a proper nutritional status, balanced diet is very much necessary. Students need proper diet for better nutritional status. In Bangladesh, nutritional status of most students aged between 18 to 24 years is not so good. This study was targeted to assess the nutrient intake by the students and its deviation from the recommended dietary intake. According to FAO/WHO guideline, 55-75 %, 10-15%, and 15-30% energy should come from carbohydrate, protein and fat respectively [8]. When the contribution of energy is computed from carbohydrate, protein, and fat as a percentage of total calorie, the ratio of carbohydrates: protein: fat was found to be 71:15:14 (percentages) of total intake among male students whereas the ratio of carbohydrates: protein: fat was found to be 70:15:15 (percentages) of total intake among female students. This finding indicates that the contribution of energy from carbohydrate and protein is much higher than fat among both male and female students. The protein consumption was found higher than the RDA among the students. Though the carbohydrate and protein intake are higher than RDA among the students, but still, it is much lower than the national data [9]. Similarly, intake of micronutrients such as calcium, iron, phosphorus, vitamin C, thiamin, riboflavin, niacin has also found lower than the national data [9]. The reason might be that the stu-

dents have limited knowledge on the benefits of micronutrient rich foods which resulted less consumption of micronutrient rich foods. The findings from this study are very much similar to some other studies conducted among Bangladeshi university students [10].

Conclusion

The findings from this study raises concern towards the consumption of necessary micronutrients such as calcium, iron and vitamin C by the university students. The reasons behind less consumption of these micronutrients are lack of appropriate knowledge and the shortage of micronutrients in their diet. The consequence of this scenario can be savage to them and they might suffer from micronutrient deficiency in their upcoming life. So, it can be concluded that the students should be provided nutritional knowledge to ensure consumption of balanced diet regularly. Also, further research works in this field are needed to get an idea about the nutritional condition of young university students who are the bearer of future generation.

Acknowledgement

Abu Ansar Md. Rizwan played the key role to design the study, analyze data and write the manuscript. Iffat Ara Begum, Md. Abdul Mazid Azad, Mohammad Shamsul Huda, Rifat Jahan Khan, Zannatul Raiyana and Jahir Uddin Md. Jaber assisted to design the study, collect data, review literature, finalize the manuscript and ensure the quality of the study.

Funding

This research received no grants from any funding agency.

Conflict of interest

The authors declared no conflict of interest for this study.

Consent for publication

All authors have given their consent to publish this article.

References

1. Ricci JA, Beker S (1996) Risk factors for wasting and stunting among children in Metro Cebu, Philippines, AM J Clinical Nutrition, 63: 966-975.
2. Majumder AK, Islam SMS (1993) Socio economic and environmental determinants of child survival in Bangladesh, J Biosoc Science, 25: 311-318.
3. Neslisah R, Emine AY (2011) Energy and nutrient intake and food patterns among Turkish university students, Nutr Res Pract, 5: 117-123.
4. Hasan T, Sultana M, Shaheen N, (2019) Energy and Nutrient intake and Dietary Diversity among Female Residential Students of Bangladesh, Curr. Res. Nutr Food Sci Jour., Vol. 7: 244-252.
5. National Institute of Nutrition (NIN) (2009) Nutrient Requirements and recommended Dietary Allowances for Indians, Indian Council of Medical Research, Hyderabad.
6. WHO (1995) Physical status: the use of and interpretation of anthropometry. Report of a WHO Expert Committee: WHO Technical Report Series: 854.
7. WHO (1998) Obesity: preventing and managing the global epidemic. Report on a WHO Consultation on Obesity: Geneva, World Health Organization.
8. WHO (2003) Diet, nutrition and the prevention of chronic diseases. Report of a Joint WHO/FAO Expert Consultation: Geneve, World Health Organization.
9. HIES. Household Income and Expenditure Survey (2010). Bangladesh Bureau of Statistics.
10. Sultana M, Hasan T, Shaheen N (2019) Energy and Nutrient intake and Dietary Diversity among Female Residential Students of Bangladesh, Curr. Res. Nutr Food Sci Jour, 7: 244-252.

Citation: *Rizwan AAM, Begum IA, Azad MAM, Huda MS, Khan RJ, Raiyana Z & Jaber JUM. Energy and nutrients intake among university students of Bangladesh. Academixs Journal of Nutrition & Food Science Vol 1(1): 1-5.*