NUTRITIONAL STATUS AND DIETARY INTAKE OF BOARDER FEMALE STUDENTS OF THE UNIVERSITY OF AGRICULTURE, PESHAWAR, PAKISTAN

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ABSTRACT

OBJECTIVES: To assess the nutritional status and dietary intake of boarder female students of the University of Agriculture, Peshawar, Pakistan.

METHODS: This cross-sectional study was conducted from March to June, 2014. A convenient sample of 141 boarder female students of age 18-19 years were selected from hostels of University of Agriculture, Peshawar, Pakistan. Written informed-consent was taken from the study subjects. Pre-planned questionnaires were used to collect data about anthropometric, biochemical and dietary intake. Data was analyzed through SPSS windows-version 16.0. ANOVA–I was used to compare means of normal, underweight and overweight BMI group at 5% level of significance.

RESULTS: Mean weight, height & BMI were 52.89±9.0 kg, 156.9±12.7 cm & 21±3.48 respectively. Nutritional status assessment of boarder female students showed that 34 (24.1%) female students were underweight, 18 (12.8%) of the respondents were overweight/obese and 98 (63.1%) were normal weight. Seventy three percent (n=103) were anemic and 27% (n=38) were non-anemic. In anemic students, 18.44% were underweight and 5.67% were underweight in non-anemic. Energy intake of university adolescent girls was 61.1%, carbohydrates 40%, fats 59-104%, protein 91.30%, iron 94.4%, zinc 87%, calcium 33% and vitamin-A 46.6% of the recommended dietary allowances (RDA).

CONCLUSION: Majority of boarder female students were having normal weight. All the macronutrients and micronutrients intake of the adolescent girls were lower than recommended RDA levels except fat. Majority of the hostel adolescent girls consumed cereal (69.9%) daily while fruits, vegetables, pulses, legumes, milk and milk product, meat and meat products intake was very low.

KEY WORDS: Nutritional Status (MeSH), Boarder female students (Non-MeSH), Students (MeSH), Micronutrients (MeSH), Macronutrients (Non-MeSH), Food (MeSH).

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INTRODUCTION

Proper nutrients intake is essential for all humans even deficiency of single nutrient causes serious diseases. Essential nutrients like essential amino acids, fat, vitamins and minerals are not only compulsory compounds for survival but these are also very essential for study to achieve the goals.[1,2,3] In all the countries for the higher education most of the students live in hostels and hostel life has strong impact on the health especially female students.[4] Boys and girl students who are living at homes their parents look after them well but hostel students especially University students are totally dependent on themselves.[5] University students are mature and also understand the importance of good diet but mostly they ignore proper food and diet. At hostel, boys and girl students get food from canteens usually cooked in unhygienic condition and usually during the process of cooking most of the essential nutrients destroyed and food does not fulfill the requirement of students.[6]

The quality of diet or food of university students also falls due to activities in university such as lecture time table, field work lack of storage facilities to store perishable food stuff, omission of feeding time at a particular hour of the day e.g. lunches eaten in various cafeteria during break provide little energy and normal ration of food required in replacing the lost energy and nutrient might not be met. As it is known that student's residing at hostel can be equally categorized as adolescent and young adult and this requires an additional feeding time to meet up with the body demands for growth.

Students needs more nutrient intake as they require an additional food intake due to academics and various activities in campus. However, because of the current socio-economic problem in developing countries, e.g. Pakistan, students are known to feed poorly due to low purchasing potentials of individual to eat right. Students residing in hostel eat poorly and hence have low nutrient intake due to poor feeding practices.[7] This research was, therefore; conducted to evaluate the food intake pattern of students residing in hostels of university of agriculture, Peshawar, Pakistan.

METHODS

A cross sectional study was carried out by selecting 141 female students residing in University hostel, from 1st March to 30th June 2014. After obtaining written informed consent from the study subjects, they were subjected to detail Biochemical assessment, dietary history by 24 hr recalls method as well as Food Frequency Questionnaire related to dietary practices. In addition, anthropometric measurements [body mass index (BMI), Waist hip ratio (WHR),] were assessed by means of measuring tape. Data was collected through preplanned questionnaire.

Anthropometric Assessment

Stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. The subject was made to stand without foot wear with the feet parallel and with heels, buttocks, shoulders, and occiput touching the measuring rod, hands hanging by the sides. The head was held comfortably upright with the top the head making firm contact with the horizontal head piece. A portable weighing machine with an accuracy of 100gms was used to record the weight of the Female students. Checking the scale with a known weight was done frequently and adjustment to zero was done every time for accurate reading. A girl was instructed to stand on the weighing machine with light clothing and without footwear and with feet apart and looking straight and weight was recorded to the nearest value.[8] BMI was calculated using the formula (BMI =Weight in kg/ height in m^2). The girls were divided into various groups based on BMI according to WHO International Standard.[9]

Dietary Assessment

The dietary data was collected by using 24-hrs dietary recall and food frequency questionnaire through face to face interviews. Standardization of recipes was made by collecting information on ingredients used for the preparation of dishes and cooked weight of each dish was determined. From the cooked weight, usual portion size of cooked food to be consumed was weighed to estimate the amount of food consumed. Similar procedure was followed for making breads from wheat and corn flour and weight of different bread sizes to be consumed was determined by weighing the breads. Food models with different portion sizes and weights were developed and used for the assessment of food and beverages consumed. Subjects were interviewed to recall food and beverages that had been consumed during the last 24 hours starting from early in the morning till going to bed last night and their responses were recorded in the questionnaire. From the amount of food and beverages consumed, energy, protein, carbohydrates, fat, iron, zinc, calcium and vitamin A was assessed by using food composition table. Dietary habits of the subjects and their food and beverages frequency was assessed by interviewing and filling out food frequency questionnaire.

Statistical analysis

The data was entered into SPSS (Statistical Package for the social sciences) for windows, version16.0 (SPSS; Chicago, IL, USA). During statistical analysis descriptive statistics like mean, standard deviation, frequency and percentages were calculated. ANOVA–I was used to compare means of normal, underweight and overweight BMI group at 5% level of significance.

RESULTS

Table I shows the results of anthropometric and biochemical status of adolescent university girls. As evident from the

TABLE I: MEAN VALUES OF ANTHROPOMETRIC AND BIOCHEMICAL STATUS OF THE UNIVERSITY GIRLS BY BMI* CLASSIFICATION

Variables	Cumulative (n= 141)	Normal Mean ± SD (n=89)	Underweight Mean ± SD (n=34)	Overweight & Obese Mean ± SD (n=18)	P-value
Age (year)	18.47±0.50	18.4±0.50	18.4±0.51	18.5±0.50	0.8044
Weight (kg)	52.89±9.0	53.14±5.3	44.43±4.36	68.3±10.4	0.0001
Height (cm)	156.9±12.7	158±4.8	160.1±5.6	150.9±22.7	>0.05
BMI (Kg/m2)	21±3.48	21.2±1.6	17.30±0.95	27.7±2.9	0.0001
MUAC (cm)	23.4±2.7	23.6±1.6	20.7±1.7	27.8±2.50	0.0001
Waist (cm)	73.5±8.83	74.2±6.8	65.1±5.1	85.8±7.1	0.0001
Hip (cm)	91.6±7.9	92.1±6.3	85.1±3.6	101.8±9.5	0.0001
WHR	0.79±0.06	0.80±0.06	0.75±0.04	0.84±0.06	0.0001
SBP(mmHg)	111.7±12.46	111.5±13.0	109.5±11.44	116.0±11.04	0.0206
DBP(mmHg)	75.3±12.95	75.7±12.84	71.0±12.9	81.38±12.04	0.021
Pulse	85±13.16	83.7±13.29	90.45±13.1	86.6±11.52	0.043
Hb (g/dl)	10.97±1.47	10.92±1.48	10.88±1.5	11.23±1.14	0.67

Means followed by different letters are significantly different at $p<0.05$ as determined by analysis of variance (ANOVA) and LSD. BMI (Body Mass Index), MUAC (Mid upper Arm Circumference), WHR (Waist to hip ratio), SBP (Systolic Blood Pressure), DBP (Diastolic Blood Pressure), Hb (Hemoglobin)

TABLE II: PREVALENCE OF MALNUTRITION AND ANEMIA IN UNIVERSITY GIRLS BY BMI AND HB

Category	Frequency (n=141)	% age
Underweight (18.5>BMI)	34	24.1
Normal (18.5=<BMI<25)	89	63.1
Overweight (BMI >25)	18	12.8
Anemic (Hb <12 g/dl)	103	73
Non-anemic (Hb ≥12)	38	27

BMI= Body Mass Index, Hb= Hemoglobin

TABLE III: ENERGY AND NUTRIENT INTAKE OF UNIVERSITY GIRLS STUDENTS

Variables	Mean ± SD	RDA	%RDA
Energy(Kcal/day)	1346.1±623.9	2200	61.1
Carbohydrates(g/day)	188.2±120.1	250	40
Fats(g/day)	51.1±33.4	49-85.5	104-59
Protein(g/day)	42.6±29.1	46	91.30
Iron(mg/day)	17.1±18.1	1800	94.4
Zinc(mg/day)	7.1±4.3	8	87
Calcium(mg/day)	338.1±285.2	1000	33
Vitamin A(mcg/day)	326.5±377.7	700	46.6

RDA (Recommended dietary allowances)

table, there was no significant ($p>0.05$) difference in mean age and height while there was significant ($p<0.05$) difference in weight of all the three groups. Mean BMI, MUAC and waist-to-hip ratio (WHR) of all the three groups (normal weight, underweight, obese and overweight) was significantly different from each other. Mean systolic blood pressure of overweight and obese university girls was significantly ($p<0.05$) higher than the underweight girls while it was not different from that of normal weight girls. Mean diastolic blood pressure of overweight and obese was significantly ($p<0.05$) higher than the underweight girls while it was not different from that of normal weight girls. Mean pulse of underweight girls was significantly ($p<0.05$) higher than the normal girls while it was not different from that of overweight and obese girls. Mean hemoglobin (Hb) level of all the three groups was not significantly ($p>0.05$) different from each other.

Table II shows the prevalence of malnutrition in university girls students by BMI and Hb. BMI prevalence in normal subjects (18.5-24.9) was 63%, overweight/obese (BMI>25) was 13% and underweight BMI (BMI<18.5) was 24%. Anemic (Hb<12g/dl) was 73% and Non-anemic (Hb≥12) 27% were recorded.

Table III shows the nutrients intake of University adolescent girls. Energy intake was 1346.1±623.9 kcal/day which was 61.1% of the RDA. Carbohydrates, fats and protein were 188.2±120.1, 51.1±33.4 and 42.6±29.1g/day which were 40%, 104-59% and 91.30% of the RDA, while iron, zinc, calcium and vitamin-A intake was 17.1±18.1, 7.1±4.3, 338.1±285.2 and 326.5±377.7 mg/day which were 94.4%, 87%, 33% and 46.6% of the RDA.

Table IV shows the dietary pattern of adolescent girls living in university hostels. Majority (69.9%) of the hostel adolescent girls consumed cereal daily while 23.6% took cereal for 4-6 days/week and 1-3days/week in 6.5%. Vegetables consumption was rarely seen in 76.2%, whereas in 19.6% it was for 1-3 days/week, in 2.8% it was 4-6 days/week and in 1.4% daily. The pulses and legumes consumption in 63.7% was rare, whereas it was 1-3 days/week in 30.8%, 4-6 days/week in 4.5% and in 1% on daily basis. 78.3% rarely consumed fruit, whereas it was 1-3 days/week in 14.1%, 4-6 days/week in 3.5% and in 4.1% on daily basis. The milk and milk product consumption in 63.6% was rare, but in 14.7% it was 1-3 days/week, in 4.2% it was 4-6 days/week and in 17.5% daily. In 83.1% meat and meat product consumption was rare, but in 13.3% it was 1-3 days/week, in 2.9% it was 4-6 days/week and in 0.7% on daily basis. In 66.9% the soft drinks and beverages intake was rare, whereas in 9% it was1-3 days/week, in 5.3% it was 4-6 days/week and in 18.8% on daily basis. The sweet and bakery products consumption were was rare in 74%, where in 15.4% it was 1-3 days/week, in 5% it was 4-6 days/week while in 5.6% on daily basis.

DISCUSSION

The results of the present study are in line with Shi et al[10] who conducted a study on adolescent girls and found that the systolic and diastolic blood pressure of obese and overweight adolescent girls was higher (7.6 mmHg) than normal girls. High blood pressure of obese and overweight adolescent may increase the chances of obesity in later age and more prone to cardiovascular disease and type 2 diabetes mellitus. A study reported that the underweight subjects had high risk of arrhythmias because of low blood pressure as compared to normal and obese subject and high risk of osteoporosis and bone fracture because of deterioration in bone due to hormonal changes, low intake of food because food in stomach takes more time as compared to normal to move into the small intestine due to which people have a high sensation of fullness even after a small food. Ogechi et al11 conducted a study on adolescent in Nigeria and found that 20% adolescent

TABLE IV: FOOD INTAKE OF UNIVERSITY ADOLESCENT GIRLS

Variables		Frequency	Percentage
Cereals	Never/rare taken	0	0
	1-3	9	6.5
	4-6	34	23.6
	Daily	100	69.9
Vegetables	Never/rare taken	109	76.2
	1-3	28	19.6
	4-6	4	2.8
	Daily	2	1.4
Pulses and Legumes	Never/rare taken	91	63.7
	1-3	44	30.8
	4-6	6	4.5
	Daily	2	1
Fruits	Never/rare taken	112	78.3
	1-3	20	14.1
	4-6	5	3.5
	Daily	6	4.1
Milk and milk product	Never/rare taken	91	63.6
	1-3	21	14.7
	4-6	6	4.2
	Daily	25	17.5
Meat and meat product	Never/rare taken	119	83.1
	1-3	19	13.3
	4-6	4	2.9
	Daily	1	0.7
Soft drinks and beverages	Never/rare taken	96	66.9
	1-3	13	9
	4-6	7	5.3
	Daily	27	18.8
Sweet and bakery products	Never/rare taken	106	74
	1-3	22	15.4
	4-6	7	5
	Daily	8	5.6

girls were underweight which are in line to our finding i-e 24% in our result.

Hanafi et al[12] also conducted a study on university adolescent girls of Taibh University Saudi- Arabia and found that 45.7% girls were anemic with normal BMI. Ali and Lindstrom[13] conducted a study on young woman (18-32) and found that the prevalence of underweight, normal and overweight were 17.5%, 57.1% and 18.4% respectively, which is in line with our research finding i.e. 24%, 63% and 13%. Totega et al.[14] conducted a study in India, found that 91% of unmarried adolescent girls were anemic because in adolescence the nutrient requirements increase with increased developmental processes and menarche and because they are far away from homes and it gets difficult for them to prepare food. Kakkar et al.[15] also conducted a study on adolescent girls in Bhopal found that 48.7% of adolescent girls were anemic. The study conducted by Farrag et al.[16] on nutritional status assessment of boarding students at Hadhramout University in Yamen reported that energy intake of the boarding female students were according to the % RNI that is 90% which is contrast to our finding that is 61% of DRA because of culture differences and environmental variation from country to country and economic condition of the students. They also reported that protein intake of more than 50% of the boarding students were higher than 100% of the RNI, which is related to our findings i-e 104-59% of the RDA. They further reported that intake of calcium, iron, zinc and Vitamin A were lower than 90% RNI i-e 36.06%, 39.44%, 78.57% and 28.30% fairly agreement to our finding while intake of iron was in contrast to the intake of current adolescent girls living in hostels was higher than 90% that is 94.4%. The intake of calcium and vitamin A was lower than 50% of RDA that is 33% and 46.6%, clearly showed that the intake of milk and milk product, fruits were insufficient that is good sources of calcium and vitamin A. Ogechi[11] reported that fat intake of hostel adolescent students was less than recommended contrast to our finding because Nigerian used less fat in food preparation.

CONCLUSION

Majority of boarder female students were having normal weight. All the macronutrients and micronutrients intake of the boarder females were lower than recommended levels except fat. Majority of the hostel girls students consumed cereal (69.9%) daily while fruits, vegetables, pulses, legumes, milk and milk product, meat and meat products intake were very low. As this was the first study in Pakistan, therefore; further studies are required to overcome the eating problems of the University students living in hostels.

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CONFLICT OF INTEREST

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AUTHORS' CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

HS: Concept, acquisition of data, drafting the manuscript, final approval of the version to be published.

SK MS FZ UI: Acquisition, analysis & interpretation of data, drafting the manuscript, final approval of the version to be published, final approval of the version to be published.

FHK: study design, critical revision, final approval of the version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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