E3 Journal of Medical Research Vol. 3(1). pp.001-005, January, 2014
Available online @ http://www.e3journals.org
ISSN 2276-9900 © E3 Journals 2014

Full length research paper

Nutritional patterns in Iranian university students: comparison between dormitory and non-dormitory states

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Accepted 16 December, 2013

There has been a great deal of interest on the nutritional status and feeding habits of adolescents. This study aimed to assess nutritional conditions of college students in university of medical sciences in Hamadan, Iran. Initial contact with potential subjects was by questionnaires which were distributed dormitory and non-dormitory students with aged 18-25 years. The three-day food record based on food frequency questionnaire comprising 5 food groups of milk, bread, meat, fruits, and vegetables was used to estimate food intake of individual subjects. Comparing food containing score between dormitory and non-dormitory students showed that except for mean score of vegetable consumption that was significantly lower in dormitory residents, the mean scores related to other food components were similar between the two groups. Despite similarity in consumption of the most of food components in both groups, scores of all food components were lower than standardized recommendations in both groups. Also, the dormitory group had lower serum hemoglobin and hematicrit levels than off campus students. Our findings emphasized richer content of nutrients including vegetables as well as higher level of serum hemoglobin and hematocrit levels in off campus states compared with dormitory conditions. There is a need for strategies and coordinated efforts to elevate the tendency of consuming fruits and vegetables among students.

KeyWords: Nutritional Status; Students; Hamadan

Introduction

Nutrition is emerging to be an integral part of the modem health care system that emphasizes preventive measures. In many developing countries, surveys are commonly performed at national, provincial, municipal and community levels with the aim being to obtain information necessary for evaluating the nutritional status of the population and for the planning of realistic nutrition programs which are consistent with the needs and habits of a community (Drichoutis *et al*., 2005; Nelson *et al*., 2008). The rapid industrial development and economic growth in many Asian countries has improved the living standard and life expectancy of this region (Visschers *et al*., 2010). The shift from a traditional agrarian economy to a commercial or industrial one usually brings about changes in life style and disease pattern (Grunert *et al*., 2010). In this regard, it is important to know the dietary intake and also the eating habits o f the local population and to identify the nutritional problem of the society, thus guide us to have a better strategy in promoting nutrition (Satia *et al*., 2005).

In recent years, there has been a great deal of interest on the nutritional status and feeding habits of adolescents, especially in college students. It has been shown that health-related factors and lifestyles have been

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associated with obesity and weight gain for college students (Magoc *et al*., 2010; Perusse-Lachance *et al*., 2010; Tremblay *et al*., 2010). According to the American College Health Association, nearly 32% of college students are overweight or obese (Tremblay *et al*., 2010; Pedersen *et al*., 2009). There is strong evidence that eating habits and behaviors about physical activity and obesity, and lack of physical activity are associated with obesity for college populations (Pedersen *et al*., 2009; Boyle *et al*., 2009; Smith *et al*., 2012) Universities and colleges are potentially important targets for the promotion of healthy lifestyles of the adult population. However, little is known concerning their nutritional behaviors. The present study aimed to assess nutritional conditions of college nursing or midwifery students in a great university of medical sciences in Iran and also compare these nutritional patterns between dormitory and non-dormitory students.

Methods

Initial contact with potential subjects was by questionnaires which were distributed to dormitory and non-dormitory students. The selected subjects were briefed on the purpose and procedures of the study. Inform consent was obtained from all subjects and the protocol was approved by the ethics committee of Hamadan University of Medical Sciences. The selection criteria were nursing or midwifery students aged 18 to 25 years, resident at home or campus, and without any serious acute or chronic illnesses. After briefing, appointments were then scheduled for anthropometric measurement and blood sampling. Subjects were also given detailed instruction on keeping dietary records. All subjects were barefooted and had light indoor clothing during these measurements. Height was measured by a stadiometer to the nearest 0.1 centimeter. Bodyweight was measured to the nearest 0,1 kg using a digital balance. Body mass index was calculated as the ratio of body weight to height squared and expressed in kg/m^2. Waist circumference was measured just above the uppermost lateral border of the right Ilium. Blood pressure in the sitting position was measured on either arm with a standard mercury sphygmomanometer by a medical technician. Systolic and diastolic blood pressures were recorded as the appearance and disappearance of Korotkoff sounds. Resting systolic and diastolic blood pressure were considered normal if <90mm/Hg and <140 nrni/Hg, respectively. Ten mL of 12-hour overnight fasting blood sample was taken by venipuncture from the forearm of each subject in the morning by a medical technician. For blood glucose determination, 1 mL of the drawn blood was placed in a plastic tube with fluoride-oxalate as anticoagulant. Aliquots of blood were stored in EDTA coated tubes for hematological (2 ml) and fatty acid (5 ml) analysis. The remaining blood was placed into heparin coated plastic tube for the determination of serum cholesterol, triglyceride and ferritin. Plasma glucose was assayed by the hexokinase method on a Hitachi 747 analyzer using commercial reagents. Measurements of plasma cholesterol, triglycerides, and high-density lipoprotein (HDL) cholesterol were performed on a Hitachi 917 autoanalyzer. LDL cholesterol was calculated by the Friedewald equation for individuals with triglyceride concentration < 400 mg/dL and by the Beta Quantification procedure for those with triglyceride concentration ≥ 400 mg/dL. Ferritin was assayed by a two-site sandwich immunochemiluminometric assay method (ICMA) with a Magic Life Analyzer. Complete blood count (CBC) was obtained by Coulter STKS with Reticulocyte Analysis. Hemoglobin, hematrocrit, red cell count, platelet count, white blood cells number and type, as well as three red cell indices: mean cell volume (MCV), mean cell hemoglobin (MCH) and mean cell hemoglobin (MCHC) were obtained in one assay. The three-day food record based on food frequency questionnaire comprising 5 food groups of milk, bread, meat, fruits, and vegetables was used to estimate food intake of individual subjects. For each food group, a maximum score of 10 could be achieved when the intake met the recommendation, and lower intakes were scored proportionately. Data were reported as mean ±standard derivation or number (percentage). Statistical analyses were performed with the statistical program SPSS (Statistical Package of Social Science version 20.0 SPSS Inc. Chicago, USA). Pearson correlation coefficients were used to determine the relationship among measured parameters. Independent student t-test or Mann-Whitney test was used to compare quantitative variables and the chi-square test was used to compare categorical variables. The level of significance for all statistical tests was set at 0.05.

Results

As shown in Table 1, except for higher mean age as well as higher mean systolic blood pressure in dormitory students, no significant differences were observed in baseline characteristics and clinical data between the on campus and off campus students. Also, regarding mean laboratory indices (Table 2), the former group had lower serum hemoglobin and hematocrit levels than off campus students, while means of other laboratory parameters were comparable between the two groups. Comparing food containing score between dormitory and non-dormitory students (Table 3) showed that except for mean score of vegetable consumption that was significantly lower in dormitory residents, the mean scores related to other food components were similar between the two groups. Despite similarity in consumption of the most of food components in both

Table 1: Baseline characteristics and clinical data of study subjects

Characteristics	Dormitory students (N = 41)	Non-dormitory students (N = 39)	P-value
Age, year	20.59 ± 1.56	21.38 ± 1.23	0.013*
Weight, kg	56.24 ± 8.05	56.26 ± 8.07	0.989
Height, cm	162.74 ± 4.43	163.36 ± 4.48	0.539
Waist circumference, cm	71.17 ± 7.81	71.34 ± 7.09	0.918
Hip circumference, cm	94.17 ± 7.91	94.78 ± 7.35	0.722
Body mass index (kg/m^2)	21.30 ± 2.67	21.16 ± 2.93	0.825
Systolic blood pressure, mmHg	109.02 ± 10.85	104.10 ± 9.79	0.037*
Diastolic blood pressure, mmHg	69.76 ± 8.87	70.13 ± 12.73	0.332
Residency			**0.814**
Rural	6 (14.6)	5 (12.8)	
Urban	35 (58.4)	34 (87.2)	
Course			**0.987**
Nursing	22 (53.7)	21 (53.8)	
Midwifery	19 (46.3)	18 (46.2)	
History of diabetes	2 (4.9)	2 (5.1)	0.999
History of hypertension	10 (24.4)	13 (33.3)	0.377
History of thyroid disorder	2 (4.9)	3 (7.7)	0.671
Monthly income			**0.236**
< 3.000.000 rials	5 (12.2)	1 (2.6)	
3.000.000 – 6.000.000 rials	19 (46.3)	18 (46.2)	
> 6.000.000 rials	17 (41.5)	20 (51.3)	
Daily physical activity			0.257
< 30 min	25 (61.0)	19 (48.7)	
30 – 60 min	10 (24.4)	12 (30.8)	
61 – 90 min	6 (14.6)	5 (12.8)	
91 – 120 min	0 (0.0)	3 (7.7)	

*p<0.05

Table 2: Laboratory parameters in study subjects

Characteristics (unit of measurement)	Dormitory students (N = 41)	Non-dormitory students (N = 39)	P-value
White blood cell **(/mm ^{3})**	6702.44 ± 1190.48	6841.03 ± 1318.83	0.624
Red blood cell **(Mil/ mm ^{3})**	4.70 ± 0.37	4.70 ± 0.38	0.988
Hemoglobin **(gm/dl)**	12.86 ± 1.04	13.32 ± 1.02	0.049*
Hematocrit **(%)**	39.07 ± 2.59	40.35 ± 2.92	0.040*
MCV (fL)	83.68 ± 7.75	86.31 ± 6.04	0.099
MCH (pgm)	27.55 ± 3.00	28.36 ± 2.39	0.183
MCHC **(%)**	32.87 ± 0.82	32.88 ± 0.73	0.937
Platelet **(1000/mm ^{3})**	266.46 ± 48.28	265.80 ± 45.63	0.942
RDW **(%)**	12.63 ± 1.10	12.41 ± 0.91	0.335
Total cholesterol **(mg/dl)**	153.85 ± 29.44	160.23 ± 27.57	0.320
Triglyceride **(mg/dl)**	82.73 ± 41.33	80.15 ± 29.15	0.749
HDL **(mg/dl)**	50.51 ± 9.43	80.15 ± 29.15	0.332
LDL **(mg/dl)**	86.71 ± 24.95	91.44 ± 22.56	0.376
Albumin **(mg/dl)**	4.90 ± 0.32	4.95 ± 0.30	0.459
Ferritin **(ng/ml)**	39.65 ± 35.40	37.31 ± 23.87	0.729

*p<0.05

Table 3: Mean food score in study groups

Characteristics	Dormitory students (N = 41)	Non-dormitory students (N = 39)	P-value
Milk	1.43 ± 0.88	1.42 ± 0.66	0.969
Meat	2.52 ± 0.91	2.48 ± 0.90	0.842
Vegetable	0.62 ± 0.46	1.06 ± 0.88	0.009*
Fruit	1.18 ± 0.94	1.47 ± 1.06	0.212
Bread	4.86 ± 2.10	5.27 ± 2.31	0.420

*p<0.05

Table 4: Standard food conditions in study groups

Characteristics	Dormitory students (N = 41)	Non-dormitory students(N = 39)	P-value
Milk	10 (23.8)	10 (27.0)	0.800
Meat	21 (50.0)	19 (51.4)	0.613
Vegetable	0 (0.0)	1 (2.7)	0.555
Fruit	7 (16.7)	12 (32.4)	0.221
Bread	15 (35.7)	12 (32.4)	0.737

groups, scores of all food components were lower than standardized recommendations in both groups (Table 4).

Discussion

Our findings totally emphasized richer content of nutrients including vegetables as well as higher level of serum hemoglobin and hematocrit levels in off campus states compared with dormitory conditions and thus students in former condition benefit of greater nutritional contents. It so emphasizes the necessity of enrichment of nutrients, adding fruits and vegetables to the diet consumed to maintain homeostasis in the body, particularly the prevention of anemia. In a similar study by Al-Khamees *et al*., in Kuwait University, most students consumed similarly fewer vegetables, while 86.5% consumed more than the recommended limit of sweets and fatty foods (Nedaa and Al-Khamees 2009). In another study on Brazilian college students, a risk of a poor quality of diet, with high intake of sodium and sugar and low consumption of fruits and whole grains was indicated. This poor quality of diet can result in an inadequate nutritional status that may increase the risk of obesity and chronic diseases (Gorgulho *et al*., 2010). Similarly, the study on Saudi Arabian students, proteins and fats were obtained from a greater number of animal sources than of plant sources. Also, there were low percentages of recommended daily intake of fibers, most vitamins especially vitamin D, and minerals. In this line, two third of the students were overweight, and 10.3% were obese (Allam *et al*., 2012). These results may be more important among female university students because of its more serious consequences such as minerals and vitamins deficiencies leading anemia. In a study on female students, the students who were overweight, with elevated body fat percentage and waist circumference had a 5-9 times greater risk of change in eating habits especially to fatty foods (Silva *et al.,* 2012). In total, it seems that the main factors associated with adequacy of nutrient intake include both educational and governmental policies aiming enrichment of nutrients for students and also high level of knowledge on food choice and irregular meal patterns. In this regard, there is need for nutritional counseling and education among university students to address the issue of body image, emphasizing eating translation attitude into healthy eating behaviors (Waswa, 2011). According to our results, food rations for both male and female students are characterized by low fruits and vegetables amounts not corresponding to the recommendations of the Human Nutrition Standards. Therefore, there is a need for strategies and coordinated efforts to elevate the tendency of consuming fruits and vegetables among college students.

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