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Protein and Calorie Intake Patterns by Hebron University Students

Sabri SAGHIR[1] and Jamal Abo OMAR[2,*]

[1]*Faculty of Agriculture, Hebron University, Hebron, Palestine*
[2]*Faculty of Agriculture, An Najah National University, Nablus, Palestine*

([*]Corresponding author's e-mail: aboomar57@najah.edu)

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Abstract

This study was conducted to investigate the pattern of calorie and protein consumption by Hebron University students. A sample size of 238 students (males and females) of ages ranged from 18 to 23 years was the target of this study. A food frequency questionnaire and 3 days food record were designed and used, and a pilot survey was carried out among university students to identify the food items commonly eaten by them. Nutrient intakes were estimated by using WinDiets software with values based mainly on the food-composition tables. Results were expressed as mean and standard deviation (SD). ANOVA and Student's paired t-test were used for data analysis. A p-value of less than 0.05 was considered to be statistically significant.

The study showed that fathers of all students investigated were of secondary education or higher. However, mothers were of lower levels of education. The majority of students were village residents (55 %) while only 8 % were refugee camps residence. About 63 % of students consumed less than 3 meals per day. Regarding the physical activity level (PAL), most of students had low to moderate activities (88 %) compared to only 12 % of them who had high activity. Calorie and protein intake was not affected by gender. However, the intake of calories was lower than that of the WHO recommendations. Family income had a significant effect ($P < 0.05$) on both calories and protein consumption. Similar significant trends were observed in the effects of family size and number of sibling. The consumption of all nutrients concerned was higher in Fridays compared to the consumption in Saturdays and Mondays. However, this increase in consumption is not statistically significant. In conclusion, university students have bad eating patterns when considering numbers of daily meals and fat and total calorie intakes and protein and calcium intakes were comparable with the dietary recommendations of the WHO. More studies are needed to follow up the pattern of food consumption in more detail considering more universities in the country.

Keywords: Calorie, protein, university students, physical activity level

Introduction

Nutritional status is one of the most important parameters to describe national development. Patterns of protein (animal protein) and energy consumption are used as an indicator of a country's development. The nutritional situation in Palestine is considered good [1]. Since 1969, energy and protein consumption in the West Bank shows an increasing trend. Prior to the Intifada, the per capita consumption of calories was larger than 2,900 calories [2]. This value is higher than that (2450) recommended by the World Health Organization (WHO). Protein consumption has followed a similar trend. It was reported by the Central Bureau of Statistics, CBS [2] that protein consumption was 82.5 g. However, patterns of nutrients consumption were affected by the political local conditions that reduced the resources for huge numbers of families that lead to severe shortage of certain nutrients [3,4].

No real comprehensive study has been done on food and nutrient consumption of university students as an important sector of the whole population. The objective of this study is to investigate the patterns of nutrient consumption of Hebron University students.

Materials and methods

A food frequency questionnaire was designed, based on Willet *et al.* [5]. A pilot survey was carried out among university students to identify the food items commonly eaten by them. Nutrient intakes were estimated by using WinDiets software with values based mainly on the food-composition tables (American University of Beirut, 1970) [6].

The activity diary was a modification of the method originally described by Bouchard *et al.* [7] Subjects chose the number that best described the type of exercise they did every 15 min on a record sheet, which was divided into 96 periods for each day (1,440 min). Subjects were given a detailed explanation and demonstration of the activity diary before the commencement of the study. The physical activity diaries were analysed using WinDiets for Windows computer program (Robert Gordon University, Aberdeen, UK). In this program, age, weight, and gender of the subjects were specified. The physical activity level (PAL) was calculated. Statistical analysis was performed using the Statistical Package for Social Sciences version 10.0 (SPSS Inc, Chicago, IL, USA, [8]).

Results were expressed as mean and standard deviation (SD). ANOVA and Student's paired t-test were used for data analysis. A p-value of less than 0.05 was considered to be statistically significant.

The sample size was calculated in order to find a difference in protein and calorie intake of 10 % among the males and females at a significance level of 5 %. The estimated sample size was 110 and 128 of females and males, respectively. All students were freshmen to seniors and expected to be in the age range of 18 to 23 years. The subjects consisted of 238 university male and female students at Hebron University. Student ages were between 18 and 22 years. All of them volunteered for this study, none of them had chronic disease, nor was on a therapeutic diet. All the measurements were made over a 2 months period. Each subject was requested to keep three-day records of food intake and activity patterns; these days were Friday, Saturday and Monday. These days were chosen as rich food is traditionally served on Fridays and in the middle of the week (Monday) while small meals are served on Saturdays.

All students had the objectives of the study explained to them by one of the authors. An informed consent in writing was obtained from all those students who agreed to participate in the study. The food records and FFQs were analyzed to estimate the average calorie and protein consumption per day. Unusual data (more than 3,000 and less than 500 calories per day) were considered incorrect and excluded from the study. Similarly, students with estimated protein intake of less than 20 g and more than 120 g were also excluded.

Results and discussion

The socio-economic and demographic profile is shown in **Table 1**. The study showed that half of student's fathers were university educated. However, mothers were of lower levels of education. The majority of students were village residents (55 %) while only 8 % were refugee camp residents and the rest were city residents. The family income for about half of the investigated students was between 1,500 - 2,000 NIS, and about one third of them had an income between 2,000 - 4,000 NIS. This result demonstrated that most of the university students belonged to the middle class section of the community. However, the family size for more than 95 % of the students contained more than 6 members. The compatibility of family size and family income is not reasonable.

From the point of nutrition the study showed that about 63 % of students consumed less than 3 meals per day (**Table 1**). Most of the students had low to moderate activities (88 %) compared to only 12 % of them who had high activity (**Table 1**). This result is in agreement with the previous findings of Al Hourani *et al*. [9].

Table 1 Socio-economic and demographic profile of university students.

Demographic variables	**Males**		**Females**		**Total**	
Father's education level	**number**	**%**	**number**	**%**	**number**	**%**
Elementary	40	31.4	25	23.0	65	27.0
Secondary	27	20.0	30	27.0	57	24.0
University	63	48.6	55	50.0	118	49.0
Mother's education level						
Elementary	55	42.9	35	32.0	90	38.0
Secondary	55	42.9	40	36.0	95	40.0
University	18	14.3	35	32.0	53	22.0
Residency						
Village	77	60.0	54	49.0	131	55.0
City	47	37.1	40	36.0	87	37.0
Refugee camp	4	2.9	16	15.0	20	8.0
Family income per month, NIS						
≤ 1500	9	7.0	9	8.0	18	8.0
1500 - 2000	58	45.0	50	45.0	108	45.0
2000 - 4000	41	32.0	38	35.0	79	33.0
> 4000	20	16.0	13	12.0	33	14.0
Family size						
≤ 5	5	4.0	4	4.0	9	4.0
6 - 9	64	50.0	53	48.0	117	49.0
> 10	59	46.0	53	48.0	112	47.0
Mean ± S.D.	7.1 ± 2.2		7.2 ± 2.4		7.1 ± 2.3	
Number of daily meals consumed						
1	10	9.9	9	8	19	8.0
2	74	58.0	58	53	132	55.0
3 or more	44	34.0	43	39	87	37.0
Mean ± S.D.	2.2 ± 0.9		2.3 ± 0.8		2.1 ± 0.9	
Type of activity						
Low	55	43.0	73	66.0	128	54.0
Moderate	55	43.0	27	25.0	82	34.0
high	18	14.0	10	9.0	28	12.0
Mean ± S.D.	1.3 ± 0.7		1.5 ± 0.9		1.4 ± 0.7	

The calorie and protein intake are shown in **Table 2**. This intake was not affected by gender. However, the intake of calories was lower than the 2,450 kcal that is recommended by the World Health Organization (WHO). Students consume more energy rich foods compared to the consumption of protein rich foods when considering the percentage of energy intake. This trend is commonly associated with low income societies [10]. This study showed that the family income had a significant effect ($P < 0.05$) on both calories and protein consumption. Similar significant trends were observed in the effects of family size and number of siblings (**Table 2**).

Table 2 Comparison of protein and calorie intake.

Parameters	Protein intake			Calorie intake		
	n	Mean ± S.D.	p	n	Mean ± S.D.	p
Gender						
Males	110	75.0 ± 7.0	-	110	1617.0 ± 130.2	NS
Females	128	73.5 ± 9.0	-	128	1540.3 ± 188.0	NS
Family income per month, NIS						
< 1500	9	66.0 ± 6.9		9	1200.0 ± 143.3	
1500 - 2000	50	71.0 ± 7.0		58	1350.0 ± 201.9	
2000 - 4000	38	78.0 ± 18.0		41	2500.0± 412.8	
> 4000	13	94.0 ± 22	+	20	2780.0 ± 586.9	+
Family size						
< 5	4	94.8 ± 22.9		5	2280.0 ± 450.1	
6 - 9	53	78.6 ± 22.5		64	2540.0 ± 449.5	
> 10	53	40.0 ± 15.0	+	59	2790.0 ± 324.0	+

+ = significant $P < 0.05$

Table 3 Nutrient consumption by university students according to days.

Parameters	Males				Females			
	Fri	Sat	Mon	P	Fri	Sat	Mon	P
Energy, kcal	1638.0	1596.0	1618.0	NS	1480.0	1570.0	1540.0	NS
Protein, g	82.0	66.0	77.0	+	78.9	74.0	79.0	NS
Fat, g	85.0	75.0	76.0	NS	80.3	72.0	78.0	NS
Calcium, g	1.02	0.8	0.8	NS	0,9	0.8	1.0	NS

NS: not significant

As demonstrated in **Table 3** the patterns of protein intake is high enough to provide the needed amount of protein for the investigated subjects when considering the required protein is 1 g per kg of body weight. However, fat consumption accounts for more than 35 % of the energy intake, attributed to bad food habits that depend on high fat foods.

The study showed that the consumption of all nutrients concerned was higher on Fridays compared to the consumption on Saturdays and Mondays (**Table 3**). However, this increase in consumption is not statistically significant.

Calcium intake has been calculated from the 3 days food record and showed enough intake (**Table 3**) in accordance with the WHO recommendations.

Conclusion

According to the study circumstances, the study showed that university students have bad eating patterns when considering numbers of daily meals and fat and total calorie intakes. Protein and calcium intakes were comparable with the dietary recommendations of the WHO. Eating patterns of both genders were obviously influenced by the family size and income. More studies are needed to follow up the pattern of food consumption in more detail considering more universities in the country.

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