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Nutritional Awareness and Carbohydrate, Protein and Lipid Knowledge Among Undergraduate Students at the University of Jordan/Aqaba Branch

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Abstract: In recent years, there is growing interest in nutrition education among people all over the world, especially, among students. Therefore, the purpose of this study is to investigate the nutritional awareness and knowledge about carbohydrate, lipid and protein among undergraduate students in Jordan. The sample was collected using a survey that was distributed to undergraduate students at the University of Jordan at Aqaba. The results show that nutritional awareness among students is slightly high (3.8/5) and students are most knowledgeable about obesity effect on health. However, results indicate that knowledge among students about carbohydrate, protein and lipid was low (1.6, 1.7, 1.8/5), respectively. Finally, the results show that there is no significant different among students based on gender, faculty and GPA.

Key words: Nutritional awareness, carbohydrate, protein, lipid knowledge, undergraduate students, Jordan, gender

INTRODUCTION

According to the World Health Organization (WHO) of the 57 million global deaths in 2008, 36 million or 63% were due to Non-Communicable Diseases (NCDs) principally cardiovascular diseases, diabetes, cancers and chronic respiratory diseases. An unhealthy diet is one of the key risk factors for NCDs. For example, high consumption of saturated fats and trans-fatty acids is linked to heart disease, a range of dietary factors has been linked with diabetes, red and processed meat consumption is linked with some cancers (WHO, 2007; Steyn *et al*., 2004; World Cancer Research Fund (WCRF) 2007).

Nutrition knowledge has a profound influence on food choice, concomitantly and nutrient intake (Dallongeville *et al*., 2001). It varies widely across geographical settings (Dallongeville *et al*., 2001) which may explain apparent variability in food choices within populations represented by varying cultural backgrounds (Gates and McDonald, 1997). The mechanism by which nutrition knowledge transforms into dietary behaviors is intricate. Theoretical models of food choices suggest that individual's awareness or tacit assumptions about food are key determinants of food choices (Furst *et al*., 1996). Therefore, nutritional awareness can be viewed as an important factor that may influence dietary choices and nutritional intake (Paquette, 2005). Awareness is modified by knowledge gained through one's own perceptions or by means of communicated information (Alkerwi *et al*., 2015). The purpose of this study is to investigate the nutritional awareness and knowledge about carbohydrate, lipid and protein among undergraduate students in Jordan.

MATERIALS AND METHODS

Survey development: A survey was developed including a series of demographic and general characteristics questions, including gender, faculty and Grade Point Average (GPA). Using the book of food, nutrition and diet therapy by Mahan and Scott-Stump, a list of items developed to measure nutritional awareness and carbohydrate, protein and lipid knowledge. Using 5-Likert scale, 8 items were used to measure nutritional awareness whereas 18 items were used to measure carbohydrate, protein and lipid knowledge, 6 items for each.

Sample and data collection: This study aims to investigate the nutritional awareness and knowledge about carbohydrate, lipid and protein among undergraduate students. The target consisted of undergraduate students at the University of Jordan/Aqaba Branch. During October 2015, sample of students from different faculties (5 faculties) asked to complete the self-administrated survey using a connivance sample approach. Overall, 140 surveys were collected.

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Statistical analysis: All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics (Means, standard deviation and frequencies) were employed for all variables. Additionally, Analyses of Variance (ANOVA) was used to figure out, if there is a significant difference between students based on gender, GPA and faculty.

RESULTS AND DISCUSSION

Demographic and general characteristics: The 140 undergraduate students participated in the survey that distributed at the University of Jordan at Aqaba in October 2015. 33.6% of them were males and 66.7% were females (Table 1). Approximately 68% of participants were from the finance faculty, 25% were from Tourism, 18% were from language, 15% were from information technology faculty and 14 % from Marin Faculty. GPA for students ranges from fail to excellent, 55% had good GPA, 46% had accepted GPA, 21% had very good GPA, 11% had fail GPA and only 7% of them had excellent GPA.

Nutritional awareness: As shown Table 2, the results show that the mean score of student's awareness about nutrition is above the midpoint of a 5-point Likert scale (3.8). Student's awareness about the effect of obesity was ranked the highest (4.6) while the awareness about taking a breakfast, variety and adequacy in a meal and controlling of weight were ranked the lowest (3.6).

Carbohydrate, protein and lipid knowledge

Carbohydrate knowledge: As shown in Table 3, the results indicate that the mean score of student's knowledge about carbohydrate is below the midpoint of a 5 point Likert scale (1.6). In more details, students ranked the following items "Carbohydrate is an organic compounds include starch and sugars" and " The aim of taking carbohydrates is to get energy" the highest (1.9) while this item "Cellulose and pectin fibers are carbohydrates" was ranked the lowest (1.3). It is clear that student's knowledge about carbohydrate is weak. This point should discussed.

Protein knowledge: As shown in Table 3, the results show that the mean score of student's knowledge about protein is below the midpoint of a 5-point Likert scale (1.7). Students ranked the following two items "Eggs and meat are considered as a protein source in our food" and "The primary aim of taking protein is building body tissues" the highest (1.9) while the following item "Animals protein is better than plant proteins " was ranked the lowest (1.4). It is clear that student's knowledge about protein is also weak.

Table 1: Demographic and general results

General results	Frequency	Percentage
Gender		
Male	47	33.6
Female	93	66.4
Faculty		
Marine Science	14	10.0
Administrative and Finance	68	48.6
Tourism and Hospitality	25	17.9
Information Technology	15	10.7
Language	18	12.9
GPA		
Fail	11	7.9
Accepted	46	32.9
Good	55	39.3
Very Good	21	15.0
Excellent	7	5.0
Total	140	100.0

Table 2: Descriptive results for nutritional awareness

Descriptive results	Mean	SD
Items	3.8	0.5
Cooked food is healthier than fried food	3.8	1.0
I take my breakfast daily	3.6	1.2
8-12 cups of water must be taken daily	4.1	1.1
I eat more than one type of food in every meal in sufficient amount	3.6	1.0
Fruits and vegetables must be taken daily	4.0	0.9
I control my weight to keep ideal weight	3.6	1.3
Obesity lead to diabetes and heart diseases	4.6	0.6
I take 3 meals at least daily	3.6	1.2

M = Mean; SD = Standard Deviation

Lipid knowledge: The results show that the mean score of student's knowledge about lipid is below the midpoint of a 5-point Likert scale (1.8) as shown in Table 3. Students ranked this item one of the saturated fat risks is that may cause atherosclerosis and heart diseases the highest (1.9) whereas the following items Lipid is an organic compounds composed of fatty acids and glycerol, one of the lipid function in the body is a rich source of energy, "Meat, egg, poultry, dairy product and oils are considered as a lipid source in our food" and "Taking plant oils is healthier than animal fats such as butter" were ranked the lowest (1.7). It is clear that student's knowledge about carbohydrate is also weak.

Analysis of Variance (ANOVA): Faculty and nutrition awareness and carbohydrate, protein, lipid knowledge. The mean score of the nutritional awareness for students ranges from 3.8-4.1 as Table 4 shows. When we compare the mean scores of 5 faculties, Marine, Administration and Finance and Tourism and Hospitality Faculties had the lowest mean (3.8) while the Faculty of Language faculty had the highest mean (4.1). However, the results of one-way ANOVA and Fisher's least significant difference post hoc test do not show mean differences between students based on faculty (Table 5).

Also Table 4 showed that the means of carbohydrate knowledge of the students among the faculties which

Table 3: Descriptive results for carbohydrate, protein and lipid knowledge

Descriptive results	Mean	SD
Carbohydrate	**1.6**	**0.2**
Carbohydrate is an organic compounds include starch and sugars	1.9	0.3
The aim of taking carbohydrates is to get energy	1.9	0.3
Taking carbohydrates as polysaccharides is better than taking it as monosaccharaides	1.4	0.5
The body needs from 50-60% of his daily energy requirements from the carbohydrates	1.5	0.5
An examples of the carbohydrate sources in our food are potato, cereals, legumes and rice	1.5	0.5
Cellulose and pectin fibers are carbohydrates	1.3	0.5
Protein	**1.7**	**0.2**
Proteins is an organic compounds composed of amino acids	1.7	0.4
Amino acids are divided into essential and nonessential amino acids	1.6	0.5
Eggs and meat are considered as a protein source in our food	1.9	0.3
Cereals, legumes and nuts meat are considered as a protein source in our food	1.6	0.5
The primary aim of taking protein is building body tissues	1.9	0.3
Animals protein is better than plant proteins	1.4	0.5
Lipid	**1.8**	**0.2**
Lipid is an organic compounds composed of fatty acids and glycerol	1.7	0.4
Fatty acids are divided into saturated and unsaturated fatty acids	1.8	0.4
One of the lipid function in the body is a rich source of energy	1.7	0.5
Meat, egg, poultry, dairy product and oils are considered as a lipid source in our food	1.7	0.5
Taking plant oils is healthier than animal fats such as butter	1.7	0.4
One of the saturated fat risks is that may cause atherosclerosis and heart diseases	1.9	0.3

M = Mean; SD = Standard Deviation

Table 4: Mean comparison of nutrition awareness and carbohydrate, protein, lipid knowledge by faculties using ANOVA

		Faculty					ANOVA		
Awareness and nutrition	M (SD)	Marine M (SD) 1	Finance M (SD) 2	Tourism M (SD) 3	Information technology M (SD) 4	Language M (SD) 5	F-values	p-values	LSD test (p>0.05)
Nutrition	3.8(0.5)	3.8(0.36)	3.8(0.47)	3.8 (0.59)	4.0 (0.56)	4.1 (0.41)	1.455	0.219	No
Carbohydrate	1.6(0.2)	1.8(0.15)	1.66(0.18)	1.57(0.20)	1.61(0.19)	1.66(0.23)	1.160	0.331	No
Portion	1.7(0.2)	2.0(0.00)	1.90(0.24)	1.82(0.32)	1.83(0.31)	1.75(0.27)	2.372	0.550	No
Lipid	1.8(0.2)	1.83(0.13)	1.80(0.16)	1.67(0.24)	1.77(0.20)	1.76(0.80)	2.921	0.024	3<1 and 2

M = Mean; SD = Standard Deviation

Table 5: Student's GPA and nutritional awareness and carbohydrate, protein, lipid knowledge:

	GPA						ANOVA	
Awareness and nutrition	M(SD)	FM(SD)1	ACM (SD)2	GOM (SD)3	VGM(SD) 4	EXM(SD)5	F-values	p-values
Nutrition	3.8(0.5)	3.86 (0.73)	3.72(0.49)	3.98(0.40)	3.92 (0.56)	3.91 (0.33)	1.964	0.104
Carbohydrate	1.6(0.2)	1.71(0.17)	1.64(0.18)	1.62(0.21)	1.65(0.20)	1.62(0.18)	0.516	0.724
Portion	1.7(0.2)	1.91(0.20)	1.90(0.25)	1.80(0.34)	1.98(0.11)	1.93(0.19)	2..001	0.098
Lipid	1.8(0.2)	1.76(0.17)	1.75(0.20)	1.76(0.19)	1.83(0.13)	1.86(0.20)	1.263	0.288

M = Mean; SD = Standard Deviation

extend from 1.57-1.8. The Faculty of Tourism and Hospitality had the lowest mean score (1.57) meanwhile the Faculty of Marine had the highest mean (1.8). There is no significant difference between the carbohydrate knowledge and the type of the Faculty (p = 0.331).

Also Table 4 showed that the means of protein knowledge of the students among the faculties which extend from 1.75-2.0. The Faculty of Language had the lowest mean score (1.75) meanwhile the Faculty of Marine had the highest mean (2.0). There is no significant difference between the protein knowledge and the type of the faculty (p = 0.55).

Also Table 4 showed that the means of lipid knowledge of the students among the faculties which extend from 1.67-1.83. The faculty of Tourism and Hospitality had the lowest mean score (1.67) meanwhile the Faculty of Marine had the highest mean (1.83). There is significant difference between the lipid knowledge and the type of the faculty (p = 0.024).

Student's GPA and nutritional awareness and carbohydrate, protein, lipid knowledge: To better understand the effect of GPA of students on nutritional awareness and carbohydrate, protein, lipid knowledge, Table 5 shows that the mean scores of the nutritional awareness among the students, according to, their (GPA) ranging from 3.72-3.98. The students with good GPA had the highest nutritional awareness mean score (3.98) and the students with acceptable GPA had the lowest nutritional awareness mean (3.72) but there is no significant difference of student's nutritional awareness based on GPA (p = 0.104).

Table 6: Gender and nutritional awareness and carbohydrate, protein, lipid knowledge:

Awareness and nutrition	M(SD)	Gender		ANOVA		LSD test
		Male	Female	F-values	p-values	(p>0.05)
Nutrition	3.8(0.5)	3.82(0.61)	3.90(0.42)	0.847	0.359	No
Carbohydrate	1.6(0.2)	1.60(0.20)	1.66(0.19)	2.597	0.109	No
Portein	1.7(0.2)	1.82(0.32)	1.90(0.25)	2.945	0.088	No
Lipid	1.8(0.2)	1.76(0.20)	1.78(0.18)	0.263	0.609	No

Reading carbohydrate knowledge among students based on GPA, the highest mean score refers to the students with fail GPA(1.71) while students whom GPA were excellent had the lowest nutritional awareness mean (1.62). However, there is no significant difference between the carbohydrate knowledge and the student's GPA ($p = 0.724$).

Regarding protein knowledge, Table 6 shows that the highest mean score refer to the students whom GPA were very good (1.98) meanwhile the students whom were good had the lowest protein knowledge mean (1.80). There is no significant difference between the protein knowledge and the student's GPA ($p = 0.098$). Finally, the highest mean score of lipid knowledge among students refer to the students whom GPA were excellent (1.86) meanwhile the students whom GPA were acceptable had the lowest lipid knowledge mean (1.75). There is no significant difference between the lipid knowledge and the student's GPA ($p = 0.288$).

Gender and nutritional awareness and carbohydrate, protein, lipid knowledge: According to, Table 6 that shows the mean of the nutritional awareness among students according the gender, the nutritional awareness mean scores among females (3.90) was higher than males but there is no significant difference between them ($p = 0.359$). With respect to carbohydrate knowledge among the students, the scores were higher for females (1.66) than males (1.60) but there is no significant difference between them ($p = 0.109$). Additionally, the mean scores of protein knowledge were higher for females (1.90) than males (1.82) without being statistically significant difference between female and male ($p = 0.088$). Finally, the mean scores of lipid knowledge were higher for females (1.78) than males (1.76) but there is no significant difference between female and male carbohydrate knowledge ($p = 0.609$).

In this study, gender, faculty and GPA are variables were used to gather data which guided and formed the basis for the analysis of this research. The ratio of females to males is twice and this reflects the fact that the number of female students is almost twice that of males in the university. The participants from the Administration and Finance faculty was the majority and this reflect the fact that the number of students accepted every year in the Faculty of Administration and Finance is the highest. Since, the levels of students generally accepted in the Aqaba branch are the weak and middle levels, it is therefore, normal to find that the highest category of students with the good GPA.

Proper nutrition makes people stronger and more productive. Healthy eating habits lead to a stronger immune system, less illness and better health. Proper and healthy nutrition is a fundamental key to a better quality of life (WHO., 2007). Awareness is defined as knowledge that something exists or understanding of a situation or subject at the present time based on information or experience (Ani and Ahiauzu, 2008). We can consider nutritional awareness as the state of being conscious of nutrition.

The nutritional awareness is almost high among the university students and this is might be because of educational programs at different aspects such as school, traditional media and social media. The awareness of the obesity effect was the highest due to the fair of the obesity and the maintaining of good health. It was stated by Atli *et al*. (2016) that there is obesity awareness among 500 students (58%) and this agree with our study results. The results indicate that student's awareness about taking a breakfast, variety, adequacy in a meal and controlling of weight is low. This might refer to the lack of knowledge among students about the importance of taking a breakfast and the additionally students didn't take care that their diet provides sufficient energy and enough of all the nutrients to meet the needs of healthy people "adequacy". With regarding weight controlling, due to the change in life pattern, part of the students didn't give attention to control their weights.

The results show that student's knowledge of carbohydrate, protein and lipid ranges from low to moderate. We can explain this that students had not much details about these important elements. However, the results suggest that student's knowledge about lipid is slightly higher than those of carbohydrate and protein and this might due to the fear of heart diseases which the lipid may is responsible for heart attack and atherosclerosis, so, the people, including students, try to know more about lipid to avoid heart diseases.

There is significant difference between Marine, Administration and Finance Faculties and Tourism and Hospitality Faculty and this due to that most of the Marine and administration and finance faculties are scientific stream and they have courses in the secondary school about lipids (biology and chemistry courses) meanwhile the tourism and hospitality students whom had literature, hospitality or information technology streams, they had little knowledge about lipids at their secondary school levels.

In general, students with GPA are very good and excellent had higher awareness and knowledge than those with fail, acceptable or good GPA. This is normal finding because when the students are cleverer, their awareness and knowledge will be higher although the student's GPA didn't affect significantly their knowledge and awareness. Although, the gender of the students do not significantly influence their awareness and the knowledge but always the nutritional awareness and carbohydrate, protein, lipid knowledge are higher for females than males. Similar finding was discovered by Pirouznia (2001) who found that girls tended to be more knowledgeable and health-conscious than the boys. A possible explanation to this difference may be that girls tend to become more occupied with their physical appearance at an earlier stage than do boys of the same age. In turn, results in higher nutritional knowledge and application (Pirouznia, 2001).

CONCLUSION

In light of low level of student's knowledge about carbohydrate, protein and lipid there is a need to develop specific courses about nutrition in order to increase the knowledge of students about these important nutrients which are vital in promoting health issues and reducing the opportunity to get influenced by some diseases such as heart diseases.

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