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Original Article

Nutrition Section

Evaluation of Knowledge, Attitudes and Practices Related to Dietary Supplements Intake among College Students: A Cross-sectional Study

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ABSTRACT

Introduction: Food intake has been connected to health status for a long time. There are some products that are used to boost the nutrient density of the food intake, such as Dietary Supplements (DS). DS can defined as a concentrated source of nutrients with a nutritional or physiological effect that adds further nutritional value to the normal diet.

Aim: This study investigated the intake of DS among students at the University of Jordan (JU) in Amman, as well as consumer's Knowledge, Attitudes and Practices (KAP) regarding DS according to gender, Body Mass Index (BMI), science and humanities, and academic year streams.

Materials and Methods: A descriptive cross-sectional questionnaire-based study was conducted on 381 students selected by using convenient sampling method from the University of Jordan (JU) in Amman, from different faculties including freshmen students and senior students between April and May 2018. The KAP was used to assess awareness of the study group on the topic. The questionnaire was divided into two parts, part I included questions related to participant's socio-demographic characteristics and part II included 11 questions for assessing KAP related to DS. Face to face interview technique was used for data collection. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Pearson's chi-square test for independence was used for the qualitative variables to detect the relationship between gender, BMI, faculty (humanities or science) and academic year and the corresponding KAP toward DS. The p-value less than 0.05 was considered as statistically significant.

Results: The results showed that the overall percentage of student's knowledge of DS is only 13.65%, which indicates lack of knowledge in regard to DS. It was found that the percentage of intake of DS at least one per week among students was approximately 42%, which is considered relatively high. Regarding the results of the present study, there were statistically significant differences in faculty (p=0.001**) and BMI subdivisions (p=0.03*) in term of previous knowledge. Science facultie's students had more information than humanities about the risks of DS (p=0.008*). Nearly (80%) of science and humanities faculties' students have not received any training or attended in any health campaign about DS. Most of the students trusted the information that comes from health care professionals (65%). One third of DS users consumed them for no certain purpose (34%). Pharmacies were the most common source to buy supplements (87%). Furthermore, vitamin D and iron were the most frequently reported DS type used, while herbal supplements, omega 6, omega 9, multi minerals were the least common DS among participants.

Conclusion: It can be concluded from results of this study that there was a relative high prevalence of DS consumption among JU students and students in general lacked knowledge about DS.

Keywords: Awareness, Body mass index, Socio-demographic domain

INTRODUCTION

Adequate and appropriate diet plays a key role in prevention of disease and maintenance of good health. A well balanced diet ensures a sufficient amount of nutrients, minerals and vitamins [1]. Diet intake style has changed widely in many parts of the world including the Middle Eastern (ME) countries [2]. In Jordan, the changes in life pattern and socio-economic status has led to nutrition transition [3]. Frequent eating of fast foods and meals away from home has increased by time. All these factors have led to the tendency to pay more attention to complementary medicine [4]. The DS are the most common subgroup of Complementary and Alternative Medicines (CAM); a group of varied medical and health care products that are not usually considered as a part of conventional medicines [4].

Micronutrients (vitamins and minerals), herbals (botanical products) and complementary nutritionals like amino acids are all considered to be DS [5]. DS are defined as products that are purposed to supply the diet; they are not drugs and, therefore, are not intended to diagnose, prevent or treat diseases [6]. These supplements can be found in many forms, such as tablets, capsules, softgels, gelcaps, liquids or powders [7].

The DS consumption has reached more than half of adults which means a rise in consumption over time in the United States [US], of which more than two-thirds use Multi-Vitamin/Multi-Mineral Supplements (MVMS). Hence, 70% of older adults in the US reported using one or more DS [8]. Currently, DS are consumed in both developed and developing countries [9]. Supplement market size was of US $96 billion in 2012 and was expected to rise to approximately US $104 billion globally [9]. The estimated number of supplement products raised from 4000 products in 1994 to more than 55,000 products in 2012 [10].

Nutrition and health in the world face challenges as a result of new shifts in the food system, especially in low and middle income countries. Understanding the changing history of the food system and how it relates to dietary changes and transitions is very important [7]. Changes in food policy are seen as a major option for improving nutrition, but they will not be enough without shifting nutrition our culture [7]. Growing prevalence rates of non communicable diseases,

which are increasingly becoming major mortality causes, result from nutrition transition [11]. Nutrition knowledge plays a significant role in raising public awareness and consequently improves the health of the community [12]. DS is different from meal replacement; in which meal replacement therapy is an alternative strategy.

Jordan Food and Drug Administration (JFDA) was established in 2003, as an independent public sector institution. The main responsibilities of JFDA include ensuring the safety and quality of food and its suitability for human consumption, and the effectiveness, quality and safety of medicine and related materials through the application of controlled systems based on the science and international standards [13]. As per the researcher's knowledge, there was no single study that conducted KAP regarding DS on Jordanian people in general to assess awareness towards DS using KAP model.

Therefore, the aim of this study was to determine the prevalence of usage of DS among a group of students from both genders, different BMI, both science and humanities faculties at the JU and from different academic year levels and as well as to assess the level of awareness of DS using KAP procedure and determine whether they are aware of any potential risks of DS or potential interactions with other medicaments. Furthermore, this research aimed at supply background information on this subject in Jordan to guide further research. The results of this study could provide baseline data for policy makers and researchers towards more thorough education and integration of nutrition and health in the courses that are taught in the universities. The outcomes of this study will help the health sectors to take a step towards the college population in regards to their dietary supplement knowledge and intakes.

MATERIALS AND METHODS

A descriptive, cross-sectional, questionnaire-based study was conducted on a selected sample from University of Jordan, Amman, students during the period between April and May 2018. This study was approved by a Committee of Graduated Studies at the Department of Nutrition and Food Technology. Total 381 students were included in the study.

Sample size calculation: The sample size was determined using the Raosoft online calculator [14]. The total population of bachelor's degree students in JU according to the admission and registration unit was approximately 35800 in 2018. Proportionate stratified random sampling; the total number of students in humanities and science faculties was approximately 17200 and 18600 students, respectively was used. Therefore, in order to achieve a confidence level of 95% and a 5% margin of error and taking into consideration the Raosoft calculator, the sample size was determined to be 381. Since, the proportion of humanities faculties was about 48%, we took 183 samples that represented these faculties and taking into consideration that females form about 60% of the faculties' population. Hence, the sample taken from these faculties consisted of 110 female and 73 male students. Regarding the science faculties, the proportion was 52% and so, the sample from these faculties consisted of 198 students, divided between females and males in proportion of 60% and 40%, respectively, so that the sample from the science faculties consisted of 119 female and 79 male students.

Inclusion criteria: The inclusion criteria for participants were: students at JU, who were Jordanian nationals and between 18-24 years of age, undergraduate (bachelor not postgraduate) students.

Exclusion criteria: The exclusion criteria for the participants were: pregnant or lactating females and students of nutrition and food sciences, because they may have a good background about DS.

Students of JU come from different backgrounds and cultures. Therefore, in order to avoid background influence, non Jordanian students were excluded. A written consent was obtained from all participants reserving their right to withdraw from the study at any time. Students were asked to respond to the questionnaire after signing the consent form. A brief overview of the research and its goals was provided to the participants. The questionnaire was answered by students under the researcher supervision.

The Assessment Tool

Knowledge, Attitudes and Practices (KAP) questionnaire was used to assess awareness of the study group on the topic. KAP is one of the modern strategies of studies and is an (an educational diagnosis of the society and assesses the awareness of a particular group of any given subject. The questionnaire in this study has been adapted from a study carried out in United Arab Emirates (UAE) and validated by qualitative adaptive questions to adapt them to the Jordanian student's community, because the UAE community is close to a certain degree of Jordanian society [15]. In order to preserve the source, the questionnaire was prepared in both Arabic and English as the original source, and used to collect information from the participants.

The questionnaire used for collecting data to meet the purpose of the study was divided into two parts. These parts included questions related to participant's socio-demographic characteristics and 11 questions assessing consumer's KAP related to DS.

Part I: Socio-demographic and lifestyle characters: This part included age (year), gender, height (cm), weight (kg), academic year level (from first to sixth year) and faculty; humanities faculties included arts, business, Shari'a, educational sciences, law, physical education, arts and design, Prince Al-Hussein bin Abdullah II faculty of international studies, foreign languages, archaeology and tourism), whereas science faculties included (science, agriculture, engineering and technology, King Abdullah II faculty of information technology and health.

Part II: Knowledge, attitudes and practices about dietary supplements: This part was divided into two sections; the first section contained six questions, two questions for each knowledge, attitude and practice. These evaluations were studied in relation to gender, BMI, faculties and academic years. The second section had five multiple-choice questions about several topics, such as the source that is considered as the most credible for information about DS, reasons of consumption and frequency of ingesting DS.

Face to face interview technique was used for data collection and the questionnaire was completed by the researcher. Measurements were taken for weight by digital balance which was calibrated regularly, and taking into account weight of clothing worn, and for height by measuring meter after taking off the shoes. Body mass index was calculated using this equation: BMI=weight in kilograms divided by squared height in meters. Sample members with BMI <18.5 were considered underweight, those with BMI ≥18.5-24.9 were considered in the normal weight range, those with BMI ≥25.0-29.9 were classified overweight, and finally those with BMI ≥30.0 were considered as obese [16].

Validity and Reliability

Regarding validity and reliability, the following assessments were carried out:

1. Pilot study: It was conducted on 15 students, among individuals who shared characteristics similar to those that were included in the study. They were asked to respond to the questionnaire, and asked whether everything was clear and if they had any idea or suggestion. The questionnaire was then revised and modified accordingly. Questionnaire forms completed by the pilot study were not included in the study.

2. Content validity: Three questions were added at the end of the pilot study questionnaire. These questions had the same meaning as three questions in the first section of the second part in the questionnaire, but in other words that can be fit with the Jordanian

community more. The participants were asked to answer them. Then, they were revised with the original questions if they have the same answers. This step was taken to insure that the two similar questions had the same response, thereby determining whether a measure is measuring the concept that the researcher thinks is being measured.

3. Translation: An expert checked the translation of the questionnaire in Arabic and English languages to make sure that both versions gave the same meaning.

STATISTICAL ANALYSIS

Data was coded and entered into the computer, where statistical analysis was performed using the SPSS version 22.0. Pearson's chi-square test for independence was used for the qualitative variables. It was applied to detect the relationship between gender, BMI, faculty (humanities or science) and academic year and the corresponding KAP toward DS. The results for categorical variables were presented as frequency (n) and percentages (%). An alpha level of 0.05 was set to assess statistical significance.

RESULTS

The study sample consisted of 381 students from the JU. The distribution of the sample according to demographic characteristics was shown in [Table/Fig-1]. Female students constituted the highest percentage 229 (60.10%) about 250 (65.6%) students were in the normal BMI category, while the lowest category was that of obese students with a frequency of 14 (3.67%).

Variable	Categories	Number	Percentage (%)
Gender	Male	152	39.90
	Female	229	60.10
BMI (†BMI presented for 380 subjects because one subject dropped out of the study after questionnaire completion and before BMI measurement completion)	Under weight	35	9.19
	Normal	250	65.78
	Overweight	81	21.26
	Obese	14	3.67
Age (in years)	18-19	105	27.56
	20-23	256	67.19
	Above 23	20	5.25
Faculty	Humanities	182	47.77
	Science	199	52.23
Academic year	First	80	21.00
	Second	113	29.66
	Third	78	20.47
	Fourth	75	19.69
	Fifth and above	35	9.19

[Table/Fig-1]: Distribution of the sample according to the demographic information. N: Number of participants; %: Percentage of the participants; BMI: Body mass index; Humanitarian faculties included (Arts, business, shari'a, educational sciences, law, physical education, arts and design, Prince Al-hussein Bin Abdullah ii faculty of international studies, Foreign languages, and archaeology and tourism) N=381; Scientific faculties included (Science, agriculture, engineering and technology, king abdullah ii faculty of information technology, and health)

The category 20-23 years for age variable had the highest number of subjects 256 (67.19%), while the age category above 23 years was the lowest 20 (5.25%). Science, faculty's students were 199 (52.23%), while humanities faculty's students had a percentage of (47.77%). The highest category for academic year variable was (2nd year) with 113 (29.66%) students, while the lowest category was (fifth year and above with a frequency of 35 (9.19%). The responses of the participants to the questionnaire has been cited in the [Table/Fig-2].

In [Table/Fig-3] the percentage for knowledge was highest 207 (54.33%) for the grade of 50% of knowledge while the lowest percentage was 52 (13.65%) for students who answer the two questions and have full knowledge that is (100%).

The percentage for the question: Which source/sources would you consider as the most trustworthy i.e., you are most likely to believe the information coming from this source? was highest 248 (65.09%) for health care professionals, while the lowest percentage was 4 (1.05%) for TV or journal advertisements [Table/Fig-4].

The highest percentage for the question "In the long term, is it more effective to get a nutrient from?" was 194 (50.92%) for both food and DS, while the lowest percentage was 7 (1.84%) for supplements.

In addition, 244 (64.04%) of the samples members consumed DS as prescribed by doctor, while the lowest percentage was 56 (14.70%) for answer daily to improve my health. The percentage for the question about the purpose of using a nutritional supplement product was 129 (33.86%) for all of the above, while the lowest percentage was 22 (5.77%) for to meet increased energy demands of the body. Finally, most of the students prefer to buy DS from the pharmacy 331 (86.88%), whereas only a very little percentage of students buy them from other sources such as peddlers 7 (1.84%).

In [Table/Fig-5] there were statistically significant differences only between gender variables and using DS in addition to looking for a professional medical help to take DS (p-value=0.022*) and (p-value=0.004*) respectively.

There were statistically significant differences between the belief in the possibility of interactions of DS with drugs, foods or drinks and gender variable p-value <0.001**.

There were significant differences only between faculty variables and knowing what are the DS and the belief that DS are always safe to use, p-value <0.001** and p-value=0.008* respectively [Table/Fig-6].

In [Table/Fig-7] there was a statistically significant difference between knowledge about dietary supplements and BMI variables p-value=0.030.

In [Table/Fig-8] there were no statistically significant differences between all parameters and the academic year level.

DISCUSSION

The consumption of DS according to this study was common among the students of the JU, 41.99% admitted the use of DS at least one per week. The reason for this could be multifactorial. At this stage

KAP	Questions	Yes		No		I don't know		p-value (t-test)
		N	%	N	%	N	%	
Knowledge	Do you know what dietary supplements are?	240	62.99	141	37.01	-	-	<0.001**
	Have you attended any health campaign/workshop on dietary supplement?	71	18.64	303	79.53	7	1.84	<0.001**
Attitude	Do you use any dietary supplement?	160	41.99 (at least one per week)	213	55.91	8	2.01	0.004*
	I always look for a professional medical help, to take dietary supplement?	217	56.96	150	39.37	14	3.67	0.002*
Practice	Do you think the use of nutritional supplements is always safe?	54	14.17	283	74.28	44	11.55	<0.001**
	Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?	236	61.94	69	18.11	76	19.95	0.003*

[Table/Fig-2]: Frequencies and percentages for "dietary supplement fact questionnaire" part II section 1 [15].
N: Number of participants; %=Percentage of the participants; *There were statistically significance differences at μf0.05; **There were statistically significance differences at μf0.001

Grade	Number	Percentage (%)
0	122	32.02
50%	207	54.33
100%	52	13.65
Total	381	100

[Table/Fig-3]: Frequencies and percentages for knowledge.
N: Number of participants; %: Percentage of the participants; 0 means that student had not answered any question of the knowledge part in the questionnaire by yess, 50% means that the student answered one of two questions of the knowledge part in the questionnaire by yess, 100% means that the student answered the two questions of the knowledge part in the questionnaire by yess

of adult life, they might use DS for experimentation and exploration and as a result of their desire to try new things, such as substitutional forms of medicine and health promoting activities, as well as the belief in the need of using these supplements [17]. Additionally, university students may be interested in body image or have weak levels of body satisfaction [18]. This discontent may cause those young adults to use DS in an effort to enhance physical appearance. This study's findings were consistent with those of previous studies, that showed a high rate of consumption, such as a study conducted in the UAE which showed that the percentage of use of DS was 39% and an Indian

Questions	Answer	N	%
Which source/sources would you consider as the most trustworthy (i.e., you are most likely to believe the information coming from this source)?	Internet	67	17.59
	Friends/relatives	30	7.87
	Health care professionals	248	65.09
	Advertisements	3	0.79
	Posters in an educational institute	8	2.10
	Instructions within products themselves enclosed leaflets	21	5.51
	TV or journal advertisements	4	1.05
	Total	381	100.00
In the long term, is it more effective to get a nutrient (vitamins, minerals, etc.) from?	Food	180	47.24
	Supplements	7	1.84
	Both	194	50.92
	Total	381	100.00
How frequently do you take dietary supplement?	Daily to improve my health	56	14.70
	Whenever I am sick	81	21.26
	As prescribed by doctor	244	64.04
	Total	381	100.00
For what purpose would you use a nutritional supplement product?	Prophylaxis to prevent diseases	40	10.50
	To treat minor illnesses for example, cold	50	13.12
	To ensure adequate nutrition and fill nutrition gap	78	20.47
	To meet increased energy demands of the body	22	5.77
	To maintain good health	62	16.27
	All of the above	129	33.86
	Total	381	100.00
From where do you buy/prefer to buy your dietary supplements?	Pharmacy	331	86.88
	Supermarket	11	2.89
	Health club (fitness center)	32	8.40
	Other sources (stands in the streets, peddlers)	7	1.84
	Total	381	100.00

[Table/Fig-4]: Frequencies and percentages for "dietary supplement fact questionnaire" part II section 2 [15].
The second part: Are there statistically significant differences in the "DS fact questionnaire" due to demographic variables :[gender, faculty, BMI, academic year?

KAP	Questions	Categories "gender"	Yes n (%)	No n (%)	I don't know	Pearson chi-square	p-value
Knowledge	Do you know what dietary supplements are?	Male	94 (61.8%)	58 (38.2%)	-	0.746	0.393
		Female	146 (63.8%)	83 (36.2%)	-		
	Have you attended any health campaign/workshop on dietary supplement?	Male	31 (20.4%)	119 (78.3%)	2 (1.3%)	0.843	0.656
		Female	40 (17.5%)	184 (80.3%)	5 (2.2%)		
Attitude	Do you use any dietary supplement?	Male	51 (33.6%)	98 (64.5%)	3 (2.0%)	7.632	0.022*
		Female	109 (47.6%)	115 (50.2%)	5 (2.2%)		
	Always look for a professional medical help, to take dietary supplement?	Male	71 (46.7%)	75 (49.3%)	6 (3.9%)	11.099	0.004*
		Female	146 (63.8%)	75 (32.8%)	8 (3.5%)		
Practices	Do you think the use of nutritional supplements is always safe?	Male	24 (15.8%)	109 (71.7%)	19 (12.5%)	0.889	0.641
		Female	30 (13.1%)	174 (76.0%)	25 (10.9%)		
	Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?	Male	76 (50.0%)	35 (23.0%)	41 (27.0%)	15.456	<0.001**
		Female	160 (69.9%)	34 (14.8%)	35 (15.3%)		

[Table/Fig-5]: Dietary supplement fact questionnaire and gender variables.
N represented the number of participants; % represented the percentage of the participants; Male total number=152, Female total number=229
*There were statistically significance differences at p≤0.05; **There were statistically significance differences at p≤0.01

KAP	Questions	Categories "Faculty"	Yes n (%)	No n (%)	I don't know	Pearson chi-square	p-value
Knowledge	Do you know what dietary supplements are?	Humanities	86 (47.3%)	96 (52.7%)	-	37.029	<0.001**
		Science	154 (77.4%)	45 (22.6%)	-		
	Have you attended any health campaign/ workshop on dietary supplement?	Humanities	33 (18.1%)	144 (79.1%)	5 (2.7%)	1.625	0.444
		Science	38 (19.1%)	159 (79.9%)	2 (1.0%)		
Attitude	Do you use any dietary supplement?	Humanities	68 (37.4%)	109 (59.9%)	5 (2.7%)	3.466	0.177
		Science	92 (46.2%)	104 (52.3%)	3 (1.5%)		
	Always look for a professional medical help, to take dietary supplements?	Humanities	108 (59.3%)	70 (38.5%)	4 (2.2%)	2.489	0.288
		Science	109 (54.8%)	80 (40.2%)	10 (5.0%)		
Practices	Do you think the use of nutritional supplements is always safe?	Humanities	34 (18.7%)	122 (67.0%)	26 (14.3%)	9.720	0.008*
		Science	20 (10.1%)	161 (80.9%)	18 (9.0%)		
	Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other	Humanities	111 (61.0%)	34 (18.7%)	37 (20.3%)	0.139	0.933
		Science	125 (62.8%)	35 (17.6%)	39 (19.6%)		

[Table/Fig-6]: Dietary supplement fact questionnaire and faculty variables (humanities and science).
N represented the number of participants; % represented the percentage of the participants; Humanitarian faculties included (Arts, Business, Shari'a, Educational Sciences, Law, Physical Education, Arts and Design, Prince Al-Hussein bin Abdullah II Faculty of International Studies, Foreign Languages, Archaeology and Tourism). Total number=182; Scientific faculties included (Science, Agriculture, Engineering and Technology, King Abdullah II Faculty of Information Technology, Health). Total number=199; *There were statistically significance differences at p≤0.05; **There were statistically significance differences at p≤0.01

KAP	Questions	Categories "BMI"	Yes n (%)	No n (%)	I don't know	Pearson chi-square	p-value
Knowledge	Do you know what dietary supplements are?	Underweight	15 (42.9%)	20 (57.1%)	-	8.915	0.030*
		Normal	167 (66.8%)	83 (33.2%)	-		
		Overweight	47 (58.0%)	34 (42.0%)	-		
		Obese	10 (71.4%)	4 (28.6%)	-		
	Have you attended any health campaign/workshop on dietary supplement?	Underweight	7 (20.0%)	28 (80.0%)	-	8.386	0.211
		Normal	40 (16.0%)	203 (81.2%)	7 (2.8%)		
		Overweight	19 (23.5%)	62 (76.5%)	-		
		Obese	5 (35.7%)	9 (64.3%)	-		
Attitude	Do you use any dietary supplement?	Underweight	19 (54.3%)	16 (45.7%)	-	5.483	0.484
		Normal	106 (42.4%)	139 (55.6%)	5 (2.0%)		
		Overweight	31 (38.3%)	47 (58.0%)	3 (3.7%)		
		Obese	4 (28.6%)	10 (71.4%)	-		
	Always look for a professional medical help, to take dietary supplement?	Underweight	24 (68.6%)	10 (28.6%)	1 (2.9%)	6.319	0.388
		Normal	147 (58.8%)	95 (38.0%)	8 (3.2%)		
		Overweight	39 (48.1%)	38 (46.9%)	4 (4.9%)		
		Obese	6 (42.9%)	7 (50.0%)	1 (7.1%)		
Practices	Do you think the use of nutritional supplements is always safe?	Underweight	4 (11.4%)	25 (71.4%)	6 (17.1%)	4.898	0.557
		Normal	36 (14.4%)	185 (74.0%)	29 (11.6%)		
		Overweight	11 (13.6%)	64 (79.0%)	6 (7.4%)		
		Obese	3 (21.4%)	8 (57.1%)	3 (21.4%)		
	Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?	Underweight	23 (65.7%)	5 (14.3%)	7 (20.0%)	5.531	0.478
		Normal	150 (60.0%)	47 (18.8%)	53 (21.2%)		
		Overweight	52 (64.2%)	17 (21.0%)	12 (14.8%)		
		Obese	10 (71.4%)	-	4 (28.6%)		

[Table/Fig-7]: Dietary supplement fact questionnaire and BMI variables.
BMI: Body mass index; N: Number of participants; %=percentage of the participants; Under Weight: BMI<18.5; Normal weight: BMI ≥18.5-24.9; Overweight: BMI ≥25.0-29.9;Obese: BMI ≥30.0; *There were statistically significance differences at p ≤0.05; **There were statistically significance differences at p≤0.01; †BMI presented for 380 subjects because 1 subject dropped out of the study after questionnaire completion and was not available for determination of BMI

KAP	Questions	Academic year	Yes n (%)	No n (%)	I don't know	Pearson chi-square	p-value
Knowledge	Do you know what dietary supplements are?	1st year	43 (53.8%)	37 (46.3%)	-	8.134	0.087
		2nd year	75 (66.4%)	38 (33.6%)	-		
		3nd year	48 (61.5%)	30 (38.5%)	-		
		4rd year	55 (73.3%)	20 (26.7%)	-		
		Above 5th year	19 (54.3%)	16 (45.7%)	-		
	Have you attended any health campaign/workshop on dietary supplement?	1st year	12 (15.0%)	66 (82.5%)	2 (2.5%)	14.699	0.065
		2nd year	18 (15.9%)	94 (83.2%)	1 (0.9%)		
		3rd year	12 (15.4%)	65 (83.3%)	1 (1.3%)		
		4th year	16 (21.3%)	58 (77.3%)	1 (1.3%)		
		Above 5th year	13 (37.1%)	20 (57.1%)	2 (5.7%)		

Attitude	Do you use any dietary supplement?	1st year	30 (37.5%)	48 (60.0%)	2 (2.5%)	7.499	0.484
		2nd year	46 (40.7%)	66 (58.4%))	1 (0.9%)		
		3rd year	30 (38.5%)	47 (60.3%)	1 (1.3%)		
		4rd year	37 (49.3%))	36 (48.0%)	2 (2.7%)		
		Above 5th years	17 (48.6%)	16 (45.7%)	2 (5.7%)		
	Always look for a professional medical help, to take dietary supplement?	1st year	47 (58.8%)	28 (35.0%)	5 (6.3%)	5.584	0.694
		2nd year	66 (58.4%)	45 (39.8%)	2 (1.8%)		
		3rd year	43 (55.1%)	33 (42.3%)	2 (2.6%)		
		4th year	44 (58.7%)	27 (36.0%)	4 (5.3%)		
		Above 5th years	17 (48.6%)	17 (48.6%)	1 (2.9%)		
Practices	Do you think the use of nutritional supplements is always safe?	1st year	12 (15.0%)	58 (72.5%)	10 (12.5%)	8.338	0.401
		2nd year	14 (12.4%)	84 (74.3%)	15 (13.3%)		
		3rd year	6 (7.7%)	64 (82.1%)	8 (10.3%)		
		4th year	16 (21.3%)	50 (66.7%)	9 (12.0%)		
		Above 5th years	6 (17.1%)	27 (77.1%)	2 (5.7%)		
	Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?	1st year	47 (58.8%)	19 (23.8%)	14 (17.5%)	5.069	0.750
		2nd year	72 (63.7%)	19 (16.8%)	22 (19.5%)		
		3th year	49 (62.8%)	14 (17.9%)	15 (19.2%)		
		4th year	46 (61.3%)	14 (18.7%)	15 (20.0%)		
		Above 5th year	22 (62.9%))	3 (8.6%)	10 (28.6%)		

[Table/Fig-8]: Dietary supplement fact questionnaire and academic year variables.
*There were statistically significance differences at p≤0.05; N: Number of participants; **There were statistically significance differences at p≤0.01; % percentage of the participants

study that unveiled a usage percentage of 49.6% among university students [15,19]. Another older study conducted in the JU showed that the usage of vitamin mineral supplements among students was only 27.4% [20]. This lower usage can be explained by the fact that their study included vitamin and mineral supplements only, another interpretation might be that the DS take among JU students has increased with time due to the rapid development in marketing of these products. Attractive information about DS is widespread from sources such as magazines, internet and television commercials. They can be easily bought from drug stores, supermarkets and many other sources. This along with the wide variety in the prices for each product might be additional factors helping DS spread significantly. They are called Over The Counter (OTC) product due to their availability without prescription.

There were statistically significant differences in DS consumption between males and females with respect to their attitude toward DS (p=0.022*) in the present study. One explanation is that females are more interested in beauty such as taking vitamin E for hair and skin health [21]. This result is in contrast to another study which was conducted in Japan and showed no differences in this aspect [18]. In the same field, there were no significant differences in the DS consumption that can be relied on age, academic year and BMI variables. This result is opposite to a recently conducted study which showed that there are statistically significant differences (p≤0.001)** in DS use due to academic year and BMI (p=0.004)** which might be due to the same age and background factors [22].

With regard to one of the most important goals of research, it was found that there were no statistically significant differences between the percentages of DS use in humanities and science faculties. However, science faculty's students showed a higher level of knowledge about DS than that of humanities faculty's students (p<0.001**), it may be because science faculty's students taking some courses that related to health and food. Different discoveries recommended that there were factually critical contrasts in the knowledge of health sciences and non health science's students relating to the medical advantages and security of these enhancements and their sorts [23]. These differences may be attributed to those students from health science's faculties had better knowledge regarding DS and were more likely to attend a health workshop or campaign on DS than those who were not from health sciences' faculties [15].

Only 13.7% of all students had a knowledge score of 100%, while about 32% of them had no knowledge about DS, this showed that the knowledge about DS was inadequate in students of both science and humanities faculties, because they might learn about diet and DS generally. This indicated that further seminars and courses on nutrition and health in regard to different aspects such as DS should be held at universities to raise the awareness among students of their health [23,24] .

About 65% of the students considered health care professionals as the most trustworthy source to believe the information coming from, which is a good indication of reducing the wrong data that may come from other sources. On the other hand, about 18% of the students trusted information received from internet which is not a small proportion. Therefore, it must be emphasised that students should use reliable sites and pages to obtain health information from them. A study was conducted in UAE, it has been found that most of the information pertaining to DS intake was obtained from healthcare providers (62%) followed by internet (14%), relatives/friends (7.5%) then product information (4%) [15]. Another study conducted in Saudi Arabia reported that around 70% of the participants received information either from doctors or pharmacists [20]. These results are near to the finding of this study, which gives an evidence of the similarity of the culture of these communities with Jordan. Another study that conducted at a rural population indicated that internet had the highest percentage of reported use (58.6%), followed by family/friends (57.1%), books/magazines (40.8%), physicians/nurses (37.9%), pharmacists (21.5%) and TV programs (18.6%) [9].

Furthermore, regarding the purpose of using DS in the present study, the highest percentage was 33.86% for all of the above answer while the lowest percentage was 5.77% for the purpose of meeting increased energy demands of the body. A study on 339 participants showed that the reasons for DS consumption were: to keep up great wellbeing (40.1%) and guarantee satisfactory nourishment consumption (36.9%), while others consumed supplements to forestall sickness (10%), to improve appearance and get more fit (3.9%) [19]. However, another study showed that the major reported reason for supplement intake was enhancing appearance (47.7%) [25]. A previous Jordanian study addressed that the participants are prone to consume DS as a kind of treatment. On the other hand, 54% of the underweight individuals are DS users, while only 4% of obese individuals are ingesting DS [20].

It is significant that clients get the message that DS are planned to ready to eat food, however are not substitutes for a sound eating routine and way of life to keep up great wellbeing and guarantee satisfactory nourishment [23,24]. Additionally, supplements can not supplant medicine or treatment to treat medical sickness. An enhancement alone won not really fix or treat a medical issue [15]. Two thirds of the consumers used DS only according to the physician prescription, which benefit to reduce the risk of chronic use of supplements. A survey reported that most respondents indicated that they consume DS daily or almost daily (71.1%), occasionally (13.8%), weekly (11.1%) and monthly (4%) [9].

These results differ from a Jordanian study held in JU, which showed that multivitamins and multiminerals were the most common type then vitamin C, and B12 [20]. Another study reported that it was popularity for using multivitamins, vitamin C and vitamin B complex, then followed by vitamin A, iron, folic acid, protein powders and herbal teas [19].

Limitation(s)

This study had some limitations. For example, it was based on cross-sectional data, which does not allow for ascertainment of temporality. It could only provide a snapshot of KAP study participants relating to DS at the time of the investigation. It was not longitudinal, so data about changes between knowledge and attitudes which depend on the academic year level could not be obtained. Furthermore, attitudinal variables are often precursors to dietary behaviours and intakes. On the other hand, studies conducted on students cannot be generalised to the whole society.

CONCLUSION(S)

Considering the conditions of this study and the outcomes, it can be concluded that there was a relatively high prevalence of DS consumption among JU students; it was found to be associated with gender, but not with science or humanities faculties. BMI and academic year level. Students, in general lacked knowledge about DS, requiring rapid intervention by health education among students to increase awareness about DS taking into consideration their speed prevalence. Furthermore, previous knowledge about the term DS was statistically significant with faculty and BMI and not statistically significant with gender and academic year level. Science faculties students had more information about safety of DS which is not affected by gender, BMI and academic year level. It is very important to highlight the importance of increasing the awareness and knowledge, attitudes and practice among humanities schools and obese population. In addition, delivering education through courses and workshops helps to improve student's nutritional KAP and adults should be encouraged to obtain their nutrient requirements by taking higher amounts of fruit and vegetables rather than ingesting DS, because this field is incompletely understood and have complex interactions.

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