

Knowledge and Practice of Dietary Supplement and Micronutrients among Medical Students at Ajman University

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Abstract:

Aims: This study aimed to assess the knowledge, attitudes and beliefs regarding micronutrients and dietary supplements among medical students. Moreover, this study aimed to compare between non-users and multivitamins/ minerals supplements users among pharmacy and dentistry students particularly from different levels.

Methods: A cross-sectional, questionnaire based study conducted to a convenient sample composing of 220 medical students pursuing pharmacy and dental at Ajman University- UAE. Data was entered and analyzed using SPSS (version 23.0).

Results: The response rate was 89.8%. The result showed that 33 (15%) had a good knowledge regarding DS and micronutrients, while 123 (55.9%) had a good practice. There was a very high significance between the scores of Pharmacy and Dentistry students ($p < 0.001$). In addition to that, males were more likely to be DS users (56.1%) compared to females (43.9%) with a significance of ($p = 0.029$).

Conclusion: Although the usage of dietary supplements in medical students is high, there is a dearth of knowledge, especially regarding the role of micronutrients in health and diseases. This study put a spot light on the poor knowledge of the most medical students.

Key words: Dietary supplements, Knowledge, Practice, Micronutrients, Medical students.

INTRODUCTION:

Dietary supplements (DS) are considered as nutraceutical preparations that can be formulated in certain dosage forms containing certain micronutrients to meet the deficiency of certain nutrients. However, these supplements can't replace the nutritional values of natural food. Additionally, micronutrients as: vitamin and minerals contributed in competing many chronic diseases and maintaining a balanced health.^[1]

According to American Society of nutrition, there is a large proportion of population using dietary supplements (DS) in their routine life.^[2] However, previous studies couldn't show a correlation between knowledge and DS consumption. On the other hand, some studies revealed that the lack of knowledge regarding the nutritional values of DS contributes in an improper DS consumption; in which consumers are unable to figure out the goals of their food.^[3,4] In 2007, the journal of ADA reported that the attitude of DS is relevant to the good knowledge of DS.^[5] Despite that, a large number of athletes who regularly use DS, don't have an accurate knowledge of DS; in which it is essential to educate them to make sure they have the suitable DS choice.^[6] Additionally, many factors could contribute to the knowledge, attitude and practice of DS; such as social and educational factors. Although pharmacists themselves are the most knowledgeable team about nutritional supplements, they still have poor knowledge regarding the proper usage of DS.^[7] However, the exact factors influencing DS consumption remain unclear and controversial. Therefore, further studies are recommended to assess the levels and influencing factors of knowledge, attitude and practice of DS.

MATERIALS AND METHODS:

Study Design:

This descriptive, quantitative, cross-sectional, questionnaire based study was conducted between January and May 2017, and carried out among different levels from pharmacy and dental students of Ajman University (AU) after getting the approval from the Institutional Ethics Committee.

Sample Size:

A convenient sample of 220 students pursuing different academic years in pharmacy and dental students were requested to fill either the written or online questionnaire form if they are interested in participation in this study. of 220 participants, 109 were males and

111 were females. of medical students 157 were pharmacy students while 63 students belonged to dental courses.

Ethical Principles:

The participation in this study was voluntary, and students were informed that completion and submission of the questionnaire would be taken after their consent to participate in this study. Written and signed consent was collected before distribution of the questionnaire. High level of confidentiality and anonymity was maintained throughout the study.

Data Collection:

A self-administered questionnaire was used as tools to collect the data from the participants. The questionnaire comprised 27 questions divided in to five parts. The first part covered the participants' sociodemographic data such as: gender, age, major and study year. The second part composed of the life style practice among study participants such as: type of diet, smoking and exercising. The third part designed to evaluate the prevalence and practice toward DS and micronutrients among the study participants the rest part of questions, which included: frequency of DS consumption, most DS and micronutrient used, reasons for consuming DS and the source of information about DS. The fourth part was to assess the attitudes (opinions) and general knowledge of the participants'. The last part was to assess the students' specific knowledge regarding DS and micronutrients. Knowledge scores were divided into three groups, a score $> 70\%$ was considered as a good knowledge, $50\% - 69\%$ as fair and $< 50\%$ as poor knowledge about DS and micronutrients. Knowledge score for each participant was calculated and summed together to give the total knowledge score of this study sample.

Statistical analysis:

Upon the receipt of completed survey, the data recoded and analyzed using the Statistical Package of Social Sciences (SPSS) version-23.0. Two approaches (descriptive and analytical) were used for data analysis. The first approach was used for demining frequencies, percentages, mean and standard deviation and the second approach used for determination of associations between the variables. Chi-square and Independent t test as used as appropriate to test for statistical differences. The level of statistical significance defined as $P < 0.05$

RESULTS:**Factors associated with Dietary Supplements use:**

Table 1 & 2: present the bivariate analysis in which dietary supplements (DS) use (dependent variable is tabulated against the independent variables). There was an effect shown of gender on DS use ($P=0.029$). Males were more likely to be DS users (56.1%) compared to females (43.9%). Major was also significantly associated with HS use ($P<0.001$). Pharmacy students were more likely to be DS users (84.6%) compared to dentistry students (15.4%). However, Age, study level, smoking, exercise and type of diet were not associated with DS use ($P=0.084$), ($P=0.099$), ($P=0.060$), ($P=0.844$), ($P=0.702$) respectively.

Factors associated with different types of Dietary Supplements use:

Significant associations between the different types of DS use and socio-demographic and life style characteristics of the respondents were reported in this study.

There was an effect shown of gender on multivitamins use ($P=0.006$). Among the 44 participants who ever used multivitamins, male participants were more likely to be multivitamins users 32 (72.7%) compared to females 12 (27.3%). There was an effect shown of gender on vitamin D use ($P=0.037$). Among the 42 participants who ever used vitamin D, male participants were more likely to be vitamin D users (29 (69.0%) compared to females (13 (31.0%)).

There was an effect shown of gender on vitamin B complex use ($P=0.045$). Among the 18 participants who ever used vitamin B complex, male participants were more likely to be vitamin B complex users (14 (77.8%) compared to females (4 (22.2%)).

There was also an effect shown of gender on iron use ($P=0.022$). Among the 12 participants who ever used iron supplements, female participants were more likely to be iron users (9 (75.0%) compared to males (3 (25.0%)).

There was an effect shown of gender on folic acid use ($P=0.022$). Among 12 participants who ever used folic acid supplements, female participants were more likely to be folic users (9 (75.0%) compared to males (3 (25.0%)). However, no significant associations were found between other types of DS and sex of the participants.

There was an effect shown of major on multivitamins use ($P=0.000$). Among the 44 participants who ever used multivitamins pharmacy students were more likely to be more multivitamins user (30 (68.2%) compared to dentistry students (14 (31.8%)).

There was an effect shown of major on vitamin D use ($P=0.000$). Among the 42 participants who ever used vitamin D, pharmacy students were more likely to be vitamin D users (27 (64.3%) compared to dentistry students (15 (35.7%)).

There was an effect shown of major on Ca supplements use ($P=0.005$). Among the 17 participants who ever used Ca, pharmacy students were more likely to be Ca users (10 (58.8%) compared to dentistry students (7 (41.2%)). However, no significant associations were found between other types of DS and the major of the participants.

There was an effect shown of study years on multivitamins use ($P=0.031$). Among the 79 participants who not ever used multivitamins final years' students were more likely not to be multivitamins user (55 (69.6%) compared to first year's students (24 (30.4%)).

There was an effect shown of study year on vitamin D use ($P=0.004$). Among the 42 participants who ever used vitamin D, first years students were more likely to be vitamin D user (23 (54.8%) compared to final years students (19 (45.2%)).

There was an effect shown of study year on Iron use ($P=0.030$). Among the 12 participants who ever used iron, final years

students were more likely to be iron user (11 (91.7%) compared to first years students (1(8.3%)).

There was an effect shown of study year on folic acid use ($P=0.030$). Among the 12 participants who ever used folic acid, final years students were more likely to be folic acid user (11 (91.7%) compared to first years students (1(8.3%)). However no significant associations were found between other types of DS use and the study year of the participants.

There was an effect shown of smoking on vitamin B complex use ($P=0.019$). Among the 18 participants who ever used vitamin B complex, smoker participants were more likely to be vitamin B complex users (11 (61.1%) compared to non- smoker (7 (38.9%)). However, no significant associations were found between other types of DS use and the smoker status of the participants.

There was an effect shown of diet type on multivitamins use ($P=0.044$). Among the 44 participants who ever used multivitamins, non-vegetarian participants were more likely to be more multivitamins user (41 (93.2%) compared to vegetarian participants (3 (6.8%)). However, no significant associations were found between other types of DS use and the diet type of the participants. Moreover, the age and the exercise of the participants were not associated with different types DS use.

General Knowledge and attitudes of participants related to DS:

In this study, 60.5% ($n=133$) of the respondents believed that dietary supplements are necessary for all ages. Moreover, 128 (58.2%) of the respondents believed that dietary supplements are generally harmless. About, half of the respondents (50.5%) of the respondents stated that healthy person should promote the usage of dietary supplements. In terms of knowledge, about 49.1% of the respondents ($n=108$) correctly answered that regular use of dietary supplements prevent chronic diseases. However, 26.8% of the respondents ($n=59$) knew that dietary supplements can reduce the risk of cancer.

Table 3 shows the responses of the participants on the statements regarding their knowledge and beliefs about the DS.

Knowledge of participants about micronutrients.

Table 4: shows the best knowledge about micronutrients was found in item 11, which showed the highest percentage 84.1% ($n=185$). However, participants had the least knowledge about item 8 with a percentage of 22.7% ($n=50$).

Figure 1 and 2: A correct option was scored 1 while incorrect response was scored zero. A total score of 11 was obtainable. A score of 70% and above was judged to be good, 50%-69% fair and <50% poor. For study participants, the overall mean of knowledge score was 4.88 with \pm (S.D) of 2.5. In all, 60.5% ($n=133$) of the respondents had poor knowledge about micronutrients, 24.5% ($n=54$) had fair knowledge while 15.0% ($n=33$) had good knowledge.

Factors associated with participant s' knowledge about micronutrients.

The univariate statistical associations between the mean score of knowledge and socio-demographic/life style characteristics conducted to find out the significant factors influencing the knowledge of health science students about micronutrients. There was an effect shown of age on students' knowledge about micronutrients ($P=<0.001$). Students with age ≥ 22 years scored remarkably better than those aged between 18-21 years. Similarly, there was an effect shown of major on students' knowledge about micronutrients ($P=<0.001$). Pharmacy students scored remarkably better than dentistry students. Study year was also, significantly associated with students' knowledge about micronutrients ($P=<0.001$). Students belong to final years scored remarkably better than those belong to first years. However, take dietary, exercise and smoking were not associated with students' knowledge about micronutrients ($P=0.066$), ($P=0.573$), ($P=0.252$) respectively.(Table 5)

Table 1: Dietary Supplements consumption according to participants' demographics

Do you take any Dietary Supplement?			P-value
Demographic variable:	Yes% (n/N)	No% (n/N)	
Gender:			0.029*
Male	69 (56.1%)	40 (41.2%)	
Female	54 (43.9%)	57 (58.8%)	
Age:			0.084
18 – 21 years	71 (57.7%)	67 (69.1%)	
≥ 22 years	52 (42.3%)	30 (30.9%)	
Major:			<0.001*
Pharmacy	104 (84.6%)	53 (54.6%)	
Dentistry	19(15.4%)	44 (45.4%)	
Study year:			0.099
First Years	46 (37.4%)	47 (48.5%)	
Final Years	77 (62.6%)	50 (51.5%)	

*p <0.05; #Significance; n (%): Frequency (Percentage)

Table 2: Dietary Supplements consumption according to participants' Life style

Do you take any Dietary Supplement?			P-value
Lifestyle variable:	Yes% (n/N)	No% (n/N)	
Smoking:			0.060
Yes	45 (36.6%)	24 (24.7%)	
No	78 (63.4%)	73 (75.3%)	
Exercise:			0.844
Yes	86 (69.9%)	69 (71.1%)	
No	37 (30.1%)	28 (28.9%)	
Type of diet:			0.702
Vegetarian	3 (2.4%)	4 (4.1%)	
Non-vegetarian	120 (97.6%)	93 (95.9%)	

*p <0.05; #Significance; n (%): Frequency (Percentage)

Table 3: Participants' knowledge and attitude about DS

Items in questionnaire:	Opinions		
	Disagree n (%)	Neutral n (%)	Agree n (%)
Are dietary supplements necessary for all ages	58 (26.4%)	29 (13.2%)	133 (60.5%)
Dietary supplements are generally harmless	33 (15.0%)	59 (26.8%)	128 (58.2%)
Regular use of dietary supplements prevents chronic diseases	36 (16.4%)	76 (34.5%)	108 (49.1%)
Dietary supplements can prevent cancer	62 (28.2%)	99 (45.0%)	59 (26.8%)
Healthy person should promote the usage of dietary supplements	63 (28.6%)	46 (20.9%)	111 (50.5%)

n (%): Frequency (Percentage)

Table 4: Participants' knowledge about Micronutrients

Items in questionnaire:	Correct Response	True n (%)	False n (%)	Don't know n (%)
1. Both iron overload and deficiency result in alteration in the immune response of humans.	True	149 (67.7%)	18 (8.2%)	53 (24.1%)
2. Folic acid (vitamin B9) can increase the risk of heart attack time to be efficacious.	False	45 (20.5%)	67 (30.5%)	108 (49.1%)
3. Probiotics increase the normal flora population inside the body and enhance the immune system for less serious diseases.	True	142 (64.5%)	23 (10.5%)	55 (25.0%)
4. Vitamin C deficiency produces scurvy.	True	142 (64.5%)	28 (12.7%)	50 (22.7%)
5. Chromium decreases insulin sensitivity in the body.	False	52 (23.6%)	44 (20.0%)	124 (56.4%)
6. Selenium is a good antioxidant	True	96 (43.6%)	22 (10.0%)	102 (46.4%)
7. A very high intake of calcium with vitamin D can lead to excessive calcification in bones.	True	143 (65.0)	28 (12.7%)	49 (22.3%)
8. Green leafy vegetables are a good source for vitamin B12.	False	122 (55.5%)	50 (22.7%)	48 (21.8%)
9. Pyridoxine (vitamin B6) is beneficial to prevent nausea during pregnancy.	True	103 (46.8%)	15 (6.8%)	102 (46.4%)
10. High doses of zinc sulfate (>2 g/day) can cause gastrointestinal irritation and vomiting.	True	94 (42.7%)	16 (7.3%)	110 (50.0%)
11- Omega-3 fatty acid protects from memory loss and cardiovascular diseases.	True	185 (84.1%)	12 (5.5%)	23 (10.5%)

n (%): Frequency (Percentage)

Table 5: Factors associated with Micronutrients knowledge score

Variables	Micronutrients Knowledge Score		
	N (%)	Mean ± (SD)	P-value
Gender:			
Male	109(49.5%)	4.7 ± (2.6)	0.346
Female	111(50.5)	5 ± 2.4	
Age:			
18 – 21 years	138(62.7%)	3.9 ± (2.1)	<0.001*
≥ 22 years	82(37.3%)	6.5 ± (2.3)	
Major:			
Pharmacy	157(71.4%)	5.3 ± (2.5)	<0.001*
Dentistry	63 (28.6%)	3.8 ± (2.1)	
Study year:			
First Years	93 (42.3%)	3.3 ± (1.7)	<0.001*
Final Years	127(57.7%)	6.0 ± (2.4)	
Take any DS:			
Yes	123 (55.9%)	5.2 ± (2.6)	0.066
No	97 (44.1%)	4.5 ± (2.3)	
Exercise:			
Yes	155 (70.5%)	4.9 ± (2.6)	0.573
No	65 (29.5%)	4.7 ± (2.4)	
Smoking:			
Yes	69 (31.4%)	4.7 ± (2.7)	0.252
No	151(68.6%)	5.2 ± (2.1)	

* P < 0.05 is considered significant

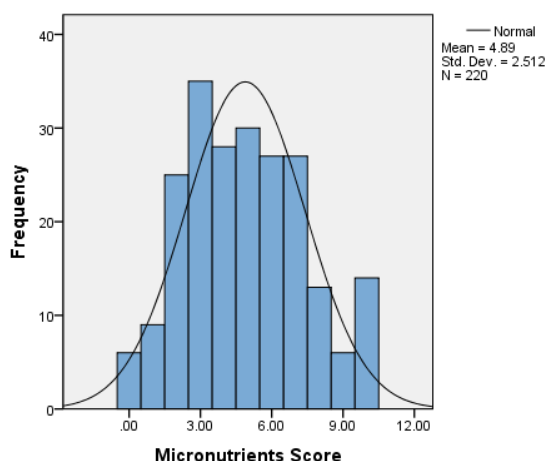


Figure 1: Micronutrients knowledge Score

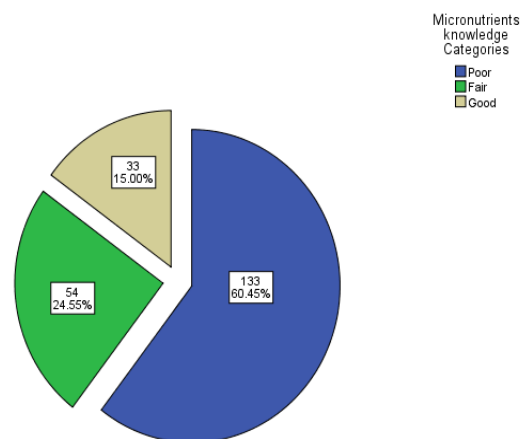


Figure 2: Micronutrients knowledge Categories

DISCUSSION:

It is a well-known fact that a balanced diet and adequate nutrition is very essential in maintaining good health. With growing awareness among people about health and preventing diseases, usage of dietary supplements is rampant. It is documented from various studies that awareness regarding nutrition is increasing in the general population and among specific groups of people like athletes, people undergoing cancer therapy and healthcare professionals and students.^[8]

DS prevalence and factors associated with DS practice:

The present study revealed that there was an effect of gender on DS use (p= 0.029), where males were more likely to be DS users (56.1%) compared to females (43.9%). This was consistent with a study done by (El Khoury and Antoine-Jonville) (p< 0.001), in which males contributed a bigger proportion of supplement users (72.0%) while females were only (39.1%).^[9] Contrary, females (83%) were significantly considered as DS consumers that males (61%) according to a study done by (Zeigler) (p<0.05).^[10] On the other hand, there was no association between DS knowledge and gender (p=0.202) according to a study by (Haque, et al.).^[11]

Major also was significantly associated with DS use (p< 0.001), in which pharmacy students were more likely to be DS consumers (84.6%) compared to dentistry students (15.4%). This is attributed with the more knowledge that PS gain from their college.^[11]

Our findings showed a significant association between gender and types of DS. Males were more likely to be multivitamins, vitamin D and vitamin B complex users (72.7%), (69.0%) and (77.8%) respectively compared to females (27.3%), (31.0%) and (22.2%) respectively with (p=0.006), (p=0.037) and (0.045) respectively. This can be justified by the need of these supplements to supposedly enhance immunity and boost energy therefore prevent colon and heart problems. It is also found that the vitamins values in multivitamins especially vitamin B complex is required in higher amounts among males according to a study done by Schwartz.^[12] Additionally, a study done by Corder, et al. revealed that high 1,25- vitamin D levels contribute in the prevention of prostate cancer among males.^[13]

In our findings, there is also a significant association between gender and iron and folic acid supplements (p= 0.022), in which females were more likely iron and folic acid consumers (75.0%) compared to males (25.0%). This can be justified as females are more likely to have anemia and folate deficiency.^[14]

The present study showed a very high significance between the major and the DS use ($p=0.000$) where two thirds (68.2%) of pharmacy students and only (31.8%) of dentistry students use DS and MN. This was consistent with other studies that showed (58.2%) of pharmacy students use DS while (36.1%) of dentistry students use DS. This factor can be attributed to pharmacy training in which dietary supplements are related to drugs.^[15]

Our study shows significance between the study year and DS use ($p=0.030$), where final years' students are more likely to be multivitamins (69.6%), iron and folic acid (91.7%) compared to last year's students (30.4%) and (8.3%). This was consistent with a study by (Kobayashi, et al.), where the usage of DS increases with higher level of studying ($p<0.001$).^[16]

This study showed a high significance between smoking and vitamin B complex use ($p=0.019$), where (61.1%) of smokers use B complex, however, (38.9%) of non-smokers use B complex. This is attributed to the plasma low level of vitamin B complex in smokers compared to nonsmokers, which serves as a cofactor for the interconversion of different forms of folate in smokers.^[17]

Similarly, a study done by Vardavas et al. revealed that vitamin B₁ consumption was found to be higher among smokers (1.7 mg) in comparison to non-smokers (1.4 mg), ($p=0.02$).^[18]

Our finding showed that there is a significance between the type of diet and DS use ($p=0.044$), in which non-vegetarian participants were more likely to be multivitamins users (93.2%) while only (6.80%) were vegetarians. This can be attributed as most of the vitamins are found in the vegetables and fruits (except vitamin B complex, iron and folic acid) and just found in small amounts in meat. Similarly, a study done by Bonnie reported that vegetarian are more likely to be folate, thiamine (B1) and riboflavin (B2) consumers than non-vegetarian.^[19]

The general knowledge about DS:

In this part, the participants' general knowledge and attitudes related to DS and MN were assessed. In term of attitudes related DS, more than half of the respondents believed that DS are necessary for all ages and are generally harmless (60.5%, 58.2%) respectively. In addition to that, half (50.5%) of the participants agree that healthy person should promote the usage of DS. This was consistent with other study by Sharma and Anfiga; where most of the respondents were between "agree" and "unsure".^[11]

In term of general knowledge, approximately half of the participants knew that DS are useful to prevent chronic diseases. Similarly, many articles ensured this fact about DS.^[11, 20, 22]

In the present study, more than half of the respondents agreed that DS reduce the risk of cancer (59.8%). This is consistent with many other studies findings.^[20, 22, 23]

Specific knowledge about DS and MN:

According to this study, more than half (60.45%) of the students scored within poor knowledge, while only (15.00%) of them scored within good knowledge. This can be attributed to very few courses talk about nutritional supplements within the curriculums, where few students got their knowledge about DS from other sources as internet and newspapers.

In the present study, there was a significant association between the major and knowledge about DS ($p<0.001$), in which students with pharmacy students ($5.3 \pm (2.5)$) scored remarkably better than those dentistry students ($3.8 \pm (2.1)$). This is related to the courses that are included in the pharmacy curriculum and training.^[15] This was consistent with others.^[11, 24]

The study showed also a significant association between study year and knowledge about DS and MN ($p<0.001$), where final years' students scored ($6.5 \pm (2.3)$) remarkably higher than first years' students ($3.9 \pm (2.1)$). This was related to the higher level of education and more courses that had been covered during the years of studying.^[16]

CONCLUSION:

To conclude, this study reported good level of general knowledge among pharmacy students compared to dentistry students, however, the net scores of specific knowledge about DS and MN was poor. This revealed that there is a gap on the knowledge on some specific points which need to be clarified especially regarding the incorrect knowledge of the specific indications of each nutritional supplement. On the other hand, students' life style and practices towards DS and MN in a good range. This study has shown that those who use DS have better knowledge and practices towards DS and MN. The existing results will be considered in developing a well-planned program and introducing courses about Dietary Supplements and Micronutrients to be obligatory in pharmacy curriculum and optional in other faculties. Also, as we are part of the healthcare system, it is important to organize educational campaigns to raise the awareness, knowledge and practice of Ajman University students towards nutritional deficiency and the importance of each nutritional element on our health.

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