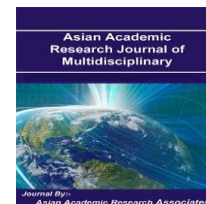




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## USE OF VITAMIN AND MINERAL SUPPLEMENTS AMONG UNIVERSITY OF TRIPOLI STUDENTS

GHAZALLA BENHUSEIN<sup>1</sup>, SAMIA DIFALLAH<sup>1</sup>, SALMA ABUMEIS<sup>1</sup>, YOUSEF TAHER<sup>1</sup>,  
ADEL ABUSHOFA<sup>2</sup>, JAMAL ELMEZOGI<sup>3</sup>

<sup>1</sup>University of Tripoli, Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy  
Tripoli-Libya

<sup>2</sup>University of Tripoli, Faculty of Pharmacy, Department of Medicinal and Pharmaceutical chemistry,  
Tripoli/ Libya

<sup>3</sup>University of Tripoli, Department of Pharmacognocny, Faculty of Pharmacy, Tripoli-Libya.

### Abstract

**Background:** In recent years, there has been increased consumption of vitamin and mineral supplements in industrialized nations. At the same time, there has been growing attention to the potential role of vitamin and mineral supplements in augmenting total nutrient intake, improving health and ameliorating disease risk.

**Aim:** The present study was carried out to determine the prevalence, reasons, sources of advice of vitamin-mineral supplements use, and the relationship between vitamin-mineral supplement use with selected demographic and lifestyle characteristics among University of Tripoli students.

**Methods** Our survey was conducted at University of Tripoli, Tripoli - Libya in a period between April and October 2009. The study sample included 321 students from five different colleges; the students aged 17-27 years. A questionnaire with questions about demographic and lifestyle characteristics as well as the use of vitamin-mineral supplements was filled by the students.

**Results:** The prevalence of vitamin-mineral supplement use was 47.8% (females 50.2%, and males 42.1%). The vitamin-mineral supplement use was associated with some demographic and lifestyle characteristics. Statistically monthly income, body mass index, smoking and physical activity was not different ( $p < 0.05$ ) influence vitamin-mineral supplements use among university students. The most frequently used supplements were vitamin C (25%), iron (19%), and multivitamins (15.9%). The main reasons for using the supplements were to improve the overall health and well-being (31.6%), enhance physical appearance (26.4%), and to treat disease (24.7%). Physician (45.9%) and previous supplement users (23.9%) were the main sources of information on the need for supplementation.

**Conclusion:** Supplement users were more likely to be females, non-smokers, physically active, and with higher family monthly income. Because of the concerns that some consumers of supplements may exceed the Upper Tolerable Limit and because many of the vitamin-mineral supplements are available as over-counter products, therefore the pharmacists must have a responsibility to assume an active found that vitamin/mineral deficiency is linked to many chronic and micronutrient deficiency diseases, the use of vitamin-mineral supplements must not be a replacement for good eating habits and healthy lifestyle.

**Key words:** prevalence, dietary supplements, deogrmaphic characteristics, vitamins

## INTRODUCTION

Vitamins and minerals are classified as micronutrients because they are needed in small amounts in our diet. However, suboptimal intake of these micronutrients can be hazardous to health and can be associated with many chronic diseases. Vitamins and minerals are obtained from different sources. They are present in natural foods especially fruits and vegetables and fortified foods. They are also available as dietary supplements (1, 2). Deficiencies of micronutrients (vitamins and minerals) represent a major global health problem. More than 2 billion people in the world today are estimated to be deficient in key vitamins and minerals, and according to World Health Organization (WHO) there is a great deal of new evidence indicating that besides preventing deficiency diseases, some vitamins and minerals play an, important role in preventing diseases (3).

Recently, there has been much interest throughout the world in the role of vitamin-mineral supplements in prevention and treatment of chronic diseases and micronutrient deficiency diseases e.g. cardiovascular disease, osteoporosis, anemia, and some cancers such as colon and breast cancer (4). Today many experts recommend a daily multivitamin dose that does not exceed the Recommended Daily Amounts (RDA). Fletcher *et al.*, (2002) and Rock CI (2007) stated that it appears prudent for all adults to take vitamin supplements (5, 6). From 1994 to 2002 the dietary supplement in USA increased by nearly 80% (7). Several studies indicated that vitamin-mineral supplement use is significantly related with female gender, younger age, non-smoker, physically active lifestyle, vegetarian status and normal (BMI) body mass index (8).

In worldwide, several studies reported that prevalence rates of vitamin-mineral supplement use among students in different universities such as South Africa 42% (9), United States of America (47%-74%) (10), 58% Korea (11).

Recently, Redhwan A. and Robert C. (2011), indicated that the prevalence of vitamin-mineral supplement use among university students in Malaysia is 43%. The main reasons for taking vitamin-mineral supplements among participants are to maintain good health, ensure adequate nutrition, and lose weight and to enhance physical status (12).

On the other hand, other studies stated that it is important to get vitamins and minerals from diet, and that the use of supplements is necessary only in certain conditions (13). United Kingdom [Food Standards Agency](#) (FSA) reported that vitamin and mineral supplements are not a

replacement for good eating habits, and most people can get all the nutrients their body needs by choosing a variety of foods (14). It also proposed that some people need certain supplements such as pregnant women, or are planning to become pregnant, need extra folic acid and may need extra iron, and older people may need extra Vitamin D and / or iron (15).

In this study our concentration will only be on the supplements containing vitamins and minerals. A multivitamin/mineral supplement is defined as a supplement containing 3 or more [vitamins](#) and [minerals](#) but does not include [herbs](#), [hormones](#), or [drugs](#), with each [nutrient](#) at a dose below the tolerable upper level and the maximum daily intake not to cause a risk for adverse health effects.

The practices towards vitamin-mineral supplement among Tripoli University students in Libya still not documented, but we need to know why students use vitamin-mineral supplement.

Therefore, the objective of the current study was to determine the prevalence of vitamin and mineral supplements use among adults and its association with demographic and lifestyle factors, the commonest vitamin-mineral supplement used and the reasons behind using the supplements.

## **METHODS**

### ***Place***

Cross sectional study was conducted among University of Tripoli, Tripoli / Libya, in the period between April and October 2009. The students who participated in our survey were from the following five faculties: Medicine, Pharmacy, Dentistry, Engineering and Science. Questionnaires were distributed randomly using simple random sampling to students.

### ***Participants***

Three hundred and sixty-three (363) students aged 17-27 years participated in our survey by filling the questionnaire. From the collected questionnaires forty-two (n=42) were excluded because handling in incomplete questionnaires, and the remaining 321 (233 females, 88 males) questionnaires were included in the study. Therefore, the response rate was 88.43% (363/233).

### ***The questionnaire***

The questionnaire consisted of two parts. Part one; contains questions about the student's college, academic year, and selected demographic and life style characteristics. Part two; it is

answered by vitamin-mineral supplement users; it contains questions about the supplements used.

The number of the questionnaires collected was in the range of 60-70 questionnaires for each college. From the answers obtained in the questionnaire the students were divided into two groups, vitamin-mineral supplement users, and non-vitamin-mineral supplement users. Then, for each group data were reviewed and organised.

The Body Mass Index (BMI) was calculated using the following equation:  $BMI = \text{weight in kilograms "kg"} / (\text{height in meters})^2 \text{ "m}^2\text{"}$ . According to (World Health Organization, 1977), the BMI is classified into four categories: Underweight:  $BMI < 18.50 \text{ kg/m}^2$ , Normal range:  $BMI 18.50-24.99 \text{ kg/m}^2$ , Over weight:  $BMI \geq 25.00 (25.00-29.99) \text{ kg/m}^2$ , Obese:  $BMI \geq 30.00 \text{ kg/m}^2$  (16).

### ***Physical activity***

Each student is classified as physically active if he/she exercises for at least 150 minutes/week.

### ***Statistical analysis***

Data were collected, encoded and analyzed once the entire questionnaires are completed by using the Statistical Package for the Social Sciences (SPSS, version 17) was used to obtain the mean and the standard error. Descriptive analysis was used to calculate the proportion and percentage of each group on each statement in the questionnaire to summarize category variables. Also, One-Sample Kolmogorov-Smirnov Test was used to find out if the data is parametric or non-parametric. Parametric groups are compared by ANOVA followed by post hoc (LSD); while non-parametric groups are compared by Mann-Whitney Test. The difference is significant at  $p \leq 0.05$ .

## **RESULTS**

### **1. Description of the participants**

From the studied sample which included 321 students there were 233 (72.59%) females and 88 (27.41 %) males. The age range was between 17 and 27 years (males and females). Nearly (33.96 %) of the students who participated in the study were from the third academic year. More than half of the participants (64.48%) were of normal weight, and nearly (20.56%) were overweight.

About (4.67 %) of the students have family monthly income less than 200 Libyan Dinars (LD). Approximately (28.04%) of them have family monthly income between 200 and 400 LD, for (27.41%) of the students it was between 400 and 600 LD, and for (39.88%) it was more than 600 LD. Nearly (21.49%) of the participants were physically active, compared with (78.50%) who were physically inactive. Regarding to eating habits, the students who eat five portions or more of fruits and vegetables represent (14.95%) of the total number. Approximately (3.74%) of the participants were smokers.

## **2. Vitamin-mineral supplement users**

From the 321 participating students, 154 (47.98%) were using vitamin-mineral supplements. The highest intake levels were among pharmacy students (22.73%) and (18.83%) among engineering students and (17.53%) among science faculty students.

### **2.1 Demographic and life style characteristics of vitamin-mineral supplement users**

Table 1. show the vitamin-mineral supplement use by demographic and life style characteristics. There is a relationship between vitamin-mineral supplement use and gender was significantly ( $P=0.024$ ), whereas females were more likely to use supplements than males. Significantly there was no association between monthly income and taking vitamin-mineral supplement among university students, the pattern supplement use with increasing family monthly income, where (54.69%) of the students with family monthly income of 600 LD and more were taking supplements, compared with (46.59%) with family monthly income between 400-600LD, (43.33%) with income between (200-400 LD) and (26.66%) with income <200 LD. There was no significant different ( $p>0.05$ ) between those with a normal weight and those who were Overweight, about 50% of students who were either under weigh or obese were taking supplements, compared with 48.8% who were of normal weight, and 43.9% who were overweight. Smoking status, physical active students, Daily Fruit and vegetable intake and types of faculty did not significantly ( $p>0.05$ ) influence the practice of vitamin-mineral supplements use among university students.

## **2.2 Vitamin-mineral supplement use**

### **2.1 Prevalence of use of vitamin-mineral supplements**

The use of vitamin-mineral supplements in the studied sample is shown in Table 2. Vitamins were the most commonly used supplements by the participating students, followed by minerals. The least used supplements were vitamin-mineral.

The three most commonly used vitamins were vitamin C, multivitamins and vitamin B complex. The two leading minerals taken by students were iron and calcium, followed by multi minerals. The use of vitamin-mineral combinations by the students was relatively low (11.2%). Vitamin C with iron and vitamin D with calcium were the most commonly used combinations.

Overall, the most commonly used supplements were vitamin C, iron, multivitamins, and calcium. In general females revealed higher supplement intake levels than males. Regarding individual supplement; the use of vitamin C was approximately equal in both sexes; but the use of vitamins A, K, and D was higher among males.

Females had significantly higher mineral intake than males, particularly multivitamins ( $p=0.001$ ), and B complex ( $p=0.040$ ) intakes. Furthermore, there was no significant different ( $p>0.05$ ) between males and females regarding other types of vitamin-mineral supplements.

### **2.2 Reasons for using the supplements**

Table 3 summarizes the reasons for using the supplements. The main reason for using the supplements as reported by students was to improve overall health (31.6%). The other reasons were: to enhance physical appearance (26.4%), to treat disease (24.7 %), to prevent disease (9.8%) and to supplement diet (7.5%). Upon comparison, we noted that the main reason reported by males was to treat disease (37.2%), and the main reason among females was to promote health (34.4%).

There were no significant differences between reasons given by female and male respondents, except for treat disease which is significantly ( $p=0.029$ ) increased.

### **2.3 Sources of advice and information**

As shown in Table 4 the users take the supplements according to advice mainly from: the physician (45.9%), previous supplement user (23.9%), and the pharmacist (16.9%). Other

sources including television programs, family member, or own knowledge represent (13.2%). There was no significant difference ( $P>0.05$ ) between males and females in the sources of advice of vitamin mineral supplement.

As shown in Table 5. significantly there was no difference between students who have information and others who do not have information about vitamin-mineral deficiency disease.

## **Discussion**

### *Prevalence of supplements use*

The results of our study indicated that the overall prevalence rate of vitamin-mineral supplement use among University of Tripoli students was (47.9%), comparing our results with previous studies showed that the prevalence rate is lower than that reported in several other studies. For, instance among American university students, the intake level ranged between 50% - 89% (9, 16), in Korea it was (54%) (17), and in Canada the rate reaches 98.6% (18). But the rate reported in the present study is higher than in other developing countries such as (27.4%) in Jordan (19), and (42%) in South Africa (20).

### *Demographic characteristics of supplement users*

The results of our study revealed that vitamin-mineral supplement users tend to include more in females than males, along with those having higher family monthly income, non-smokers and physically active (Table 1). These results are in full agreement with the results reported by Lyle BJ et al., (1998) (21). Associations between supplement use and demographic and lifestyle factors observed in this study were consistent with general trends reported by Suleiman A., et al., (2008), with the two exceptions of fruits, vegetables intake and BMI (19). Regarding the daily consumption of fruits and vegetables, we noted that most of the supplement users did not take fruits and vegetables daily, or they took them in quantity less than that specified by experts in nutrition, which are 5 portions or more of fruits and vegetables daily, this result is inconsistent with the results reported in other studies (22). This finding may reflect a belief among vitamin-mineral supplement users in the studied sample that the use of supplements can replace a healthy diet. Also we noted that there was no relationship between body mass

index BMI and supplement use, since the use of supplements by the students who were under weight, normal weight or obese was approximately the same.

### ***Supplements used***

Regarding the use of supplements among the survey participants, the most frequently used vitamins were vitamin C (25%), multivitamins (15.9%), and vitamin B-complex (6%), and the use of vitamin C was approximately equal in both sexes (Table 2). Such results were also reported by Mazlan Bin Yong, (1999) (23). Vitamin C is a famous vitamin, and there is a widespread belief among the population of the benefits of vitamin C in the treatment of common cold; also the availability of a product in the market containing vitamin C in combination with paracetamol may explain the high level of use of this vitamin in the studied sample (24, 25). The most frequently used minerals in our study were iron (19%) and calcium (14.6%), and the most frequently used vitamin-mineral combination was vitamin C with iron (6.2%). This finding is higher than that reported by Suleiman et al., (2008) (19).

### ***Reasons behind using the supplements***

There appears to be no consensus among studies in regard to the reasons behind the use of supplements. Our study findings demonstrated that the reasons for use of supplements were mainly to promote health (31.6%), to enhance physical appearance (26.4%), and to treat disease (24.7%) (Table 3). Similar results were obtained from other studies indicated that the main reason for vitamin-mineral supplement was to maintain the general health, ensure adequate nutrition, enhance physical appearance (26, 27), but they differ from those reported in developed countries where the main reason for supplement use was to prevent disease and maintain good health (28, 29). Driskell (1999) indicated that illness, inadequate diet and increased energy were the main reasons students gave for using supplements (30). In our study the main reason reported by females was to promote health (34.4%), and the main reason reported by males was to treat disease (37.2%).

### ***Source of advice for using the supplements***

In this study the users were taking the supplements upon an advice mainly from physician (45.9%), or from persons who used or are still using the supplements. Another results indicated that family and friends, doctors and advertising are the most important sources of information on the need for supplement use (11, 20), our findings are inconsistent with those results.



From our results it seems that the pharmacists did not play a major role in providing advice and information regarding the use of the supplements. Since many of the vitamin-mineral supplements are available as over-the-counter (OTC) products, the pharmacists have a responsibility to assume a more active role in promoting the safe use of these supplements. Also, we noted that the use of supplements based on advice from health care providers was higher among females.

### ***Chronic diseases and the use of vitamin-mineral supplements***

Many recent studies found that vitamin/mineral deficiency is linked to many chronic and micronutrient deficiency diseases (31, 32, 33). In Libya very limited studies are available about the prevalence of micronutrient deficiency diseases such as anemia, osteoporosis, and other diseases caused by vitamin/mineral deficiency. Regarding to chronic diseases (such as hypertension, diabetes mellitus and cardiovascular diseases) and according to the Libyan National Survey for Family Health (2008), the prevalence of these diseases reaches approximately 11% (34). Furthermore, the studies and reports currently available by Libya steps survey 2009 have showed that the risk factors for chronic and micronutrient deficiency diseases (such as unhealthy diet, smoking, and physical inactivity) are common among Libyans (35). Although in our survey the prevalence of cigarette smoking between students was relatively low (3.4%), another larger surveys showed that the prevalence rate of cigarette smoking in Libya varied from 16.7% to 25% in different age groups (35).

Our results showed that only 14.95% of the participating students eat fruits and vegetables in sufficient daily amounts (five or more portions per day), these results do not differ a lot from the results of a study supervised by World Health Organization which revealed that only 12.6% of students ate fruits and vegetables five or more times per day. This may reflect health unawareness, and may also demonstrate that a large portion of the students can not financially afford to get these foods in the sufficient required quantities. In addition, our results demonstrated that approximately 78.5% of the participating students were physically inactive. Probably, this could be the cause of increasing weight among these students, where approximately 20.56% of the students were overweight, and it is well known that raised body mass index (overweight-obesity) is an important cause of chronic diseases. These results might indicate unhealthy life style among Libyans (36).

According to World Health Organization at least 80% of premature heart disease, stroke and type 2diabetes, and 40% of cancer can be prevented through healthy diet, regular physical activity and avoidance of tobacco products (37). We noted that although the benefits of vitamins and minerals in preventing and decreasing the incidence of many chronic diseases are assured by many studies, the use of supplements as an important source of these nutrients is still controversial.

Therefore, there is an apparent need to raise the awareness of the public towards the importance of adhering to a healthy lifestyle, keeping weight within normal range, and maintaining a balanced daily regimen by getting the daily requirements of nutrients from food. Then try to compensate the deficient nutrients by using the supplements, rather than the use of supplements as a replacement to healthy regimen.

### **CONCLUSION**

The overall prevalence rate of vitamin-mineral supplement use among University of Tripoli students was approximately 47.98%. Supplement users were more likely to be females, non-smokers, physically active, and with higher family monthly income. The main reason for using the supplements as reported by students was to promote health. The other reasons were: to enhance physical appearance, treat disease, prevent disease, and to supplement diet. Users take the supplements following an advice mainly from: the physician, and persons who previously used the supplements. Therefore, pharmacists need to assume a more active role in promoting the safe use of vitamin-mineral supplements. As mentioned above, many recent studies found that vitamin/mineral deficiency is linked to many chronic and micronutrient deficiency diseases, but the use of vitamin-mineral supplements must not be a replacement for good eating habits and healthy lifestyle.

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Table 1. Prevalence of vitamin-mineral supplement use among students by demographic and life style characteristics.

Characteristic n (%)	Vitamin-mineral supplement users n (%)	P value
<b>Overall</b> n = 321	154 (47.9)	
<b>Gender</b> Male = 88 (27.4) Females = 233 (72.6)	37 (42.1) 117 (50.2)	
<b>Family monthly income</b> < 200 LD = 15 (4.6) 200-400 LD = 90 (28.04) 400-600 LD = 88 (27.4) > 600 LD = 128 (39.9)	4 (26.7) 39 (43.3) 41 (46.6) 70 (54.7)	0.101
<b>Body mass index (kg/m<sup>2</sup>)</b> <b>Under weight</b> BMI < 18.50 kg/m <sup>2</sup> . n = 26 (8.1) <b>Normal range</b> BM 18.50-24.99 kg/m <sup>2</sup> . n = 207 (64.5) <b>Over weight</b> BMI ≥ 25.00 (25.00-29.99) kg/m <sup>2</sup> . n = 66 (20.6) <b>Obese</b> BMI ≥ 30.00 kg/m <sup>2</sup> . n = 22 (6.9)	13 (50) 101 (48.8) 29 (43.9) 11 (50)	0.493
<b>Smoking status</b> Smoker = 12 (3.7) Non-smoker = 309 (96.2)	4 (33.3) 150 (48.5)	0.302
<b>Physical activity</b> Physically active = 69 (21.5) Physically inactive = 252 (78.5)	35 (50.7) 119 (47.2)	0.606
<b>Daily Fruit and vegetable intake</b> Do not take = 6 (1.9) 1-2 portions = 139 (43.3) 3-4 portions = 128 (39.9) ≥ 5 portions = 48 (14.9)	3 (50) 72 (51.8) 59 (46.1) 20 (41.7)	0.758
LD: Libyan Dinars. BMI: Body Mass Index.		

Table 2. Prevalence of use of vitamin-mineral supplements by gender

Vitamin-mineral supplement	Males (n=88)	Females (n=233)	Total (n=321)	P value
	n (%)			
<b>Vitamins</b>	<b>48 (54.55)</b>	<b>157 (67.38)</b>	<b>205 (63.86)</b>	
Multivitamins	8 (9.1)	43 (18.5)	51 (15.9)	0.001
Vitamin C	22 (25)	58 (24.9)	80 (25)	0.052
Vitamin B combination (vitamin B6 + vitamin B9 + vitamin B12)	/	3 (1.3)	3 (0.9)	0.040
Vitamin B complex	4 (4.5)	15 (6.4)	19 (6)	0.799
Vitamin A	5 (5.7)	9 (3.9)	14 (4.4)	0.261
Vitamin E	1 (1.1)	7 (3)	8 (2.5)	0.458
Folic acid	1 (1.1)	9 (3.9)	10 (3.1)	0.306
Vitamin K	2 (2.3)	3 (1.3)	5 (1.6)	0.376
Vitamin D	4 (4.5)	8 (3.4)	12 (3.7)	0.404
Others	1 (1.1)	2 (0.9)	3 (0.9)	0.683
<b>Vitamin-mineral combination</b>	<b>4(4.5)</b>	<b>32(13.7)</b>	<b>36(11.2)</b>	
Vitamin C with iron	2(2.3)	18(7.7)	20(6.2)	0.865
Vitamin D with calcium	2(2.3)	9(3.9)	11(3.4)	0.292
Others	/	5(2.1)	5(1.6)	0.645
<b>Minerals</b>	<b>20(22.7)</b>	<b>105(45.1)</b>	<b>125(38.9)</b>	
Iron	7(7.9)	54(23.2)	61(19)	0.11
Calcium	9(10.2)	38(16.3)	47(14.6)	0.458
Multi minerals	3(3.4)	13(5.6)	16(5)	0.749
Others	1(1.1)	/	1(0.3)	0.002

Table 3. The reasons for using vitamin-mineral supplements as reported by students.

Reason	Males	Females	Total	P value
	n (%)			
Treat disease	16 (37.2)	27 (20.6)	43 (24.7)	0.029
Enhance physical appearance	9 (20.9)	37 (28.2)	46 (26.4)	0.347
Supplement diet	3 (6.9)	10 (7.6)	13 (7.5)	0.887
Promote health	10 (23.3)	45 (34.4)	55 (31.6)	0.176
Prevent disease	5 (11.6)	12 (9.2)	17 (9.8)	0.637
<b>Total</b>	<b>43 (100)</b>	<b>131 (100)</b>	<b>174 (100)</b>	

Table 4. Sources of advice for using vitamin-mineral supplements.

Source of advice	Male	Females	Total	P value
	<b>n (%)</b>			
Physician	14 (35.9)	59 (49.2)	73 (45.9)	0.097
Previous user of the supplements	13 (33.3)	25 (20.8)	38 (23.9)	0.148
Pharmacist	6 (15.4)	21 (17.5)	27 (16.9)	0.684
Others	6 (15.4)	15 (12.5)	21 (13.2)	0.714
<b>Total</b>	<b>39 (100)</b>	<b>120 (100)</b>	<b>159 (100)</b>	

Table 5- information about vitamin-mineral deficiency disease

Information about vitamin-mineral deficiency diseases	Males 40	Females 114	Total 154	P value
	<b>n (%)</b>			
Students who have information	27 (67.5)	87 (76.3)	114 (74.0)	0.682
Students who do not have information	13 (32.5)	27 (23.7)	40 (25.9)	0.172
<b>Total</b>	<b>40 (100)</b>	<b>114 (100)</b>	<b>154 (99.9)</b>	