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RESEARCH ARTICLE

Epidemiological Aspects of Dietary Supplement use among Saudi Medical Students: A Cross-sectional Study

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Abstract:

Background:

Dietary supplement use received wide attention and interest throughout the world, particularly in Gulf countries, because of advanced economic and industrial growth.

Objective:

The present study aimed to determine the prevalence and correlates of dietary supplement use among medical students at Jouf University, Saudi Arabia.

Methods:

For this cross-sectional study, an anonymous self-administered structured questionnaire was distributed among medical students at Jouf University, Saudi Arabia. Out of the 381 medical students, 366 answered the questionnaire with a response rate of 96%. Analysis of data was done using the Statistical Package for Social Science (SPSS) program, version 24. Statistical significance was considered at P values <0.05.

Results:

Regarding the prevalence of dietary supplement use, 36.3% (n=133) and 29.5% (n=108) of the respondents were previous and current users of dietary supplements, respectively. Multivitamins and vitamin D were the most prevalent dietary supplements used by the participants. The students reported that the internet was the main source of knowledge concerning dietary supplements. The significant predictors of dietary supplement use in the logistic regression analysis were: age >21 years (odds ratio (OR): 3.26; confidence interval (CI): 1.67-10.53), females sex (odds ratio (OR): 2.23; confidence interval (CI): 2.34-6.84), and being in the third academic year or more (odds ratio (OR): 2.58; confidence interval (CI): 1.82-5.37). The most reported reasons for utilizing dietary supplements were nutritional supplementation and health promotion. Nearly three-quarters of the students agreed that dietary supplementation is good for health and recommended others to use them after doctor recommendation.

Conclusion:

Dietary supplement use was remarkably high among medical students at Jouf University, Saudi Arabia. Consumption of dietary supplements increased significantly among older students, females, and those in the third academic year or more. This study recommends other studies involving students from non-health domain colleges to detect if there is a difference in the prevalence of dietary supplement use within this population.

Keywords: Dietary supplements, Prevalence, Correlates, College students, Saudi Arabia, Multivitamins.

Article History

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1. INTRODUCTION

Recently, dietary supplement usage has a worldwide distribution as a broad group of products that are added to the

diet to improve human health [1]. Dietary supplements should not replace the balanced daily meals of food to be beneficial to human health [1]. Although dietary supplements can be marketed in the form of pills, tablets, capsules, and liquid, it can be added to some types of growing foods, including breakfast cereals and beverages, to increase their nutritional value [2]. According to Dietary Supplement Health and Education (DSHE), a dietary supplement was defined as any

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product (other than tobacco) taken by mouth and intended to be used in the diet to increase the total dietary intake, metabolite, extract constituent, or collection of any of the above [3]. The European Food Safety Authority (EFSA) defined dietary supplements as nutritional products or substances aimed to supplement a normal diet [4]. Furthermore, the Dietary Guidelines for Americans reported that using fortified food in addition to dietary supplements may be beneficial to general health [5]. People use dietary supplements to maintain overall health and protection against disease, malnutrition, physical inactivity, stress, and cigarette smoking [6]. Dietary supplements are often used without medical instructions for weight loss or gain and increase energy production. Some types of intakes have harmful adverse events, including organ failure or dysfunction from inherent toxicity, interactions, or product contamination [6]. Several studies have depicted the correlation between dietary supplement use and certain characteristics, including gender, smoking, physical activity, and socioeconomic variables [7 - 10]. The utilization of dietary supplements was higher among females and those with a higher monthly income [11, 12]. People with healthier lifestyles were more likely to have dietary supplements. It has been found that physically active people and nonsmokers consume more supplements than others [12]. A study conducted in the US using representative data from the National Health and Nutrition Examination Surveys showed that the prevalence of dietary supplement use was 33.2% among children and adolescents [13]. The prevalence of dietary supplement use was 68%, 43%, and 21% respectively, in studies carried out in Serbia, Malaysia, and Germany [14 - 16]. Besides, the prevalence of dietary supplement use was 20.1% among Australian adolescents [17]. Skeie *et al.* demonstrated the variable prevalence of dietary supplement use among different populations by the effect of various environmental and cultural factors [18]. Studies have shown an increase in dietary supplement use in Gulf countries [7, 10, 19]. In the Middle East region, Saudi Arabia is considered one of the big markets for dietary supplements as they represent 4% of total pharmaceutical products sold in the region with a cost of approximately USD 2 billion [20]. Although dietary supplements are extensively used worldwide, few studies have shown their usage by college students, who tend to be young and highly educated, and therefore, may exhibit usage patterns different from those of the general population. The current study was carried out to identify the prevalence and correlates of dietary supplement use among medical students in the Aljouf region, Saudi Arabia. Also, the current study highlighted the attitudes and opinions concerning dietary supplement use among this targeted population. To the best of the authors' knowledge, no study has been carried out on dietary supplement use by college students in the Aljouf region, Saudi Arabia.

2. MATERIALS AND METHODS

2.1. Study Setting

The present study was executed at the Faculty of Medicine of Jouf University, Kingdom of Saudi Arabia. Jouf University is one of the biggest public universities in the northern region

of the kingdom. A total of 381 male and female students were enrolled at the Faculty of Medicine of Jouf University, Saudi Arabia, during the academic year 2019/2020. Data collection was conducted between November 2019 and February 2020.

2.2. Study Design

The design of the study was cross-sectional based on a structured anonymous self-administered questionnaire. The study population was all students enrolled at the College of Medicine. The total number of students at the College of Medicine is 381. Total coverage of all students at the College of Medicine was attempted. However, 366 students agreed to participate in the present study yielding a response rate of 96%. Reasons for non-response were incomplete questionnaires, absence during the study period, and lack of interest in the study.

2.3. Data Collection Tool

A self-administered structured anonymous questionnaire composed of two parts was used for data collection. The first part contained socio-demographic items; age, gender, residence, academic level, marital status, monthly family income, smoking, and exercise practicing. In addition, the first part included queries regarding the self-perception of general health and the sources of information about dietary supplements. The second part was about dietary supplement use (current/previous use of dietary supplement). If the students reported taking a supplement, they were asked to mention the name of the dietary supplement, duration of use, reasons for use, and experienced side effects. Also, the second part included some questions directed to dietary supplement users, such as their opinion on dietary supplements, who recommends these products for them, and if they advise others for dietary supplementation.

2.4. Pilot Study and Validity of the Questionnaire

The used questionnaire was validated in two similar studies [21, 22]. The opinion of three experts was sought and obtained on content validity. A pilot study was performed on 30 students before starting data collection to confirm the face validity and stability of the questionnaire and to ensure the clarity and understanding of the questions.

2.5. Data Analysis

SPSS program, version 24 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Descriptive statistics was displayed using number and percentage for categorical variables and mean \pm SD for continuous variables. Factors associated with dietary supplement use were determined using the Chi-square test. The significant predictors of dietary supplement use were identified using logistic regression analysis. P-value < 0.05 reflected the significance level.

3. RESULTS

A total number of 366 medical students at Jouf University participated in the present study and completed the questionnaires. Table 1 illustrated the socio-demographic features of the students. Their age ranged from 18-30 years,

with a mean of 21.49±1.89 years. The majority of the respondents were males (61.7%), urban residents (75.1%), single (94.3%), non-smoker (84.7%), and practicing exercise (71.9%). Regarding the academic year, 52.5% of the students were in the third academic year or more. Family monthly income was less than 5000 RS among 72.6% of the students. On inquiry about self-perception of general health, 57.9% of the students considered their general health as good. Concerning the sources of knowledge of dietary supplements among the students, the main source was the internet (56.6%) followed by the doctor (45.4%), while only 13.7% had their orientation from pharmacists (Fig. 1). Fig. (2) revealed that 29.5% (n=108) of the respondents were current users of dietary supplements, while 36.3% (n=133) experienced a past history of dietary supplement use. However, 34.2% (n=125) of the students didn't use dietary supplements. Multivitamins were the most prevalent dietary supplement utilized by the students (51%) followed by vitamin D (41.1%) while zinc was the least used dietary supplement (15.8%) (Fig. 3). Table 2 investigated the correlates of dietary supplement use among the students. There were statistically significant associations between dietary supplement use and age, sex, academic year, and physical activity. Logistic regression analysis revealed that the significant predictors of dietary supplement use were age >21 years, female sex, and being in the third academic year or

more. Students aged >21 years old were 3.3 times more likely to use dietary supplements than students aged 18-21 years old (odds ratio (OR): 3.26; confidence interval (CI): 1.67-10.53). In addition, females were 2.2 times more likely to use dietary supplements than males (odds ratio (OR): 2.23; confidence interval (CI): 2.34-6.84). The present study revealed that students in the third academic year or more were 2.6 times more likely to use dietary supplements than students in the first or second academic year (odds ratio (OR): 2.58; confidence interval (CI): 1.82-5.37). Patterns of use, opinions, and attitudes towards dietary supplements among the students were depicted in the Table 3. Concerning the reasons for using dietary supplements, the most common reason was as a nutritional supplement (49.4%), followed by health promotion (42.3%), feeling exhausted (26.1%), and feeling ill (24.1%). Concerning the duration of use of dietary supplements, 33.6% and 32.4% of the students respectively consumed them for one month and three months. Almost 77% of the students experienced no gastrointestinal side effects from dietary supplement use. Nearly half of the participants reported that the doctor who recommended dietary supplement use. The majority of the medical students agreed that dietary supplements are good for health (74.7%). Also, 73.1% recommended dietary supplement use to others when doctors prescribed.

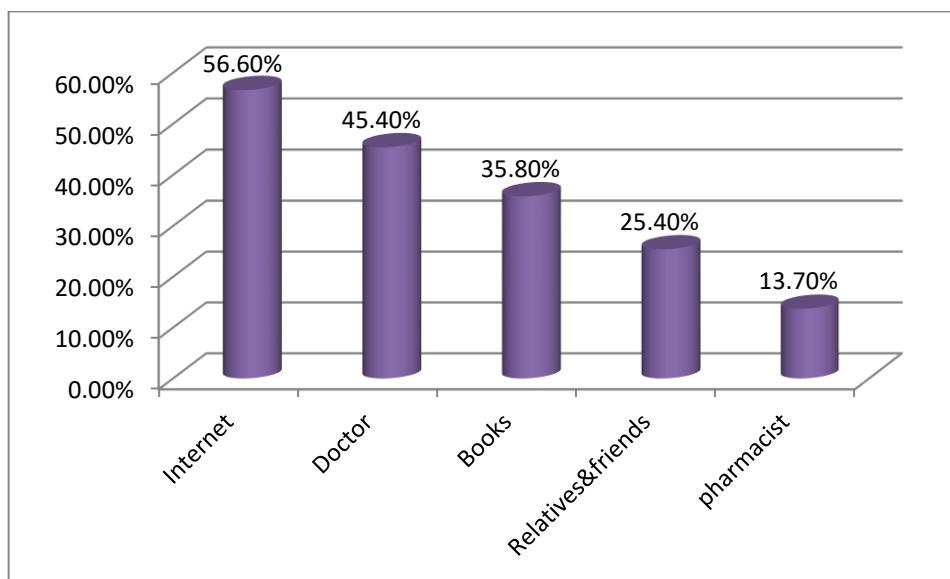


Fig. (1). Sources of knowledge of dietary supplements among Saudi medical students. (more than one answer had been reported)

Table 1. Socio-demographic characteristics and self-perception of the general health of Saudi medical students.

	No. (n = 366)	%
Age		
18-21	194	53
>21	172	47
Mean ± SD (Range)	21.49±1.89 (18-30)	
Sex		
Female	140	38.3
Male	226	61.7

(Table 3) contd....

	No. (n = 366)	%
Residence		
Rural	91	24.9
Urban	275	75.1
Academic Year		
First & second	174	47.5
Third & more	192	52.5
Marital Status		
Single	345	94.3
Married	21	5.7
Physical Activity		
Yes	263	71.9
No	103	28.1
Smoking		
Yes	56	15.3
No	310	84.7
Monthly Family Income		
<5000 RS	266	72.6
5000-7000 RS	24	6.6
>7000 RS	76	20.8
Self-perception of General Health		
Good	212	57.9
Fair or below	154	42.1

* More than one answer had been reported.

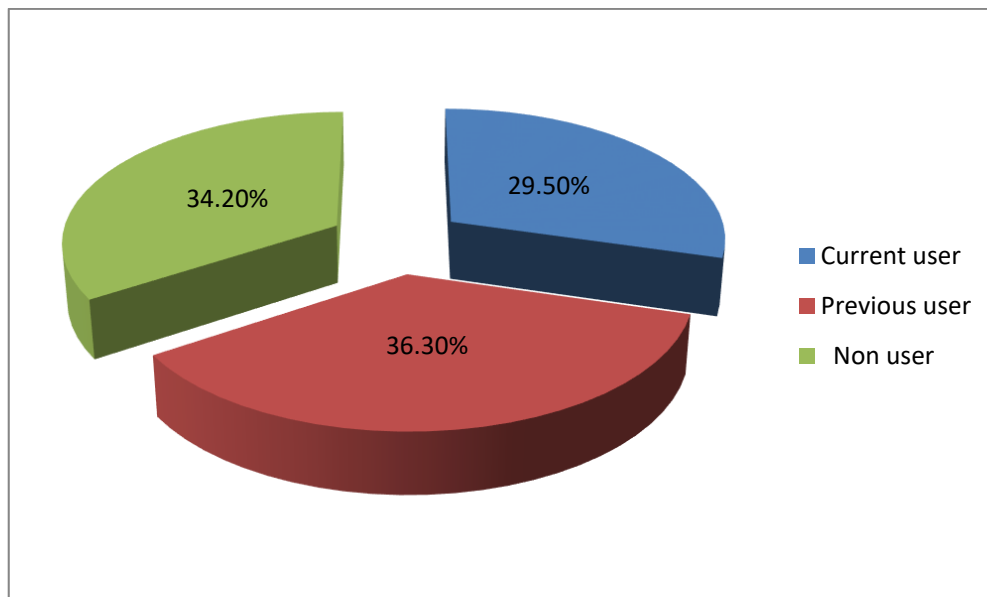


Fig. (2). Prevalence of dietary supplement use among Saudi medical students.

Table 2. Correlates of dietary supplement use among Saudi medical students.

	Users (n=241) No. (%)	Non users (n=125) No. (%)	COR (95% CI)	P value	AOR (95% CI)	P value
Age						
18-21	87 (44.8%)	107 (55.2%)	1		1	
>21	154 (89.5%)	18 (10.5%)	5.04 (2.47-15.27)	0.000	3.26 (1.67-10.53)	0.005

(Table 4) contd....

	Users (n=241) No. (%)	Non users (n=125) No. (%)	COR (95% CI)	P value	AOR (95% CI)	P value
Sex						
Male	127 (56.2%)	99 (43.8%)	1		1	
Female	114 (81.4%)	26 (18.6%)	3.42 (2.07-5.64)	0.000	2.23 (2.34-6.84)	0.000
Residence						
Rural	56 (61.5%)	35 (38.5%)	1		1	
Urban	185 (67.3%)	90 (32.7%)	0.78 (0.48-1.27)	0.317	0.87 (0.57-1.65)	0.913
Academic year						
First& second	103 (59.2%)	71 (40.8%)	1		1	
Third& more	138 (71.9%)	54 (28.1%)	1.57 (1.37-2.87)	0.001	2.58 (1.82-5.37)	0.022
Marital status						
Married	14 (66.7%)	7 (33.3%)	1		1	
Single	227 (65.8%)	118 (34.2%)	0.96 (0.38-2.45)	0.935	1.12(0.41-3.02)	0.828
Physical activity						
No	65 (63.1)	38 (36.9)	1		1	
Yes	216 (82.1)	47 (17.9)	1.54 (1.82-2.16)	0.013	1.68 (0.75-2.15)	0.172
Smoking						
Yes	36 (64.3%)	20 (35.7%)	1		1	
No	205 (66.1%)	105 (33.9%)	0.92 (0.51-1.67)	0.789	1.58 (0.83-4.21)	0.162
Monthly income						
<5000 RS	178 (66.9%)	88 (33.1%)	1		1	
5000-7000RS	13 (54.2%)	11 (45.8%)	1.32 (0.56-2.04)	0.451	0.63 (0.14-2.68)	0.851
>7000 RS	50 (65.8%)	26 (34.2%)	0.64 (0.37-0.92)		1.82 (0.76-1.38)	
Self-perception of general health						
Fair or below	103 (66.9%)	51(33.1%)	1		1	
Good	138 (65.1%)	74 (34.9%)	0.92 (0.59-1.43)	0.722	1.09 (0.68-1.76)	0.717

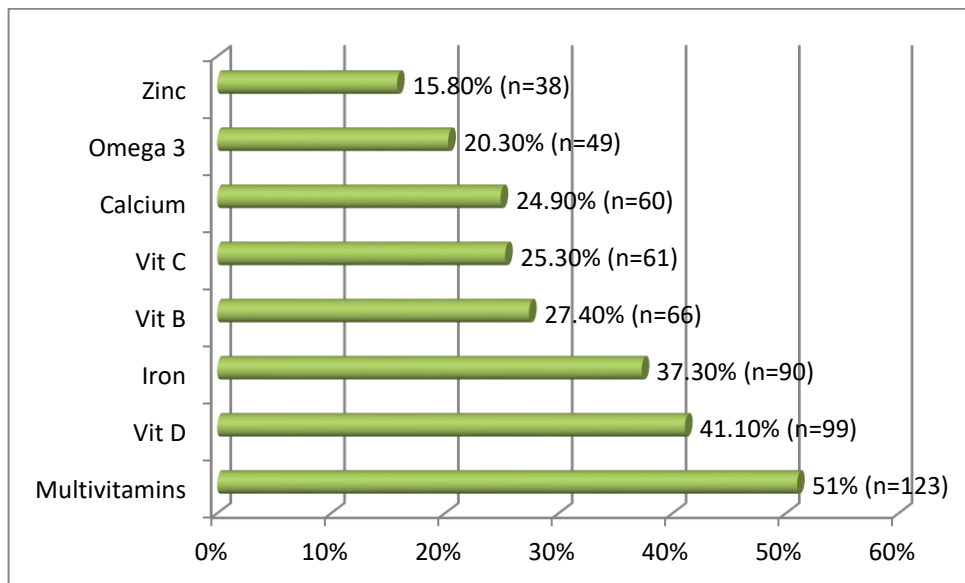


Fig. (3). Distribution of different dietary supplements among Saudi medical students. (more than one answer had been reported)

Table 3. Patterns of use, opinions, and attitudes towards dietary Supplement among Saudi medical students.

Reasons for use*	No. (%) (n = 241)
Feeling ill	58 (24.1)
Feeling exhausted	63 (26.1)
Nutritional supplement	119 (49.4)
Health promotion	102 (42.3)

(Table 5) *contd....*

	No. (%) (n = 241)
Duration of use of dietary supplements	
Week	31 (12.8)
Month	81 (33.6)
3 months	78 (32.4)
6 months	19 (7.9)
One year	5 (2.1)
>1 year	27 (11.2)
Do you experience gastrointestinal side effects from dietary supplement use?	55 (22.8)
Yes	186 (77.2)
No	
Who recommends you using the dietary supplement?	120 (49.8)
Doctor	35 (14.5)
Relatives and friends	86 (35.7)
Yourself	
Dietary supplements are considered good for health	180 (74.7)
Agree	10 (4.1)
Disagree	51 (21.2)
I don't know	
Do you recommend dietary supplement use to others?	50 (20.7)
Yes, I always recommend	176 (73.1)
Yes, when doctors recommend	15 (6.2)
Not at all	

* More than one answer had been reported.

4. DISCUSSION

In the Middle East region, particularly in the Gulf countries where there has been an advanced economic and industrial development, the need for dietary supplements is manifested and likely to increase because of increasing wealth, health awareness, educational level, the prevalence of chronic diseases, and the popularity of dietary supplements through the internet [7, 10, 19]. Numerous studies have been carried out among university students in the Aljouf region, Saudi Arabia [23 - 26]. However, no study has been conducted to date about the epidemiology of dietary supplement use in this population. So, the current study aimed to find out the prevalence and correlates of dietary supplement use among medical students at Jouf University, Saudi Arabia. Furthermore, this study highlighted the attitudes and opinions regarding dietary supplement use among this targeted population.

The present study identified that the most common sources of information about dietary supplements among study participants were the internet and doctors. The internet was the most prevalent source of information among Japanese participants [27], while doctors were the source of information about dietary supplements in other studies [12, 16].

The correlation between high educational level and dietary supplement use has been documented in many studies. Pouchieu *et al.* revealed a significant association between educational level and dietary supplement use among French students [28]. Furthermore, a study conducted by Mileva-Pecheva *et al.* showed high consumption of vitamins and minerals among females with a high educational level [29]. The present study supported the above findings revealing a high prevalence of dietary supplement use (65.8%) among medical students at Jouf University, Saudi Arabia. The high prevalence of dietary supplement use among the studied participants reflected their increased consciousness about health and wellbeing and recognition of the benefits of dietary supplements. It was shown that highly educated individuals

anticipate the advantages of dietary supplements in the prevention of diseases, enhancing the immune system, improving the quality of life and boosting emotional support [30]. The prevalence of dietary supplement use in the present study was lower than that reported among Nigerian and American students [31, 32] and higher than that reported among college students in Qatar and Pakistan [19, 22].

Socio-demographic characteristics and lifestyle factors that influenced the consumption of dietary supplements in this study were age, academic year, sex, and physical activity. Age is an important determinant of dietary supplement use. The present study revealed that dietary supplement use increased significantly among older students. In the present study, dietary supplement use increased significantly with the academic year of the student in agreement with the study conducted in Japan [27]. Consumption of dietary supplements is high among females compared to males because females are more concerned about their overall health and wellbeing [33]. Females were more likely to use dietary supplements in comparison to males in the present study in correspondence with other studies [17, 28]. However, a study conducted among college students in the United States showed no significant sex difference in dietary supplement use [34]. A balanced diet and physical activity are necessary for a healthy lifestyle. Dietary supplements cannot be considered a complete diet but complement a normal diet. They are utilized to attain the recommended dietary intake and decrease nutritional deficiency. Users of dietary supplements make a great effort to enhance health and wellbeing than non-users. The present study revealed that students who are physically active were more likely to use dietary supplements, inconsistent with other studies [11, 35].

The most common dietary supplements utilized by medical students in this study were multivitamins (51%) and Vitamin D (41.1%). Studies in Jordan, Pakistan, and Tehran indicated that multivitamins were the most prevalent used supplements [12,

22, 36]. Many studies conducted in Saudi Arabia revealed Vitamin D deficiency within this population [37 - 39]. Vitamin D was the second common supplement used by the students after multivitamins in this study.

The present study displayed the attitudes and opinions of the students towards dietary supplements. The most prevalent reasons for dietary supplement use among the students in the present study were nutritional supplementation and health promotion in agreement with other studies [15, 21]. However, a study conducted among university students in Japan revealed other reasons for dietary supplement use as building muscles for males and as a beauty supplementation and assisting in weight loss for females [27]. Studies have revealed a low incidence of side effects related to the gastrointestinal tract because of dietary supplement use [22, 40]. Nearly 23% of the study participants revealed that they experienced gastrointestinal side effects from dietary supplement use as nausea, vomiting, and diarrhea, which is nearly consistent with the study conducted among Lebanese adults [30]. The majority of the students in the present study agreed that dietary supplements are considered good for health, inconsistent with studies conducted in Saudi Arabia and Japan [21, 27]. Regarding recommending dietary supplement use to others, nearly three-quarters of the students in this study believed that dietary supplements should be used after a doctor's recommendation. However, most of the Lebanese participants reported that dietary supplements were safe to use as they utilized dietary supplements upon recommendation of friends and relatives [41].

The present study, which displayed dietary supplement use among medical students at Jouf University, Saudi Arabia, had some limitations. First, the study included only medical students at Jouf University, and therefore may not be representative of all university students. Second, it was a cross-sectional design with more vulnerability to interview and recall biases.

CONCLUSION

The present study was the first to assess dietary supplement use by college students in the Aljouf region, Saudi Arabia. The prevalence of dietary supplement use was remarkably high in the target population, and multivitamins and Vitamin D were the most frequently used supplements. In addition, increasing age, female sex, and higher academic year were shown to be significantly associated with high consumption of dietary supplements. The present study recommends similar studies involving students from non-health domain colleges to detect if there is a difference in the prevalence of dietary supplement use among these students.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the Ethical Review Committee of Jouf University, Saudi Arabia (Approval No: 1-19-6/40).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research

procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Consent for publication of the present study was obtained from the target population.

AVAILABILITY OF DATA AND MATERIALS

Data are available from the authors upon reasonable request.

FUNDING

None.

CONFLICT OF INTEREST

Conflict of interest was not declared in the present study.

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