

Frequency of dietary supplements usage in the Saudi Arabian public and gym users

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Abstract

Objectives: The aim of the study is to explore the use of dietary supplements and to assess awareness of its positive/adverse effects among physically active adults and the general population in Saudi Arabia.

Methods: We conducted a cross-sectional online survey-based study and received 574 responses showing frequencies and types of dietary supplements.

Results: The results show that 44.6% of respondents use dietary supplements. The most used dietary supplements were Vitamin C and multivitamins, consumed by 44% of the respondents, Vitamin D (44%), Iron (41%), and Calcium (39%). Protein sports bars and powder were consumed mainly by gym members, particularly those practicing weight-training exercises. Approximately, 4% of respondents reported side-effects secondary to the usage of the dietary supplements. We conclude that the dietary supplement usage is widespread in Saudi Arabia among both gym members and the general public.

Conclusion: It is highly recommended to increase awareness measures from official health entities by educating the general population and physically active adults about dietary supplement use and adverse effects to ensure safe practices.

Keywords:

Introduction

Dietary supplements are considered as food products that contain dietary ingredients intended to supplement nutritional value to a diet. It encompasses specific vitamins, multivitamins, minerals, enzymes, amino acids, and herbs.^{1,2} As a balanced diet is essential for development and maintenance of the human body, dietary supplement usage has become commonplace to improve overall health and well-being, and to reduce the risk of certain diseases. Dietary supplements use has become very common in the US, Europe, and GCC countries.³

A previous study indicated that almost half of Saudi participants consumed dietary supplements.⁴ Another study reported 93.3% of Saudi athletes consumed supplements,⁵ while 76.6% of female Saudi college students reported consumption of dietary supplements.³ Furthermore, dietary supplements were reported to be used by ~36% and ~24% of students in Saudi health and non-health colleges, respectively, while 62.3% of Saudi adults were reported to be supplement users or had used supplements at least once before.⁴

Such widespread usage has been attributed to increased availability of dietary supplements, and the belief that dietary supplements are more natural and safer to use compared to prescription medication.⁶ This rise in supplement use, however, is also associated with an increase in the adverse effects caused by supplement mis-/overuse, with studies reporting health complications (and fatalities in severe cases) due to overdose, drug–drug, and drug–disease interactions caused

by supplement misuse.^{7,8} For example, excessive use of cholecalciferol and vitamin D may adversely affect soft tissues and kidney functions,⁹ while the medical management of cardiovascular diseases can be affected due to interactions between the supplement and various drugs used in the management of diseases.¹⁰

This study aimed to explore the use of dietary supplements among physically active adults and the general population in Saudi Arabia, and their awareness of positive/adverse effects of dietary supplements.

Methods

Study Design

This is a cross-sectional study using an online self-administered questionnaire. Questions included covered sociodemographic and lifestyle characteristics, perceived health status, dietary supplement use, and general awareness regarding adverse effects.

Study Population

Our target population was adults living in Saudi Arabia. Participants <18 and >65 years of age were excluded. Convenience sampling was utilized: assuming the estimated population of Saudi Arabia of 33.7 million, 95% confidence interval, we calculated a target sample size of 384. After excluding respondents under 18 and over 65 years of age, we analyzed a total of 574 responses.

Survey Tool (Questionnaire)

Questions included covered sociodemographic and lifestyle characteristics, perceived health status, dietary supplement use, and general awareness regarding adverse effects.

We modified and designed our questionnaire from the previously used and validated surveys.^{11, 12} Content validity was performed by an expert in the field. The survey was also translated and made available in Arabic as well as English. Face validity was performed by an Arabic language translation expert. The survey included questions aimed at assessing the knowledge, experience, and awareness of participants regarding dietary supplements in addition to demographic factors (such as age, gender, nationality, and level of education). We also queried the use, purpose, reasons, and duration of taking dietary supplements, as well as short-/long-term side effects, exercising, frequency of going to the gym, and type of supplement used among participants.

Ethical Considerations

Ethical approval was obtained from Alfaisal University Institutional Review Board (approval number IRB20026). Researchers abided by the rules and regulations of the Saudi National Committee of Bioethics and the Research Policies & Procedures of Alfaisal University. No identifying data were collected to ensure anonymity and confidentiality. Access to the surveys' responses was limited to the investigators.

Data Collection and Analysis

The questionnaire was shared via electronic-social media platforms (Instagram, Twitter, and WhatsApp and work/personal emails). Data were extracted and analyzed using the SPSS Statistics 21 data analysis package. The descriptive statistics of mean, standard deviation, percentages, and frequencies were calculated. The Chi-square test was employed on categorical variables to examine associations. The significance was determined if the *p*-value was <0.05.

Results

A total of 636 respondents completed the questionnaire from different regions in Saudi Arabia, of which 574 respondents fit the inclusion criteria. The sociodemographic characteristics of the participants are summarized in Table 1 and their lifestyle choices are presented in Table 2. The majority of the respondents were females (67%), from the younger age group of 18–25 years (68%), most had a bachelor's degree or higher (68%), and almost two-thirds were Saudi nationals (66%). The Body Mass Index (BMI) grouping showed that 6% were underweight, while almost half were in the normal weight category (49%); 28% overweight, and 15% obese among the respondents as shown in Table 1.

Table 2 shows that 163 (28%) did not exercise, while most reported exercising 3–5 days per week (37%) and another 14% exercised 6–7 days per week. There were 199 (35%) who were using some specific diet, while 264 (46%) of the participants used dietary supplements in the last month. There were 106 (18%) of the respondents who were members of a Gym (Table 3).

Table 1. Sociodemographic characteristics of the study participants (n=574).

Variable	n	%
Gender		
Females	383	66.5
Males	191	33.2
Age (years)		
18-25	392	68.1
26-45	156	27.1
>45	28	4.9
Educational level		
High School / Diploma / Intermediate	183	31.7
Bachelor's Degree / Graduate	391	67.8
Nationality		
Saudi	381	66.1
Non-Saudi	195	33.8
BMI (kg/m²)		
<18.5	33	5.7
18.5-24.9	284	49.3
25-29.9	162	28.1
30+	85	14.8
Missing	12	2.1

Table 2. Lifestyle choices of respondents (N=576).

	N	%
Exercise		
No exercise	163	28.3
1-2 days/week	122	21.2
3-5 days/week	212	36.8
6-7 days/week	79	13.7
Diet		
Any specific diet	199	34.7
No specific diet	375	65.3
Use of dietary supplements		
Yes	264	44.6
No	317	55

Length of usage of dietary supplements (N=264)			
	<1 month	40	6.9
	1-3 months	73	12.7
	>3 months	151	26.2
Use of dietary supplements in the last month (N=264)			
	Daily	157	27.3
	Weekly	82	14.2
	Once a month	25	4.3
Gym members			
	Yes	106	18.4
	No	470	81.3

There were 264 respondents who were using dietary supplements; the most common supplements were Vitamin C, Vitamin D, and multivitamins consumed by 44% of these 264 respondents. Other commonly used supplements included Iron (41%) and Calcium (39%). Protein sports bars and powder were consumed mainly by gym members, particularly those practicing weight-training exercises. A few respondents reported using other specific dietary supplements that included probiotics, Zinc, Magnesium, and Folic acid. There were 39% of the 264 respondents using dietary supplements who reported short- or long-term adverse effects directly resulting from supplement-use, while 4% reported side-effects

secondary to the usage of the dietary supplements, including acne, constipation, bloating sensation, nausea, low appetite, change in urine color due to beta-carotene, dizziness, dependency, hair loss, erectile dysfunction, hypotension, changes in bowel movements, increased blood pressure, liver damage, anxiety, tremors, hypervitaminosis, and agitation.

The major sources of information regarding dietary supplements were identified as the internet (31%), doctors/pharmacists (18%), and friends/family (8%). The most common reason for supplement use was to complete dietary/nutrient needs (34%), while 16% of the participants used it for muscle building; another (15%) reported use for medical recommendation/prescription from a doctor. Other reported reasons included boosting immunity, enhancing performance (stamina), and improving memory. Of those who exercised, 60% reported exercising 1–2 h/session, while 38% reported exercising for <1 h. The most commonly reported type of workout was cardio (37%) and weight training (34%) exercises. Table 3 shows the association between the demographic variables and use of dietary supplements. There was a significantly higher proportion of females (48.8%) than males (36.8%) who reported using dietary supplements ($p=0.004$). Respondents aged more than 45 years of age were more likely (70.3%) to use dietary supplements ($p=0.002$) as compared to the younger respondents aged 18–25 years (41.1%) and 26–45 years (49.3%). Also, those with BMI greater than 30 kg/m² (48.2%) and 25–29.9 kg/m² (50.3%) were more likely to use dietary supplements as compared to those with BMI <18.5 (36.3%) and 18.5–24.9 kg/m² (41.9%) ($p=0.002$). The use of dietary supplements was also higher in those who exercised (49.2%) as compared to those who did not (33.7%) ($p=0.001$). Educational level was not significantly related to the use of dietary supplements ($p=0.12$). There was also no significant difference ($p=0.13$) in the use between Saudis and Non-Saudis (Table 3).

Table 3. Association of demographic variables with use of dietary supplements.

		n	Use dietary supplement n (%)	Do not use dietary supplement n (%)	p-value
Gender	Females	383	187 (48.8%)	196 (51.1%)	0.004
	Males	190	70 (36.8%)	120 (63.2%)	
Educational level	Bachelor / graduate	391	168 (42.9%)	223 (57.1%)	0.12
	High school / diploma	183	89 (48.6%)	94 (51.3%)	
Age groups (yrs)	18-25	391	161 (41.1%)	230 (58.9%)	0.002
	26-45	156	77 (49.3%)	79 (50.7%)	
	>45	27	19 (70.3%)	8 (29.7%)	
BMI groups (kg/m²)	<18.5	33	12 (36.3%)	21 (63.7%)	0.002
	18.5-24.9	284	119 (41.9%)	165 (58.1%)	
	25-29.9	161	81 (50.3%)	80 (49.7%)	
	>30	85	41 (48.2%)	44 (51.8%)	
Nationality	Saudi	382	178 (46.6%)	204 (53.4%)	0.13
	Non-Saudi	192	79 (41.1%)	113 (58.9%)	
Exercise	Yes	410	202 (49.2%)	208 (50.7%)	0.001
	No	163	55 (33.7%)	108 (66.2%)	

Table 4 presents the association between demographic variables with being on a specific diet. There was no difference with regards to gender ($p=0.09$), educational level ($p=0.40$), age group ($p=0.62$), and nationality ($p=0.07$). It was found that respondents who were overweight or obese (BMI 25 kg/m² and above) were more likely to be on a specific diet (42%) as compared to those with BMI <18.5 kg/m² (6%) and those with normal BMI of 18.5 to <25 kg/m² (31%) ($p<0.001$).

Table 5 also shows that there was no difference for exercising or not by gender ($p=0.08$), education level ($p=0.32$), and age group ($p=0.69$). Respondents who had BMI <18.5 kg/m²

(48.5%) or BMI >30 kg/m² were less likely to exercise as compared to those with normal BMI (76%) or BMI between 25 and <30 kg/m² (74%) ($p=0.001$). Also, Saudi nationals were more likely (76%) to exercise as compared to non-Saudis (63%) ($p=0.001$).

Table 5 shows no difference by gender in those who exercised ($p=0.08$). Also, no statistically significant difference was seen in respondents who exercised based on their education levels ($p=0.31$). Respondents with a higher BMI (>30 kg/m²) were more likely to exercise as compared to those having a normal BMI ($p=0.001$). Saudis were more likely to exercise as compared to the non-Saudi respondents ($p=0.001$).

Table 4. Association of demographic variables with being on a specific diet.

		n	On specific diet n (%)	No specific diet n (%)	p-value
Gender	Females	383	142 (37.1%)	241 (62.9%)	0.09
	Males	190	57 (30%)	133 (70%)	
Educational level	Bachelor / graduate	391	140 (35.8%)	251 (64.2%)	0.40
	High school / diploma	183	59 (32.2%)	124 (67.8%)	
Age groups (yrs)	18-25	391	126 (32.2%)	265 (67.8%)	0.62
	26-45	156	70 (44.9%)	86 (55.1%)	
	>45	27	3 (11.1%)	24 (88.9%)	
BMI groups (kg/m²)	<18.5	33	2 (6.1%)	31 (93.9%)	<0.001
	18.5-24.9	284	87 (30.6%)	197 (69.4%)	
	25-29.9	161	68 (42.2%)	93 (57.8%)	
	>30	85	36 (42.4%)	49 (57.6%)	
Nationality	Saudi	382	141 (36.9%)	241 (63.1%)	0.07
	Non-Saudi	192	58 (30.2%)	134 (69.8%)	

Table 5. Association of demographic variables with exercise.

		n	Exercise n (%)	Do not exercise n (%)	p-value
Gender	Females	383	265 (69.2%)	118 (30.8%)	0.08
	Males	189	144 (76.2%)	45 (23.8%)	
Educational level	Bachelor / graduate	390	274 (70.3%)	116 (29.7%)	0.32
	High school / diploma	183	136 (74.3%)	47 (25.7%)	
Age groups (yrs)	18-25	391	275 (70.3%)	116 (29.7%)	0.69
	26-45	155	118 (76.1%)	37 (23.9%)	
	>45	27	17 (63%)	10 (37%)	
BMI groups (kg/m²)	<18.5	33	16 (48.5%)	17 (51.5%)	0.001
	18.5-24.9	284	216 (76.1%)	68 (23.9%)	
	25-29.9	161	119 (73.9%)	42 (26.1%)	
	>30	84	51 (60.7%)	33 (39.3%)	
Nationality	Saudi	381	289 (75.9%)	92 (24.1%)	0.001
	Non-Saudi	192	121 (63%)	71 (37%)	

Discussion

The findings of this study demonstrated a high prevalence of dietary supplement use in Saudi Arabia (45.8%) and showed an association with certain demographics and lifestyle factors. Other studies have suggested that dietary supplement use has been very common on a global level.¹³ The prevalence of dietary supplement use varies globally, however, the findings indicate that it is relatively high in Saudi Arabia compared to other countries. A cross-sectional study used nationally representative data from the National Health and Nutrition Examination Survey in the United States indicated that over half of Americans used at least one type of dietary supplements during the previous month of the study.¹⁴ In addition, the prevalence of dietary supplement use among Pakistanis was 48.2%,¹⁵ and 35.6% among college students in the United Arab Emirates,¹⁶ which confirm the findings of the high prevalence of dietary supplements use in general. Another cross-sectional study among Saudi population revealed that more than half of its participants used dietary supplements, which is similar to our findings.¹⁷ Moreover, a local study at Princess Nourah Bint Abdulrahman University in Riyadh also highlighted the finding of the high prevalence of dietary supplement use in Saudi as all its participants have used it at some point in time and 32.3% were using it at the time of the study.¹⁸ Alowais et al have suggested that increased awareness levels about health promotion and disease prevention contributed to the increased use of dietary supplements in many countries,¹⁷ which may justify the high prevalence of dietary supplement use in Saudi Arabia. However, a Chinese study revealed that only 24.2% of its participants consumed dietary supplements during the past year.¹⁹ The frequency of dietary supplement use in Saudi Arabia seems to be higher than other countries.

A comparison of educational levels (Bachelors and graduates vs high school and diploma holders) did not show a statistically significant difference regarding the use of dietary supplements. These findings match another study conducted in Saudi Arabia that found no association between dietary supplement use and the level of education.¹ However, another study in Saudi Arabia found that dietary supplement use was more prevalent (84.5%) among those with high educational levels.¹⁷ Also, another study indicated higher dietary supplement use among Chinese medical students (58.9%) compared to non-medical students.¹⁹ The difference between these results and other studies can be due to the nature of this study, since the survey was distributed electronically and most participants (67.8%) had higher education.

Since dietary supplements have been very common, sources of information about it vary. The major sources of information regarding dietary supplements identified by the participants were internet, doctors, or pharmacists, and friends, family, or relatives which is in concordance with findings of other studies.¹⁷ However, Rogza et al. found that physicians were the most frequent source of information for dietary supplement use, which is safer for consumers unlike unreliable sources like Internet.²⁰ Though only 15% of the participants used dietary supplements due to a medical recommendation/prescription from a doctor, it is recommended to increase awareness measures from official health entities by educating the general population and physically active adults about dietary supplement use and adverse effects to ensure safe practices.

The findings show that the most used dietary supplements were Vitamin C and multivitamins or both, unlike another Saudi-based study among females that showed that cod liver oil, Omega 3, multivitamins, ginseng, and vitamin A to be most commonly used supplements. The difference could be a result of limiting the study to college females only as their reason for dietary supplement use was to maintain healthy hair, unlike this study that included both males and females up to 65 years old.³ Similarly, a study conducted among Saudi females suggested that the primary reason for using dietary supplements was for aesthetic reasons.¹⁸

Other commonly used supplements in this study were: Vitamin D, Iron, and Calcium. Protein sports bars and protein powder were consumed mainly by gym members, particularly those practicing weight-training exercises. A few participants reported using other specific dietary supplements that include probiotics, Zinc, Magnesium, and finally folic acid. However, Jawadi et al found that most commonly used supplements among active adults who go to the gym in Saudi were whey protein, amino acids, multivitamins, creatinine, and Omega 3 to improve body shape,²¹ which is slightly similar to the findings in this study as 16% of participants used it for muscle building. Other reported reasons included boosting immunity, enhancing performance (stamina), and improving memory.

Athletes use dietary supplements for various reasons such as maintenance of good health and improving micronutrient deficiencies. Maintaining a balanced meal can be a challenge, therefore, dietary supplements replace inadequate energy and macronutrient intake.¹³ This study mirrors the findings as the most common reason for using dietary supplements reported by the participants was completing dietary/nutrient needs.

The results indicate that almost 40% of the responses replied in affirmative regarding dietary supplements having short- or long-term adverse effects. Significantly just 4% of respondents reported side-effects secondary to the usage of the dietary supplements. Another study conducted among Saudis also revealed that dietary supplement consumers (75%) were aware of its adverse effects.⁴ In contrast, another study in India showed that only 16.9% of dietary supplement users felt that regular use results in side-effects.²²

Some of the adverse effects reported included acne, constipation, bloating sensation, nausea, low appetite, change in urine color due to beta carotene, dizziness, dependency, hair loss, erectile dysfunction, hypotension, changes in bowel movements, increased blood pressure, liver damage, anxiety, tremors, hypervitaminosis, and agitation. Some of the adverse effects including diarrhea, constipation, stomachache, headache, nausea, and vomiting have been reported among Japanese adults from using dietary supplements. However, only just under 10% of them have reported the symptoms due to the inability to link the cause and effect relationship of these adverse effects.²³

The results showed that respondents who exercised were more likely to use dietary supplements. A cross-sectional study among Saudi females mirrors our findings as it showed that more physical activity was significantly positively associated with dietary supplements use.³ While another study in Saudi Arabia showed that dietary supplement users believed that its use is most needed among pregnant women and during recovery from diseases.¹⁷ Since this study sample included physically active participants, this difference can be justified by the type of dietary supplements and the purpose of its use.

Study limitations

Since our study was conducted during coronavirus COVID-19 pandemic, all sports activities including gyms were closed due to social distancing and quarantine regulations, which might have impacted physical activity levels and dietary supplement use. Therefore, this factor can affect the generalizability of our study. In addition, due to the nature of the cross-sectional studies, causal inferences cannot be achieved. Moreover, recall bias in the type and frequency of supplement use may be present. Selection bias is another limitation given that only people with internet access were included in our study.

Conclusion

The dietary supplement usage is widespread in Saudi Arabia among both gym members and general public. The incidence of reported adverse effects is low as compared to other published studies. Since there are many dietary supplements available, future studies should be conducted to assess different types of dietary supplements and its adverse effects in Saudi Arabia. In addition, it is highly recommended to increase awareness measures from official health entities by educating the general population and physically active adults about dietary supplement use and adverse effects to ensure safe practices.

Conflicts of Interests

Authors report no conflict of interests.

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