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KNOWLEDGE, PERCEPTION AND PRACTICES ON DIETARY SUPPLEMENT USE AMONG YOUNG ADULTS IN SAUDI ARABIA

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Abstract

Introduction: Dietary supplements (DS) have gained popularity among young adults, but there is limited knowledge about their usage and associated risks. Previous studies have highlighted the prevalence of DS use and the need for education on proper usage. This study aimed to assess the knowledge level and perception of young adults in Saudi Arabia regarding dietary supplement use and associated risks without prescription. **Methodology:** A cross-sectional study was conducted using a questionnaire-based survey. The study included 371 participants aged 18-30 years, residing in different regions of Saudi Arabia. Inclusion criteria included young adults of both genders living in Saudi Arabia, while individuals under 18 years of age and non-Saudis were excluded. Data collection was conducted using a structured questionnaire. The collected data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) software. **Results**: In a study involving 371 young adults in Saudi Arabia, findings revealed significant insights into their knowledge, perception, and practices regarding dietary supplement use. The mean age of participants was 24.7 years, with a majority being female (67.7%) and single (67.1%). Notably, 66.0% reported using dietary supplements within the past year, primarily for health reasons (49.7%). While 71.8% acknowledged the potential dangers of unsupervised supplement use, 17.1% admitted not reading instructions, highlighting a need for better education. Additionally, 44.7% exhibited high knowledge levels about supplements, with significant associations found between knowledge and factors such as gender and marital status.
Conclusion: The findings revealed a significant prevalence of dietary supplement use, with 66.0% of participants reporting current or past usage. This aligns with previous research indicating a growing trend of dietary supplement consumption among young adults globally, particularly in the Middle East.

Keywords: Dietary supplements (DS), Nutritional supplements (NS), Saudi Arabia (SA).

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Introduction:

Dietary supplements (DS) are regarded as nutraceutical preparations that can be designed in specific dosage forms and contain specific micronutrients to make up for nutritional deficiencies. Yet, these supplements are unable to completely replace the nutritional benefits of actual food [1]. These supplements, whether synthetic or derived from natural resources, are classified as micronutrients, which include minerals, vitamins, and macronutrients, which include amino acids, fatty acids, and carbohydrates [2]. The industry of DS is now worth several billion dollars, and there is a growing necessity to investigate the efficacy as well as the safety of these products, particularly for younger users [3].

Nutritional supplements (NS) have become widely utilized during the past few decades, with intake depending on gender, age, and nutritional deficiency. People use NS for a variety of reasons, including illness prevention, energy boosts, enhanced physical performance, and treatment of health issues including osteoporosis [4].

Although taking supplements of vitamins and minerals dose not reduce the chance of acquiring diseases, but it could be beneficial. Like, Potassium supplements have been shown to offer several advantages and it supports therapy of hypertensive people and experts advised people to take it [5].

Supplements for diet are used by three out of four persons. Multivitamins are the dietary supplements that are utilized the most. The most common justification for consuming dietary supplements was advice from medical personnel. Most of individuals said utilizing dietary supplements improved their quality of life. Constipation and headache were the most common side effects of utilizing dietary supplements, whereas an increase in hunger was the most common benefit [6].

These DS are not always safe. Some of these supplements contain active ingredients that have a physiological or pharmacological effect, just like regular drugs [7]. The user of DS may be able to benefit their health from the DS products, but they are also at risk of experiencing unintended adverse effects due to misinformation or a lack of knowledge about the DS [8].

The use of DS is growing, especially among young adults [9]. A cross-sectional study conducted in Saudi Arabia found a substantial difference in age between DS users and non- users, with DS users being more likely to be younger [10].

Typically, DS are self-prescribed, and the common health-related justifications for using them suggest that people are not well-informed about their advantages and risks [9]. Additionally, a few DS can cause substantial toxicity. Furthermore, individuals frequently Do not inform their doctors that they use DS. As a result, there is a significant possibility for adverse supplement- drug interactions [7].

One of the primary concerns that comes with DS use is that consumers might use them improperly. Therefore, consumer education is crucial since maintaining safety comes first. And doing so will help spread awareness of a healthy lifestyle among people of all ages as well as reduce healthcare expenses [8].

A cross-sectional study was conducted in 2018 on a convenient sample of 220 medical students studying pharmacy and dentistry at Ajman University in the UAE and the results found that 33 (15%) had good knowledge of dietary supplements (DS) and micronutrients, while 123 (55.9%) had good practice. There was a significant difference in results between Pharmacy and Dentistry students (p0.001). Furthermore, males were more likely to use DS (56.1%) than females (43.9%), with a value of (p= 0.029) [11].

In 2021, a cross-sectional survey was conducted in Jordan and the results showed that most participants (80%) knew what dietary supplements (DS) are. The prevalence of DS use was high (62.1%), and females were substantially more likely to use it (p = 0.004). Multivitamins (93.0%), vitamin D (65.8%), and vitamin C (57.6%) were the most regularly consumed DS among users. nearly half of the

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participants (46.2%) thought DS had no side effects. The participants most frequently learned about DS from unreliable sources like social media. Self-prescription was the most common method of supplement ingestion among DS users. Finally, among Jordanians, the general idea of correlating healthy practices with DS use was determined to be false [12].

Cross sectional research of Saudi women who visited gyms in Riyadh, Saudi Arabia, in November 2021 showed that the majority of the 355 female participants (68.7%) ingested dietary supplements. The most often utilized dietary supplements were fatty acids (3.3%), minerals (22.1%), amino acids and proteins (30.3%), and vitamins (82.8%). 53.3% of survey participants who used or had used supplements had prior knowledge, 13.1% were current, and 33.6% were out-of-date. Body mass index (BMI), marital status, educational level, or weight did not correlate with supplement consumption.

Objectives:

The main objective of this study was to measure the knowledge level among young adults in Saudi Arabia (SA) about Dietary Supplement Use and to evaluate their perception level of the risk associated with taking Dietary Supplements without prescription.

Materials and Methods:

Study design:

The study is an observational cross-sectional questionnaire-based study. The survey conducted in all regions of Saudi Arabia, from September 2023 to October 2024. The participant would be chosen through a convenient random sampling without prescription.

Inclusion and Exclusion criteria:

Our inclusion criteria were mainly young adults, including both genders between the age of 18-30, living in Saudi Arabia. We exclude people under the age of 18 and above 30, also, non-Saudi.

Sample size:

The sample size of this study was estimated by Qualtrics calculator: The minimum sample size is 371 with confidence level 95%. The Sample size estimated by using this formula:
Sample Size= (Z-score)2 x StdDev x (1-StdDev) / (Margin of Error)2

Method for data collection and instrument (*Data collection Technique and tools)*:

Instrument: in our study we used questionnaire done by Shahad Aljebeli and others[13].
Data collection was done in the form of the participants' responses to the questions, the survey instrument was a self-administered anonymous questionnaire in English and Arabic. The questionnaire included demographic features such as age, gender, pregnancy and lactation, marital status, education level, chronic medical condition, studying or working field, family income, and living region. The participants were asked about their use of dietary supplements, whether they were based on a prescription or not, when they use dietary supplements, the type of supplement and the reason for supplement intake, the importance of medical consultation when taking supplements, and if they read the attached instructions with the supplements.
Also, they were asked about their knowledge of the existence of negative side effects from supplements

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and the need for lab tests to check the level of vitamins and minerals.

Scoring system:
Demographics: Sociodemographic data is collected from the survey including Gender, Age, Martial status, pregnancy and breastfeeding, any chronic illnesses, Education level, occupation (health or Non health), Monthly family income, region of the participant.

Knowledge score: Responses to six questions on knowledge for calculating knowledge score, the population asked regarding their knowledge level toward dietary supplement four question had three choices yes, no, I don't know. Score 1 given If the answer 'yes'. Score 0 given if the answer 'No' or 'I Don't Know.' 1 question to assess what kind of dietary supplement the participant is using had 22 different answers each answer scored as '1'. 1 question to assess the reason for using dietary supplement had 4 different answers each answer scored as '1'.
Maximum knowledge part: 6.

Attitude score: This section including question regarding attitude toward dietary supplement use, if the participant currently using dietary supplement, if the participant using dietary supplement with or without prescription, and when the participant is using dietary supplement. Two questions had three choices yes, no, I don't know. Score 1 given If the answer 'yes'. Score 0 given if the answer 'No' or 'I Don't Know'. 1 question to assess when the participant is using dietary supplement had 4 different answers each answer scored as '1'.
Maximum attitude part: 3
-Our survey includes 9 questions. Knowledge part: 6 questions. Attitude part: 3questions.Highest score: 9. Lowest score: 0. The score for knowledge and attitude from 0-9 points and classified into three categories as follow: High level: ≥ 7 scores, moderate level: 5 - 6 scores and low level: ≤ 4 scores.

Analyzes and entry method:
The data initially inputted into a computer using the "Microsoft Office Excel Software" program for Windows. Subsequently, the data transferred to the Statistical Package of Social Science Software (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.), for the purpose of conducting statistical analysis.

Results:

Demographic parameters of 371 people in a total group is presented in Table (1). Age, gender, marital status, pregnancy status for females, presence of chronic medical condition, education level, field of study or work, monthly income and region of residence are some of the distributions of participants across different parameters which give useful information about the sample population. We note that the participants mean age is 24.7 and standard deviation is 3.3 years. Most of the participants fall within the age range from 23 to 26 years, and the numbers of females were more (67.7%) than males (32.3%). A big chunk of them are single (67.1%) and have earned the bachelor's degree (72.0%). Finally, the participants' data shows a relatively low prevalence of chronic medical conditions (only 6.7%) and a broad distribution by field of study or work.

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Table (1): Sociodemographic characteristics of participants (n=371)

Parameter		***No.***	***Percent (%)***
Age (Mean:24.7, STD:3.3)	less than 23	112	30.2
	23 to 26	140	37.7
	more than 26	119	32.1
Gender	Female	251	67.7
	Male	120	32.3
Marital status	Single	249	67.1
	Married	115	31.0
	Divorced	3	.8
	Widowed	4	1.1
For females, are you: (n=258)	Pregnant	18	7.0
	Lactating	6	2.3
	None	234	90.7
Do you have any chronic medical condition (Like: diabetes, high blood pressure... etc.)?	No	346	93.3
	Yes	25	6.7
Education level	Elementary school	2	.5
	Middle school	2	.5
	High school	65	17.5
	Diploma	9	2.4
	Bachelor	267	72.0
	Graduate Studies	26	7.0
The studying or working filed: (If you are still in school, please don't answer this question) (n=325)	Medical field	161	49.6
	Non-medical field	164	50.4
Monthly income	Less than 5000	57	15.4
	5000–10,000	82	22.1
	11,000–16,000	76	20.5
	Higher than 16,000	156	42.0
Region of residence	Northern Saudi region	13	3.5
	Southern Saudi region	29	7.8
	Central Saudi region	127	34.2
	Eastern Saudi region	42	11.3
	Western Saudi region	160	43.1

Figure 1 presents the data clearly, indicating that a good size number of 245 persons have reported taking dietary supplements while this period. On the other hand, only 126 respondents out of a total of 200 have not yet added any dietary supplements as part of their regimen within that same period. Further analysis and contemplation of why so many, including those surveyed in this data, consume dietary supplements is prompted by this data. The decision to use or abstain from dietary supplements can be influenced by factors such as age, gender, socio-economic status, and health related concerns, which exemplify the complexity and variability of individual health choices.

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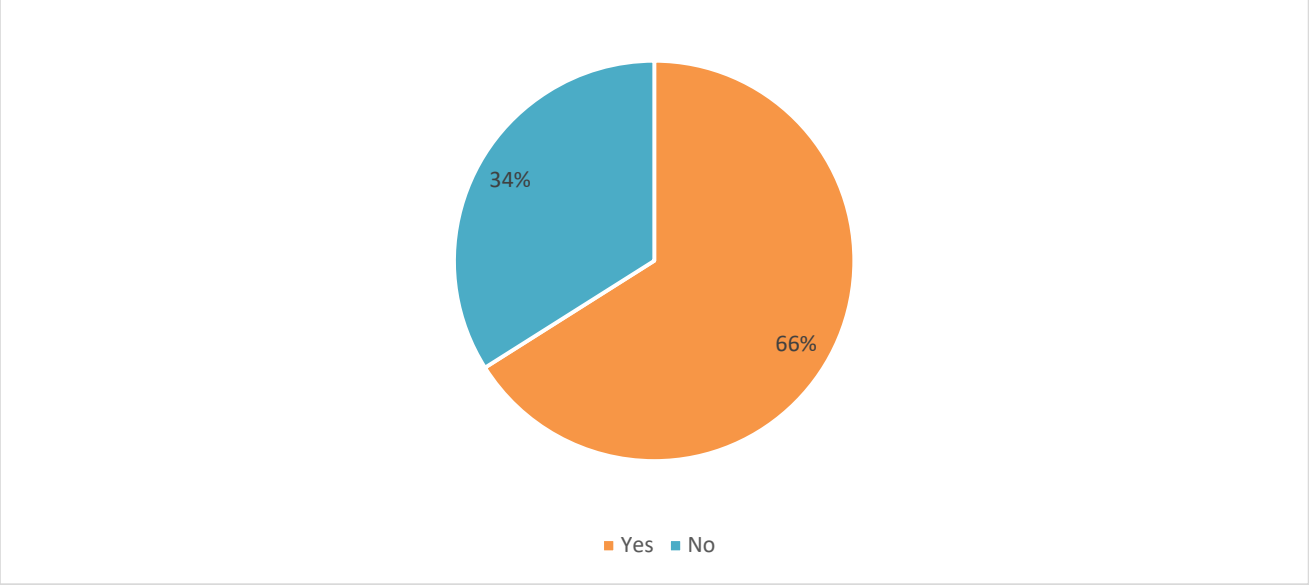
Figure (1): Illustrates if participants are using or used dietary supplements in the past year.



To illustrate for example in Table (2), the table depicts for example parameters on the usage of dietary supplements among the respondents. A large majority, 66.0 % (245 individuals), report having either used or currently using dietary supplements within the past 12 months, while 34.0 % (126 individuals) have not. 33.0% (123 persons) claim to use dietary supplements according to prescription, whereas 39.4% (148 persons) do not, and 17.0% (63 persons) use some that are prescribed, and 12.7% (47 persons) do not take any. On a frequency basis, 29.1% (108) use them on an as need basis, 27.5% (102) sometimes, 22.9% (85) daily, 7.0% (26) when they are sick, 13.5% (50) none. The types of supplements used, the data shows, include a wide variety of options. The most common types are multi-vitamins and minerals (26.1%), vitamin D (15.4%), iron (8.1%), omega 3 (5.1%), protein (4.3%), amongst others. A large portion (10.2) percent of respondents also did not use any supplements and 8.6 percent of respondents did not use supplements listed in the table.

Table (2): Parameters related to attitude of Dietary supplement users (n=371).

Parameter		***No.***	***Percent (%)***
Are you currently using or used in the past 12 months any dietary supplements?	Yes	245	66.0
	No	126	34.0
Do you take dietary supplements based on medical prescription?	Yes	115	31.0
	No	146	39.4
	Some of them	63	17.0
	Don't use	47	12.7
When do you use supplements?	As needed.	108	29.1
	From time to time	102	27.5
	Daily	85	22.9
	When sick	26	7.0
	Don't use	50	13.5
Type of supplements:	Multi-vitamins and	97	26.1

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	minerals		
	Multi-vitamins	18	4.9
	Multi-metal	3	.8
	Vitamin B 12	12	3.2
	Folic acid (B9)	13	3.5
	Vitamin B complex	7	1.9
	Vitamin A	1	.3
	Vitamin D	57	15.4
	Vitamin C	14	3.8
	Calcium	1	.3
	Zinc	1	.3
	Iron	30	8.1
	Potassium	1	.3
	magnesium	3	.8
	Omega 3	19	5.1
	Cod liver oil	1	.3
	Coenzyme Q10	2	.5
	Protein	16	4.3
	Herbal supplements	5	1.3
	None	38	10.2
	Others	32	8.6

The figure (2) shows the responses to the question of how many people believe it is needed to have laboratory tests to measure levels of vitamins and minerals. A majority (203 respondents) said yes, they are aware of the need to do lab tests to monitor their vitamin and mineral levels. On the other hand, only 8 respondents answered negatively meaning that in their view such tests are not necessary. Among 34 who said that they are unsure, 34 said that they are unsure if such tests are required.

Figure (2): Illustrates if participants knew that they must do lab tests to check the level of vitamins and-minerals.

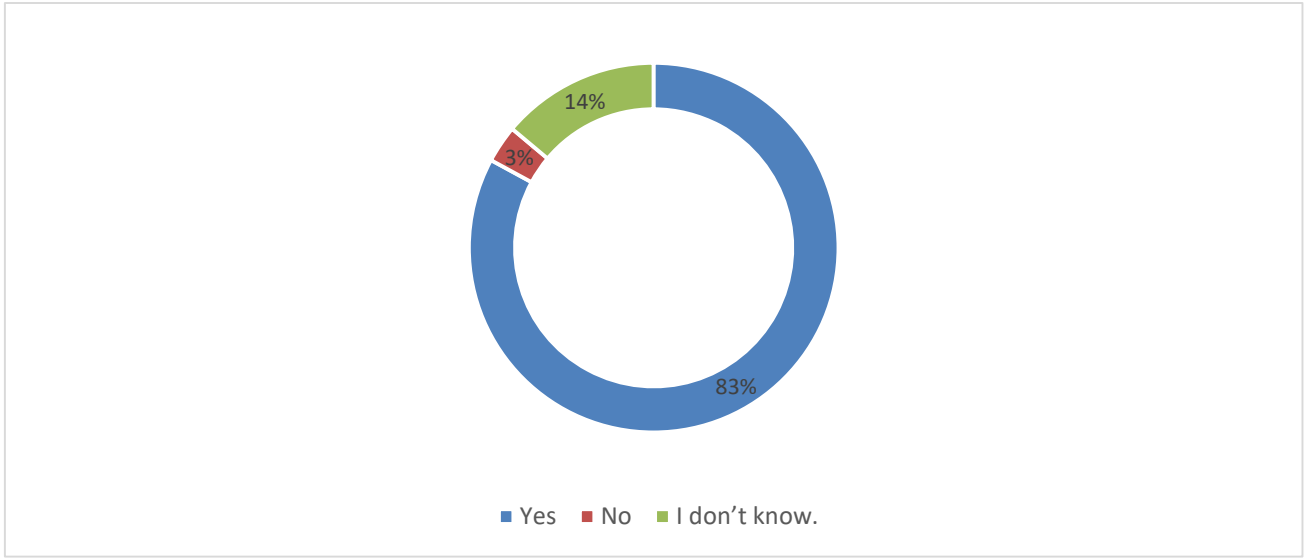

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Table (3) presents data about participants' supplement knowledge and provides clues as to the reasons for individuals taking supplements; whether they know the importance of medical consultation; whether they adhere to instructions; whether they understand which side effects could result from supplements; and whether they know when to get lab tests performed to see their vitamin and mineral levels. The three most cited reasons for taking supplements, in order, among survey respondents from among the 371, were health (49.7%), personal experience (8.5%), and recommendations from friends or family (7.7%). Interestingly, a high percentage (71.8%) do realize taking supplements without a doctor's advice might be dangerous, admitted the existence of this proportion. Nevertheless, it's disconcerting that some of them (17.1%) did not read the attached instructions, which could affect the effectiveness and safety of supplementation. In addition, the prevalence among participants (65.3%) who agree with the statement that dietary supplement can have side effects indicate that our education and awareness is required about this aspect. Although the data also shows that this is a positive trend, a large majority (82.8%) said they know they need lab tests to monitor their vitamin and mineral levels, which suggests a proactive approach to achieve optimal health.

Table (3): participants supplement knowledge (n=371).

Parameter		***No.***	***Percent (%)***
Reason for Supplements Intake (n=245)	Based on internet, TV, and social media	13	5.3
	Maintain health.	122	49.7
	Based on personal experience	21	8.5
	gym and fitness	18	7.3
	recommended by friends or family.	19	7.7
	pregnancy/lactation	13	5.3
	others	39	15.9
Do you think that there is a difference between taking the supplements with or without by medical consult? (n=245)	Yes	176	71.8
	No	24	9.7
	I don't know.	45	18.3
Do you read the attached instructions with the supplements? (n=245)	Yes	108	44.1
	No	42	17.1
	Some time	95	38.8
Do You Think that dietary supplements have any negative side effects? (n=245)	Yes	160	65.3
	No	45	18.3
	I don't know.	40	16.3
Do you know that you must do lab tests to check the level of vitamins and minerals? (n=245)	Yes	203	82.8
	No	8	3.2
	I don't know.	34	13.8

Table (4) which shows knowledge and attitude about dietary supplement use score results, allows us to assess the distribution of the respondents across the different levels of knowledge and awareness of dietary supplement usage. It indicates the total of 371 respondents and out of those 371; 166 respondents exhibited high level of knowledge which comes to 44.7 percent of the number of respondents. An

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additional 19.1 percent of respondents had a moderate level of knowledge and totaled 71 people. Additionally, 36.1% of 134 respondents had very low knowledge level of hematological examination.

Table (4): Shows knowledge and attitude about dietary supplement use score results.

	Frequency	**Percent**
High level	166	44.7
Moderate level	71	19.1
Low level	134	36.1
Total	371	100.0

Table (5) shows that knowledge level of dietary supplements has statistically significant relation to gender (p value=0.0001), marital status (p value=0.009), state of having chronic diseases (p value=0.001), and region of residence (p value=0.005). It also shows statistically insignificant relation to age and household monthly income.

Table (5): Relation between knowledge and attitude level of dietary supplements among participants and sociodemographic characteristics.

Parameters		***Knowledge and attitude level of dietary supplements***		***Total (N=371)***	***P value****
		High level	**Moderate or low**		
Gender	Female	134	117	251	0.0001
		80.7%	57.1%	67.7%	
	Male	32	88	120	
		19.3%	42.9%	32.3%	
Age	less than 23	49	63	112	0.967
		29.5%	30.7%	30.2%	
	23 to 26	63	77	140	
		38.0%	37.6%	37.7%	
	more than 26	54	65	119	
		32.5%	31.7%	32.1%	
Marital status	Single	97	152	249	0.009
		58.4%	74.1%	67.1%	
	Married	65	50	115	
		39.2%	24.4%	31.0%	
	Divorced	1	2	3	
		0.6%	1.0%	0.8%	
	Widowed	3	1	4	
		1.8%	0.5%	1.1%	
Chronic disease	**No**	147	199	346	0.001
		88.6%	97.1%	93.3%	
	Yes	19	6	25	
		11.4%	2.9%	6.7%	

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Education level	Elementary school	0	2	2	N/A
		0.0%	1.0%	0.5%	
	Middle school	0	2	2	
		0.0%	1.0%	0.5%	
	High school	21	44	65	
		12.7%	21.5%	17.5%	
	Diploma	6	3	9	
		3.6%	1.5%	2.4%	
	Bachelor	126	141	267	
		75.9%	68.8%	72.0%	
	Graduate Studies	13	13	26	
		7.8%	6.3%	7.0%	
Household monthly income	Less than 5000	24	33	57	0.807
		14.5%	16.1%	15.4%	
	5000 to 10000	34	48	82	
		20.5%	23.4%	22.1%	
	11000 to 16000	34	42	76	
		20.5%	20.5%	20.5%	
	More than 16000	74	82	156	
		44.6%	40.0%	42.0%	
Region of residence	Northern region	7	6	13	0.005
		4.2%	2.9%	3.5%	
	Southern region	5	24	29	
		3.0%	11.7%	7.8%	
	Central region	69	58	127	
		41.6%	28.3%	34.2%	
	Eastern region	16	26	42	
		9.6%	12.7%	11.3%	
	Western region	69	91	160	
		41.6%	44.4%	43.1%	

P value was considered significant if ≤ 0.05.

Discussion:

This study explored the knowledge, perception and practices concerning dietary supplement use among young adults in Saudi Arabia. We found that dietary supplement use was highly prevalent (66.0% of participants reported current or past use). It fits in with previous research showing an increase in dietary supplement use among young adults worldwide, notably in the Middle East. For example, a similar result was found among medical students in Saudi Arabia who reported supplement use of 51% with multivitamins, 41.1% of which specifically used vitamin D supplements [14]. Results from this study highlight the urgent need for targeted educational interventions to promote understanding of dietary supplements and associated risk.

The knowledge levels of participants in this study varied comparatively, 44.7% had a high level of knowledge. Similar to what other studies in other parts of the world, such as the UAE, found that students lacked proper knowledge about dietary supplements with only 15% of the student population having a good knowledge about dietary supplements [15]. Variation in educational background; access

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to information; and differences in cultural perceptions involving dietary supplements may explain differences in knowledge levels across different studies. Furthermore, the present study demonstrated that gender, marital status, and chronic diseases, markedly influenced knowledge levels of dietary supplement, which showed that demographic variables do impact on how individual knew dietary supplements [16].

More than half (49.7%) of respondents cited health benefits as the most important motivation for consuming a dietary supplement and health was the most important motivation for use of other nutritional or health supplements used. This finding is consistent with known global trends in which individuals rely on dietary supplements to gain perceived health benefits, such as disease prevention and enhanced physical performance [17]. It is, however, troubling that 17.1% of participants said they had not read the attached supplement instructions, leaving them vulnerable to misuse and potential health perils. That calls attention to a particularly important area of intervention, as educational programs aimed at improving understanding of the reasons why following usage guidelines is important in relation to dietary supplements would minimize substantially associated risks in dietary supplement use [18].

Furthermore, the study was that 71.8 percent of participants agreed that the danger of taking supplements without a medical requirement were possible. Importance of this awareness is important since previous research has demonstrated that many people underestimate the risk that accompanies dietary supplements, believing that these are inherently safe because they come from such natural sources [19]. Due to 65.3% of participants recognizing dietary supplements can have some side effects, there is a need for comprehensive education on the potential side and interactions of dietary supplements. This matches existing literature, which indicates that many are unaware potential interactions between dietary supplements and prescribed medications [20] can result in serious health complications.

As regards to study limitations, because this was a cross-sectional design, it could not determine relationships of cause and how knowledge, perception, and use of dietary supplements are related. It also relies on self-reported data and thus the bias introduced from this may be that participants overestimate their knowledge and that they may underreport their supplement use. In addition to this, the study sample was overwhelmingly female (67.7%), and so may not be representative of the entire Saudi young adult population. Future research should broaden its gender representation, and should pursue longitudinal designs to better understand the dynamics of dietary supplement use over time [21]. Social desirability bias might be another limitation insofar as the participants' responses are not necessarily the honest answer to their behaviour or belief but rather something they believe will be what people want to hear. There is a possibility that this could skew also knowledge and practices related to dietary supplements. In addition, the study did not delve into the exact types of dietary supplements young adults were taking to determine how they consumed dietary supplements as well as their preferences.

Conclusion:

Results of this study indicate that dietary supplements are widely used by young adults in Saudi Arabia, but with divergent understanding and knowledge of risks and benefits associated with the products. Given that the substantial proportion of participants acknowledge the necessity of medical advice prior to supplement use is a chance to strengthen health education programs with the intent to enhance education and safe practices. Future research should explore ways to build and examine educational interventions meant to hone young adults' knowledge and encourage the responsible use of dietary supplements. Filling identified gaps in knowledge and awareness can lead to creating a more

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knowledgeable, more aware, population that can then make better decisions about dietary supplements.

Acknowledgement:

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Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

Funding:

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Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

All data associated with this study are present in the paper.

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