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ASSESSMENT OF THE AWARENESS OF ATHLETES ABOUT DIETARY SUPPLEMENTS USAGE IN SAUDI ARABIA.

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Abstract

Background: There has been a significant surge in the use of dietary supplements in recent times. Although these supplements may be considered drugs in their physiological effects, individuals must use them under medical supervision to ensure better health outcomes and patient safety. The level of awareness among dietary supplement users plays a vital role in using these products safely and effectively. The current study focuses on examining athletes' awareness levels regarding the use of dietary supplements. **Methods:** In a cross-sectional online survey study, 598 individuals participated, providing informed consent at the beginning of the survey. The survey, hosted on Google Forms and distributed through a valid URL on the What's App application, included 18 awareness-related statements categorized into knowledge and behavioral clusters. Descriptive statistics and Persons' Chi-squared test were conducted to analyze the responses and their association with participants' characteristics. **Results:** The results revealed that women demonstrated higher awareness levels than men. A Chi-squared test indicated no connection between gender and the responses but did establish a notable correlation between educational level and the responses. Descriptive statistics indicated that awareness levels within the knowledge and behavioral clusters ranged from 35% to 65%. **Conclusion:** The study findings indicate a need to raise awareness among individuals who use dietary supplements. It is recommended that health promotion campaigns be conducted to improve health outcomes and promote the safe utilization of dietary supplements.

Keywords: Dietary supplements, Nutritional supplements, Athletes, Awareness.

This study was approved by the institutional review board, Fakeeh College for medical sciences, Saudi Arabia, under the registration number of 328/IRB/2022. The study was conducted in accordance to Helsinki declaration code

1. Introduction

U.S. and European dietary guidelines define dietary supplements (DS) as products that contain added nutrients derived from vitamins, minerals, and other substances. These substances include amino acids, herbal extracts, probiotics, essential fatty acids, and plant-based ingredients. Dietary supplements are available in various forms, such as tablets, capsules, and syrups [1].

The use of these products is becoming increasingly common, often because they share similarities with drugs and are believed to have therapeutic benefits. It is crucial to recognize that while dietary supplements can function as protective agents for health or treatments for nutrient deficiencies, they may also include prohibited or tainted substances [1]. It is crucial to remember that dietary supplements should only be used under medical supervision, providing a sense of safety and guidance. Misuse of these supplements can lead to serious health issues and even life-threatening complications. Therefore, it is essential to be aware of and understand the proper usage of these products to ensure better health outcomes [2].

Dietary supplement usage is on the rise globally. Approximately half of all adults in the United States acknowledge using dietary supplements. Similarly, over 70% of adults and adolescents in Denmark have been reported to use supplements [3]. In 2015, the United Arab Emirates (UAE) reported a supplement usage rate of 39% among Middle Eastern and Arab countries. In Saudi Arabia, the usage of at least one dietary supplement was reported at almost 47% among Saudis [3].

Prior research has examined the frequency and recognition of dietary supplement use in high school and university students [4]. In several studies, a notable proportion of Saudi dietary supplement users were found to be athletes [5, 6]. Only a small number of research studies have examined the level of awareness of dietary supplements among Saudi athletes.

This study aims to evaluate the level of awareness among athletes in Saudi Arabia regarding nutritional supplements. This includes exploring the types of supplements they consume, how they are used, the frequency and duration of usage, and their understanding of the benefits and potential side effects of dietary supplement use. Furthermore, the study aims to advocate for the responsible use of dietary supplements under medical guidance. The primary focus of the study is to examine the knowledge, attitudes, and behaviors concerning dietary supplement usage among athletes in Saudi Arabia. The target demographic for this study comprises Saudi athletes who use dietary supplements and fall within the age range of 16 to 50 years.

2. Methods

2.1 **Study design**

From February 2022 to December 2022, a cross-sectional online survey was conducted to evaluate Saudi athletes' awareness of the proper use of dietary supplements (DS) under medical supervision. Athletes were defined as individuals regularly engaging in physical skills-based exercise at least three days per week. The study was approved by the institutional review board (IRB) of Fakeeh College of Medical Science under approval number 328/IRB/2022 and adhered to the principles outlined in the Helsinki Declaration Code.

2.2 **Survey development**

Before collecting data, our survey went through a thorough validation process conducted by an expert epidemiologist to ensure the accuracy and dependability of the survey questions. The survey comprised 18 statements aimed at assessing awareness, which were divided into two clusters: knowledge and behavior. Participants were required to indicate their level of awareness regarding DS usage using a three-point Likert scale: Not aware, Neutral, and Aware. Additionally, the survey was made available in both Arabic and English and included a cover page that transparently outlined the study's purpose and objectives, along with a request for informed consent from the participants.

2.3 **Data collection**

The survey was conducted using Google Forms and distributed anonymously online. Additionally, it was shared through the What's App application to maximize participation. The survey included questions about participants' demographics (such as age, gender, education level, and employment status), as well as statements about their knowledge and behavior. Electronic informed consent was obtained from all participants at the beginning of the survey. The data collected pertained to the participants' usage of DS over the previous 12 months.

2.4 **Data analysis**

The number of participants required for this study was precisely calculated to be 500, with a confidence level of 95%. This calculation was based on a rigorous formula: N = Zα/22 p (1-p)/MOE2, where n represents the required numbers, Zα/2 represents the critical value of the normal distribution with 95% confidence level, p represents the sample proportion, and MOE represents the margin of error. Descriptive statistics for the variables were accurately represented as frequencies, percentage frequencies, and mean. Normal distribution was measured using the Shapiro-Wilk test, ensuring the precision of our analysis.

The associations between respondents' characteristics and the responses were calculated using Pearson's chi-square test of independence. In addition, a crosstabulation statistical test was performed to calculate the frequency and percentage frequency of participant's responses associated with each survey statement. The significance level was adjusted to p-values less than 0.05. The IBM SPSS statistical package (version 25.0) was used for the data analysis. The results were summarized in tables and figures.

3. Results

The study involved 598 participants. The researchers used descriptive statistics to summarize the respondents' characteristics. Descriptive statistics indicated that the individuals who primarily prioritize the awareness of using dietary supplements under medical supervision are as follows: those in the 18-24 age range, male athletes, individuals with bachelor's degrees, non-smokers, university students, people who engage in walking exercises, individuals with no notable medical conditions, and those who regularly use Vitamin B-12. All details are reported in Table I.

The awareness level per each survey item was reported as mean and percentage frequencies. The awareness levels per respondents' characteristics were reported as a percentage mean value. The overall awareness level was 50.18% for the knowledge cluster and 52% for the behavioral cluster. Most of the supplement users denoted a higher knowledge-based awareness level (59%) regarding the components of the DS products (protein, fats, essential amino acids, honey) and a higher behavior-based awareness level (57%) regarding the treatment protocol of DS products in combination with other therapeutic products. Table II reports the detailed results for the awareness level per cluster as frequencies (% frequencies).

Concerning the awareness level among athletes based on age, the most significant proportion of participants with the highest knowledge-based awareness was in the age group of 18-24 years (18.6%) and behavior-based awareness (23.4%), Figure I. In contrast, the participant group with the slightest awareness was those under 18. Most of the DS users in the 18-24 group showed a significantly higher awareness (25%) for both knowledge-based awareness regarding the components of the DS products (protein, fats, essential amino acids, honey) and higher behavior-based awareness level (30%) regarding the treatment protocol of DS products in combination with other therapeutic products

The association between gender characteristic and the awareness level among study's participants was measured using Pearson's chi-square test of independence (Table III).

Concerning the awareness level among athletes based on gender, male athletes showed higher awareness level (26) than female athletes (25). Figure II reports the detailed results of this analysis. Most of the DS product's male users denoted a significantly higher awareness (33.9%) for both knowledge-based awareness regarding the components of the DS products (protein, fats, essential amino acids, honey) and higher behavior-based awareness level (38.8%) regarding the treatment protocol of DS products in combination with other therapeutic products. Conversely, female DS users denoted 31% awareness for the same awareness clusters.

Concerning the awareness level among athletes based on education level, most participants with bachelor's degrees implied the highest knowledge-based awareness (27.8%) and behavior-based awareness (30.7%). Those users showed significant knowledge-based awareness (33%) regarding the benefits and health outcomes of using DS products for athletes, and significant behavior-based awareness (47.4%) regarding the treatment protocol of DS products in combination with other therapeutic products (Figure III, Table IV).

Conversely, the middle-level education group implied the lowest awareness level (2%) in both awareness clusters. Similarly, the high school education group showed 25.4 % in the knowledge-based awareness cluster and 17.4% in the behavior-based awareness cluster. Figure III reports the detailed results of this analysis.

Concerning the awareness level among athletes based on smoking status, the majority of non-smoker DS users showed the highest knowledge-based awareness (26.8%) and behavior-based awareness (35.7%). Those users showed significant behavior-based awareness (57%) regarding the benefits and health outcomes of using DS products for athletes (Figure IV).

The results showed that DS users with no remarkable medical conditions were used to consume the DS products for less than three months and implied a significantly higher awareness level (30%) than those with medical conditions who regularly used the DS products (more than three months). Figures IV, V, and VI report a detailed analysis of the awareness level per smoking status, medical condition status, and rate of DS usage, respectively. Our results showed that vitamin B-12 was the most DS product used among athletes (30%). Besides, GIT-based adverse events were the most experienced of DS product usage.

The descriptive statistics provided insights into the usage patterns of dietary supplement (DS) products among the study participants. The analysis, based on a sample of 598 participants, revealed the following distribution of DS product usage: Vitamin B-12: 29.9% (highest usage), Proteins: 26.4%, Vitamin C: 20.4%, Energy boosters: 14.7%, Herbal products: 8.5% (lowest usage).The results of this analysis are visually represented in Figure VII.

Regarding the types of experienced adverse reactions associated with the usage of DS products, GIT-based adverse events were the most significant adverse reactions were reported by the participants. The results of this analysis are visually represented in Figure VIII.

Regarding the source of participants' knowledge of using DS products, the analysis revealed the following distributions: family/friends/T. V./social media (81%), coachs/leaflets/magazines (13%), and physician/pharmacists/dietitians (6%). The results of this analysis are visually represented in Figure IX.

Results of Pearson's chi-square test of independence for the association between respondents' characteristics (gender, education) and the responses were reported in Tables III and IV. A Pearson's chi-square (($\chi 2$) showed that there is no association between awareness level and gender ($p = 0.153$). Conversely, Pearson's chi-square (($\chi 2$) showed that the level of education was significantly associated ($p = 0.044$) with the awareness level.

Table I Respondents' characteristics (*n*= 598).

Characteristics	**Frequencies (% frequency)**
Age (years)	
< 17 years old	20 (3.3%)
18-24 years old	222 (37.1%)
25-39 years old	193 (32.3%)
40-50 years old	163 (27.3%)
Gender	
Male	301 (50.3%)
Female	297 (49.7%)
Highest level of education	
Primary	2 (0.3%)
Middle	14 (2.3%)
High school	152 (25.4%)
Bachelor	380 (63.5%)
Master	35 (5.9%)

Ph.D.	15 (2.5%)
Smoking status	
Yes	148 (24.7%)
No	450 (75.3%)
Respondents' type	
Student	209 (34.9%)
Employed	153 (25.6%)
Unemployed	236 (39.5%)
Respondents' Exercise	
Muscle Exercise	160 (26.8%)
Ball Exercise	56 (9.4%)
Endurance Exercise	37 (6.2%)
Flexibility Exercise	50 (8.3%)
Walking	268 (44.8%)
No Exercise	27 (4.5%)
Protein/DS usage status	
Yes	269 (45%)
No	329 (55%)
Medical condition status	
Yes	131 (21.9%)
No	461 (77.1%)
Rate of DS usage	
Less three months	395 (66.1%)
Three months	32 (5.3%)
Six Months	25 (4.2%)
Nine Months	10 (1.7%)
Twelve Months	7 (1.2%)
More than one year	129 (21.5%)
Type of DS products	
Proteins	158 (26.4%)
Vitamin- C	122 (20.4%)
Vitamin- B_{12}	179 (29.9%)
Energy boosters	88 (14.7%)
Herbal products	51 (8.5%)
Type of experienced adverse events	
GIT-based adverse events	415.6(69.5%)
CNS-based adverse events	123.8(20.7%)
Physiological adverse events	58.6(9.8%)

Table II Awareness level of the respondents for each survey statements.

Statements	Awareness Level Count (%)		
	Not aware	Neutral	Aware
Cluster 1: Knowledge statements			
1. Eating more protein for energy than you need can make you put on fat.	171 (26.8%)	167 (27.9)	260 (43.5%)
2. The body needs fat to fight off sickness	243 (40.6%)	203 (33.9%)	152 (25.4%)
3. Do you think cheddar cheese is high or low in fat?	39 (6.5%)	96 (16.1%)	463(77.4%)
4. Do you think margarine is high or low in fat?	52 (8.7%)	62 (10.4%)	484 (80.9%)
5. Do you think honey is high or low in fat?	49 (8.2%)	131 (21.9%)	418 (69.9%)
6. The body has a limited ability to use protein for muscle protein synthesis.	96 (16.1%)	187 (31.2%)	315 (52.7%)
7. Eggs contain all the essential amino acids needed by the body.	67 (11.2%)	200 (33.4%)	331 (55.4%)
8. Eating more protein is the most important dietary change if you want to have more muscle.	119 (19.9%)	93 (15.6%)	386 (64.5%)
9. Did you receive information on DS usage from an authorized medical knowledge source?	484 (80.9%)	36 (6%)	78 (13%)
10. Do you have explicit information about the DS active ingredients and the associated adverse reactions of supplement usage?	396 (66.2%)	88 (14.7%)	114 (19.1%)
Cluster 2: Behavioral statements			
11. The interest in health promotion is crucial for increasing awareness.	44 (7.4%)	359 (60%)	195 (32.6%)
12. How long have you been using supplements?	427 (71.4%)	35 (5.9%)	136 (22.7%)
13. If you don't take any supplements, please choose the reason	305 (51%)	46 (7.7%)	247 (41.3%)
14. The reason for supplement intake is: (You can choose more than one option.)	410 (68.6%)	100 (16.7%)	88 (14.7%)

15. Do you take prescription medication with dietary supplements?	188 (31.4%)	0	404 (67.6%)
16. Do you take the over-the-counter medication with a dietary supplement?	175 (29.3%)	0	423 (70.7%)
17. Do you obtain any medical advice before consuming any supplements?	112 (18.7%)	0	486 (81.3%)
18. Do you continue to use supplements when you are not training?	85 (14.2%)	0	513 (85.8%)

Table III The association level between gender variable and the responses.

Awareness statements	Awareness Frequencies count (%)		χ2-value	P-value
	Male	Female		
1. Eating more protein for energy than you need can make you put on fat.	141 (23.6%)	119 (19.9%)	4.528	0.104
2. The body needs fat to fight off sickness	61 (10.2%)	91 (15.2%)	10.381	0.006
3. Do you think cheddar cheese is high or low in fat?	221 (37%)	242 (40.5%)	5.557	0.062
4. Do you think margarine is high or low in fat?	252 (42.1%)	232 (38.8%)	5.723	0.057
5. Do you think honey is high or low in fat?	212 (35.5%)	206 (34.5%)	0.148	0.928
6. The body has a limited ability to use protein for muscle protein synthesis.	172 (28.8%)	143 (23.9%)	4.855	0.088
7. Eggs contain all the essential amino acids needed by the body.	174 (29.1%)	157 (26.3%)	2.840	0.242
8. Eating more protein is the most important dietary change if you want to have more muscle.	183 (30.6%)	203 (33.9%)	12.605	0.002
9. Did you receive information on DS usage from an authorized medical knowledge source?	33 (5.5%)	45 (7.5%)	10.828	0.004
10. Do you have explicit information about the DS active ingredients and the associated adverse reactions of supplement usage?	68 (11.4%)	46 (7.7%)	5.264	0.072
11. The interest in health promotion is crucial for increasing awareness.	116 (19.4%)	79 (13.2%)	10.497	0.005

12. How long have you been using supplements?	67 (11.2%)	69 (11.5%)	3.519	0.172
13. If you don't take any supplements, please choose the reason	112 (18.7%)	135 (22.6%)	4.251	0.119
14. The reason for supplement intake is: (You can choose more than one option.)	35 (5.9%)	53 (8.9%)	9.737	0.008
15. Do you take prescription medication with dietary supplements?	197 (32.9%)	213 (35.6%)	2.725	0.099
16. Do you take the over-the-counter medication with a dietary supplement?	210 (35.1%)	213 (35.6%)	0.275	0.600
17. Do you obtain any medical advice before consuming any supplements?	257 (43%)	229 (38.3%)	6.730	0.009
18. Do you continue to use supplements when you are not training?	264 (44.1%)	249 (41.6%)	1.835	0.175
Mean values	25.8%	25.3%	5.683	0.153

Table IV The association level between the education level variable and the responses.

Awareness statements	Awareness Frequencies count (%)			χ2-value	P-value
	Middle	High school	Bachelor		
1. Eating more protein for energy than you need can make you put on fat.	8 (1.3%)	60 (10%)	168 (28.1%)	22.171	0.010
2. The body needs fat to fight off sickness	1 (0.2%)	37 (6.2%)	103 (17.2%)	13.704	0.030
3. Do you think cheddar cheese is high or low in fat?	9 (1.5%)	111 (18.6%)	298 (49.8%)	6.754	0.040
4. Do you think margarine is high or low in fat?	11 (1.8%)	130 (21.7%)	295 (49.3%)	13.648	0.000
5. Do you think honey is high or low in fat?	(1.5%)	(15.2%)	(45.5%)	21.972	0.020
6. The body has a limited ability to use protein for muscle protein synthesis.	9 (1.5%)	77 (12.9%)	207 (34.6%)	13.690	0.000
7. Eggs contain all the essential amino acids needed by the body.	6 (1%)	86 (14.4%)	204 (34.1%)	10.769	0.380
8. Eating more protein is the most important dietary change if you want to have more muscle.	9 (1.5%)	96 (16.1%)	251 (42%)	11.410	0.030

9. Did you receive information on DS usage from an authorized medical knowledge source?	3 (0.5%)	14 (2.3%)	52 (8.7%)	10.180	0.040
10. Do you have explicit information about the DS active ingredients and the associated adverse reactions of supplement usage?	0 (0%)	19 (3.2%)	78 (13.1%)	30.275	0.000
11. The interest in health promotion is crucial for increasing awareness.	5 (0.8%)	44 (7.4%)	125 (20.9%)	11.043	0.020
12. How long have you been using supplements?	2 (0.3%)	24 (4%)	93 (15.6%)	16.375	0.090
13. If you don't take any supplements, please choose the reason	3 (0.5%)	63 (10.5%)	162 (27.1%)	15.917	0.020
14. The reason for supplement intake is: (You can choose more than one option.)	2 (0.3%)	22 (3.7%)	61 (10.2%)	18.435	0.050
15. Do you take prescription medication with dietary supplements?	11 (1.8%)	120 (21.1%)	248 (41.5%)	16.017	0.000
16. Do you take the over-the-counter medication with a dietary supplement?	11 (1.8%)	114 (19.1%)	265 (44.3%)	7.958	0.000
17. Do you obtain any medical advice before consuming any supplements?	12 (2%)	129 (21.6%)	301 (50.3%)	6.843	0.030
18. Do you continue to use supplements when you are not training?	12 (2%)	137 (22.9%)	319 (53.3%)	7.185	0.040
Mean values	1.13%	21.4%	27.8%	14.130	0.044

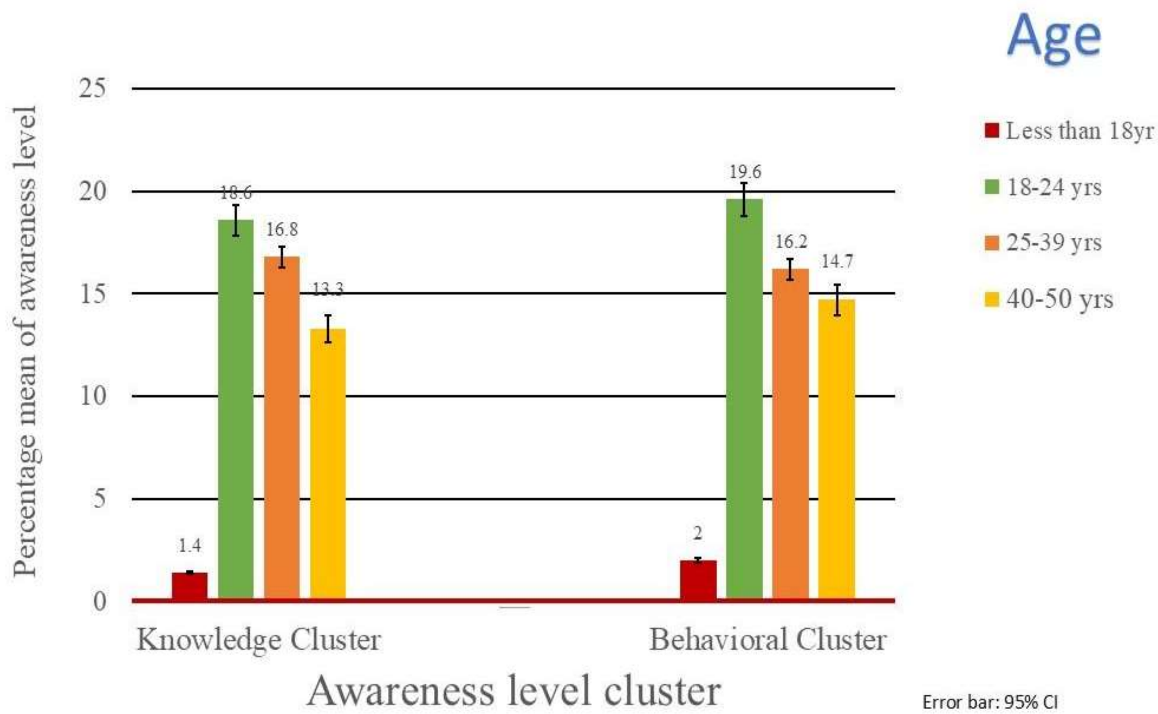

Figure I Percentage awareness level per age for all survey clusters.

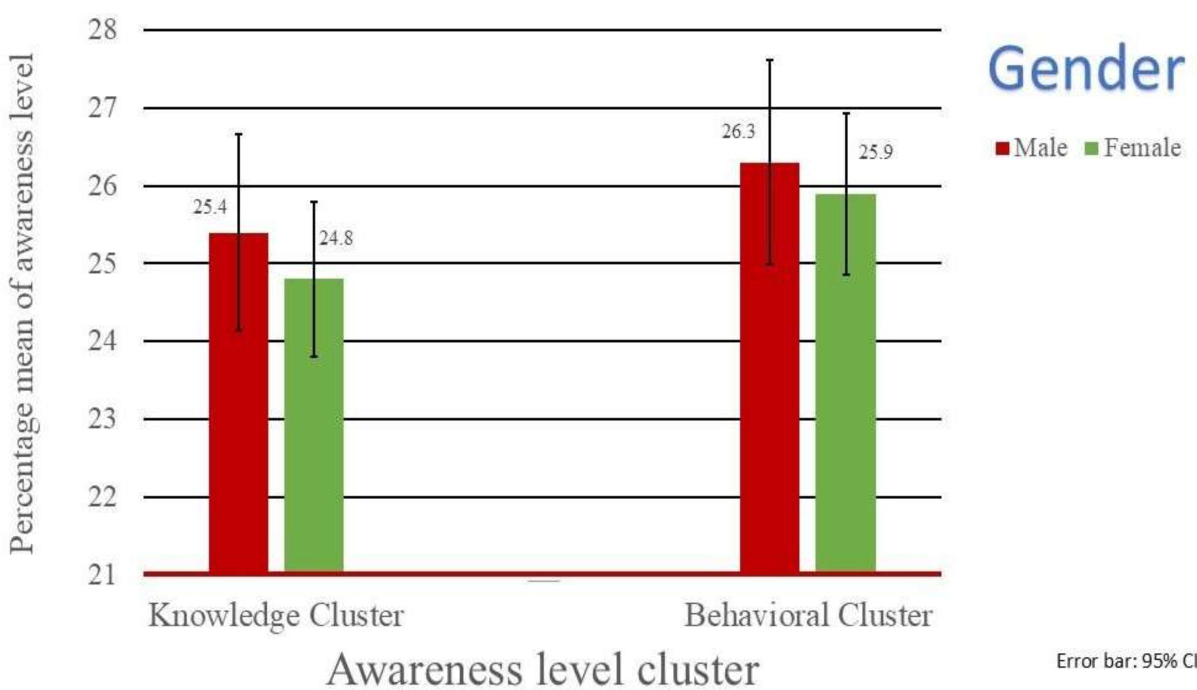

Figure II Percentage awareness level per gender for all survey clusters.

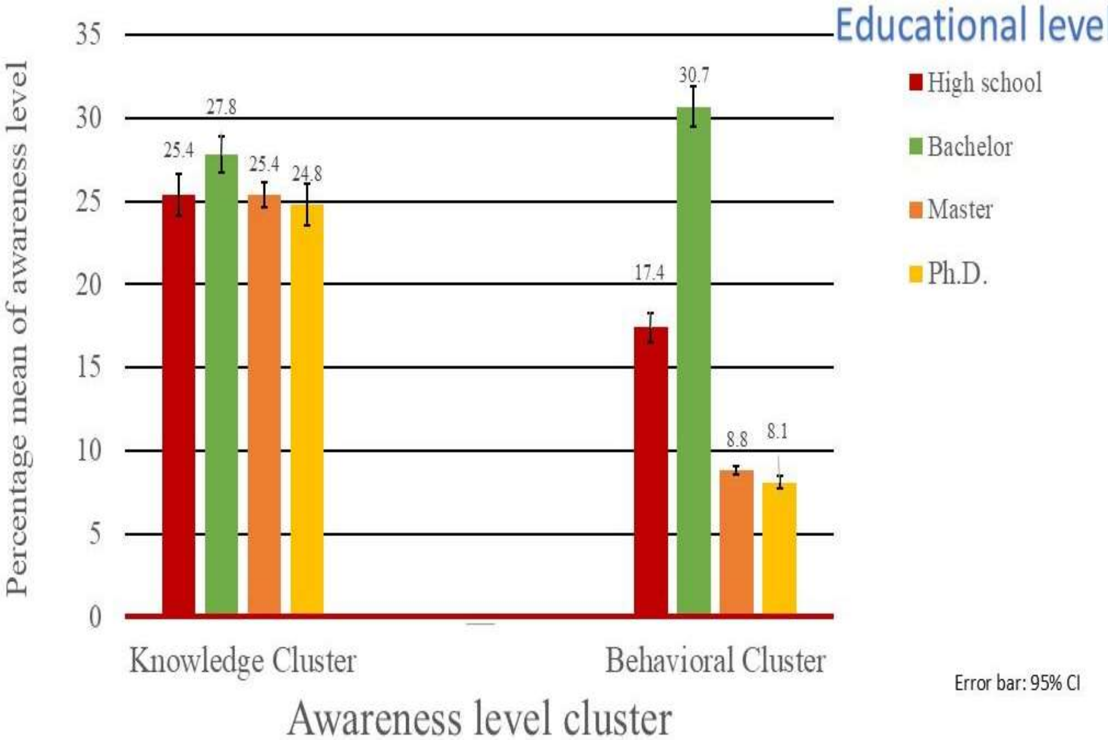

Figure III Percentage awareness level per education for all survey clusters.

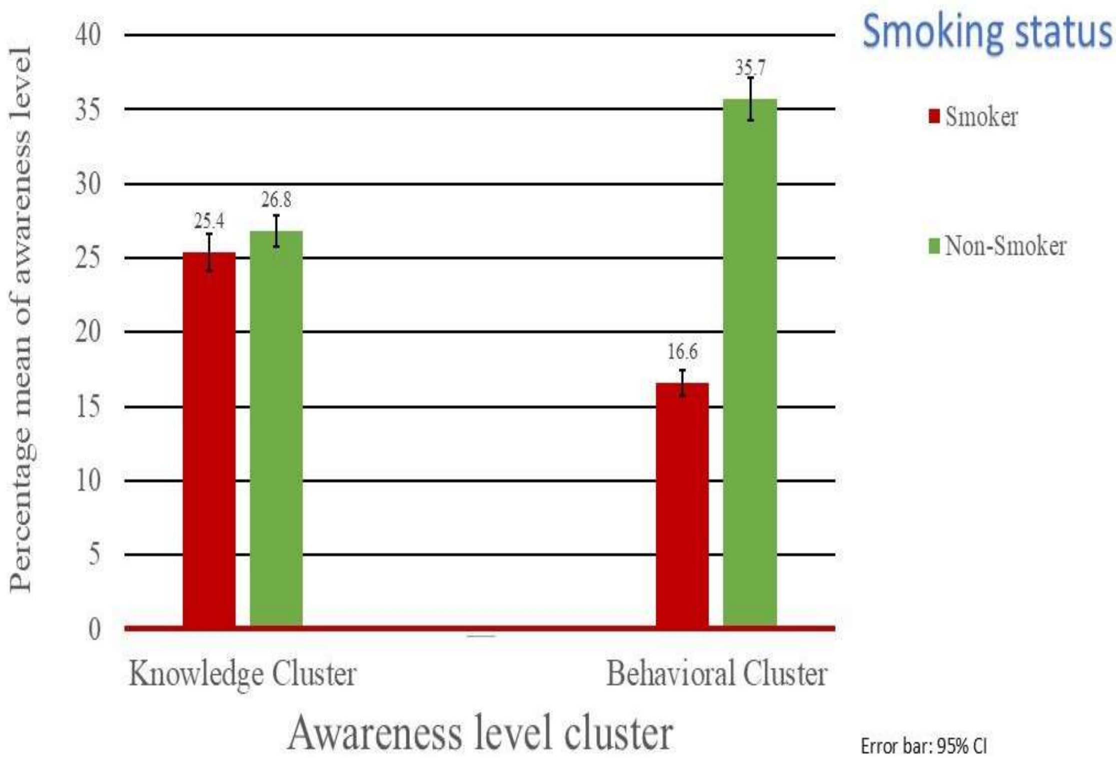

Figure IV Percentage awareness level per smoking status for all survey clusters.

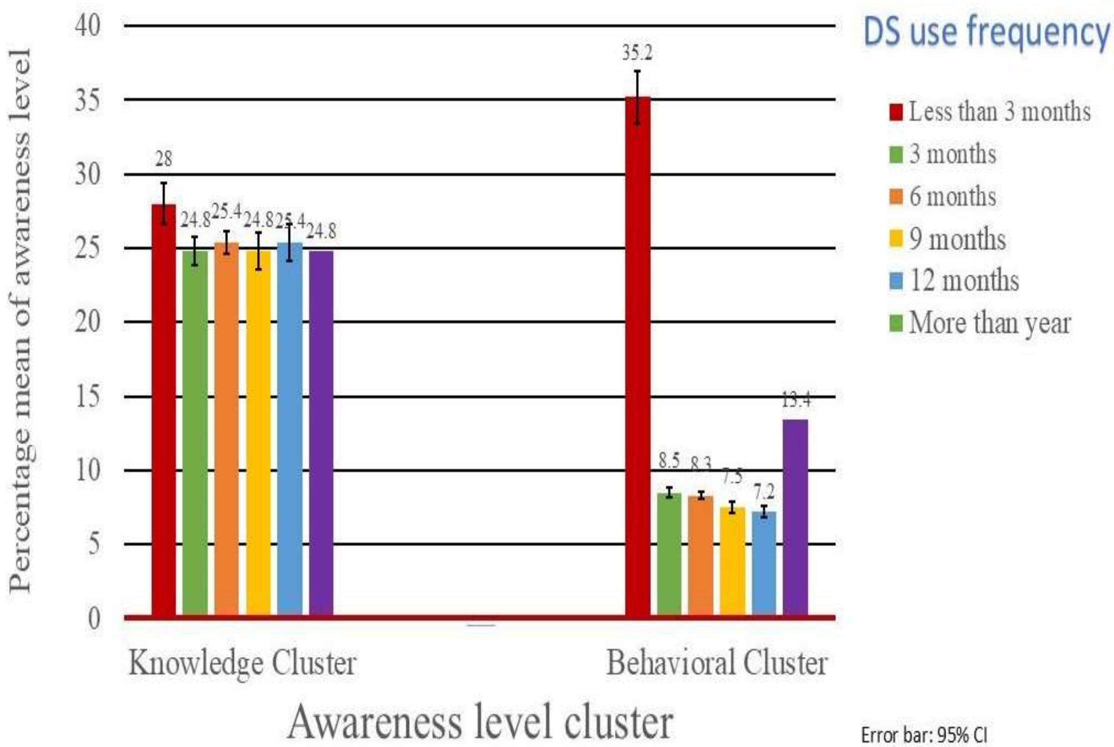

Figure V Percentage awareness level per medical condition status for all survey clusters.

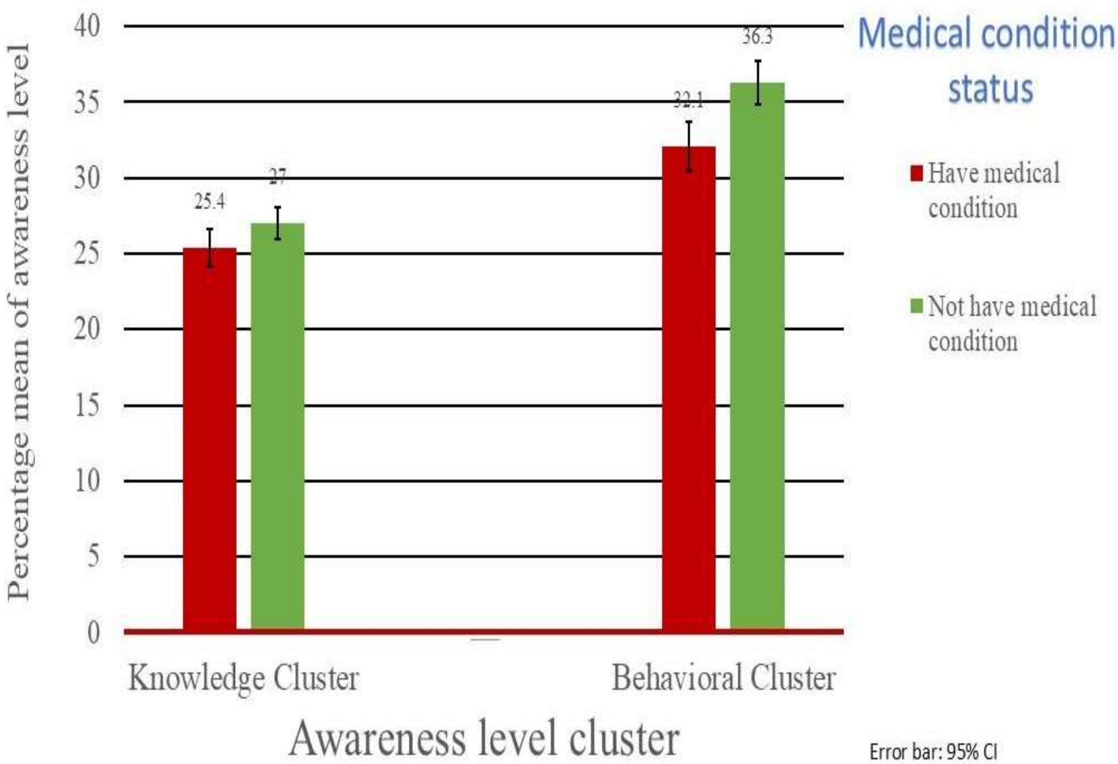

Figure VI Percentage awareness level per rate of DS usage for all survey clusters.
Abbreviation: DS, dietary supplements.

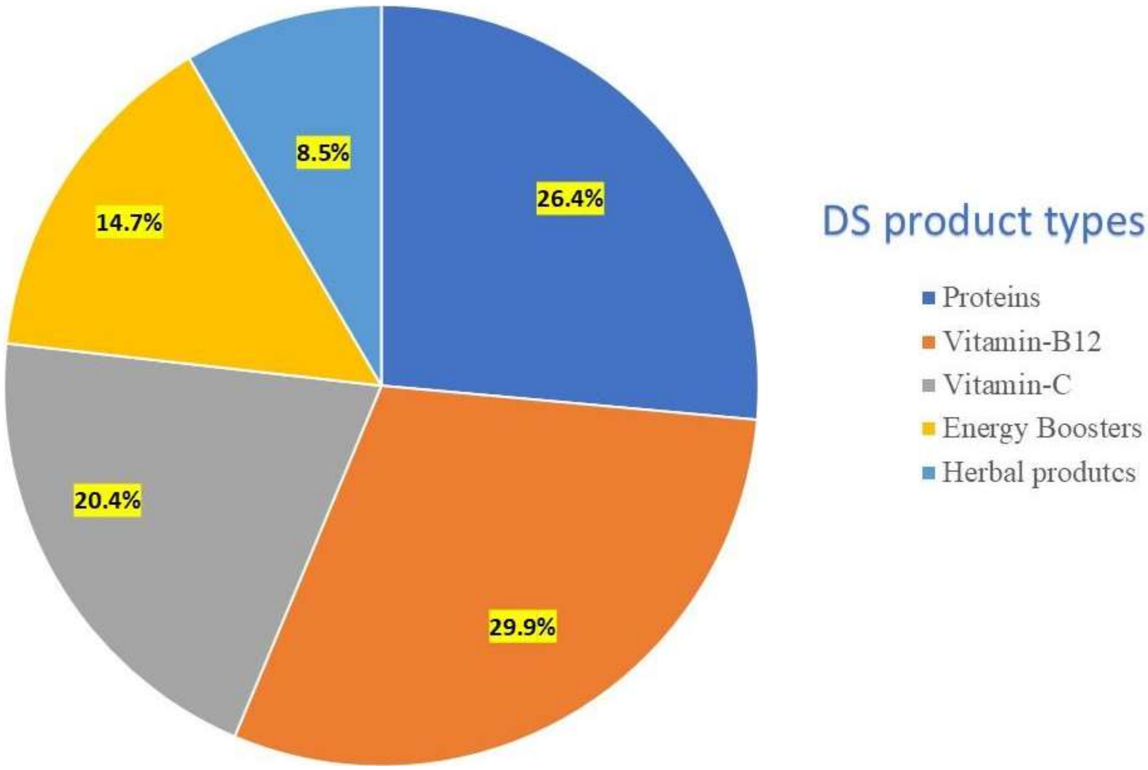

Figure VII Frequencies of DS product types were used among Saudi athletes**.** The types of DS products were 158 for proteins, 122 for Vitamin-C, 179 for Vitamin B-12, 88 for energy boosters, and 51 for herbal products.

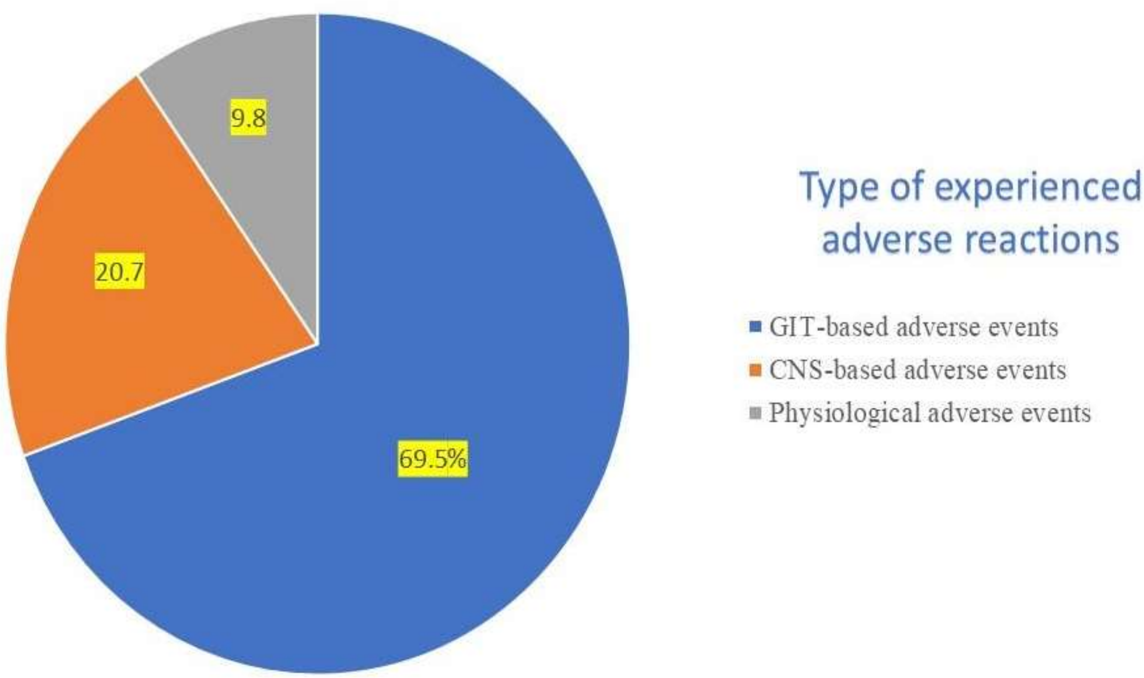

Figure VIII Percentage frequencies of experienced adverse reactions. The experienced adverse reactions were 416 for GIT-based adverse events, 124 for CNS-based adverse events, and 59 for Physiological adverse events.

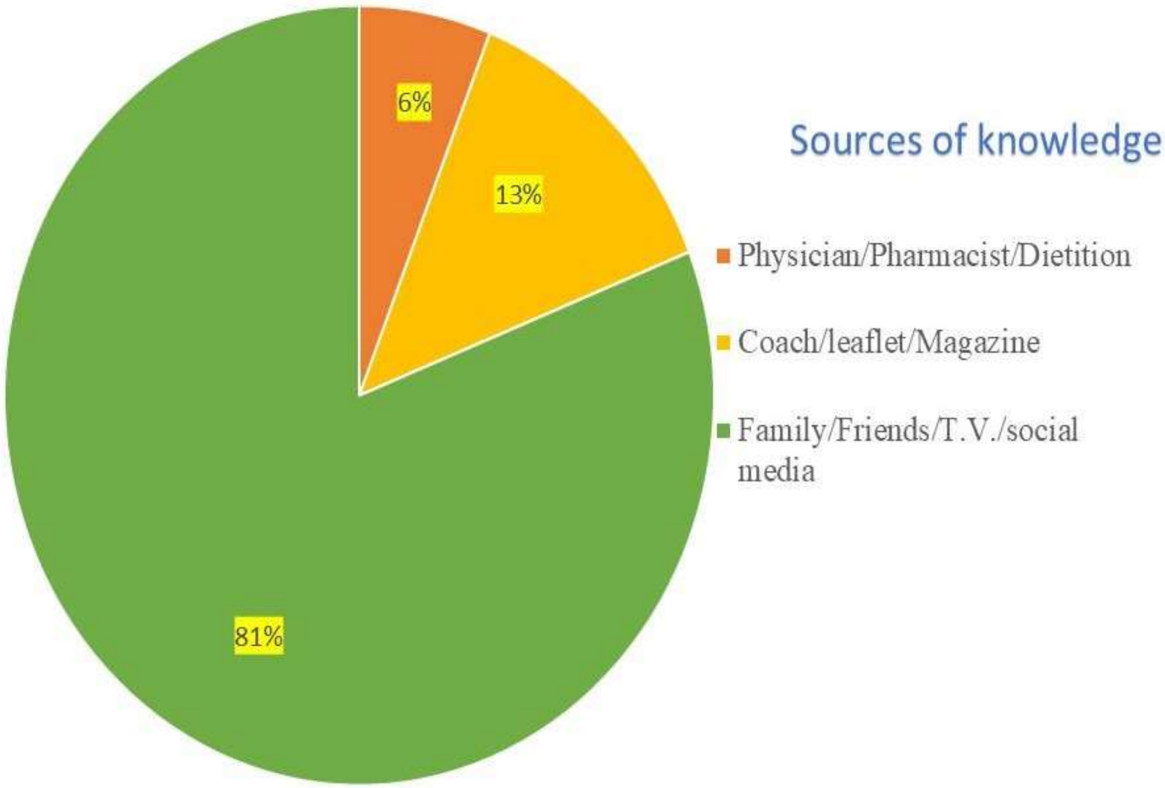

Figure IX Percentage frequencies of knowledge's source of DS products. The frequencies of knowledge's source were 484 for family/friends/T.V./social media, 78 for coach/leaflet/magazine, 36 for Physician/Pharmacist/Dietitian.

4. Discussion

Previous research studies have identified the widespread use of DS (digital signage) globally [1]. DS usage has dramatically increased recently [5]. Among all population groups, the most substantial users of DS are individuals between the ages of 40 and 50 [4]. The latest research reveals that individuals between the ages of 25 and 39 often utilize dietary supplements as part of their regular health and fitness routines to enhance their overall well-being and stay in good physical shape.

Professional knowledge of DS usage is required for better health outcomes and safe use [7]. It is essential to keep DS users informed about dietary supplements. Previous research has highlighted the regulatory difficulties in ensuring the safety and quality of dietary supplement usage [7]. According to our study, there is a low level of awareness among Saudi users regarding the adverse effects of using dietary supplements (DS), as indicated in Table II. The most commonly reported adverse reactions were related to gastrointestinal issues, illustrated in Figure 7. The primary sources of information for Saudi athletes about DS products were social media, television, and advice from friends and family, as shown in Figure 8. Furthermore, our research revealed inconclusive evidence regarding the most commonly used DS products among users. However, it was found that the most frequently used DS product was Vitamin B-12, as depicted in Figure 9.

There is inconclusive evidence on the health benefits of DS [8]. In addition, the DS intake is generally safe but not totally without risk [8]. Previous studies have reported several adverse effects of the overconsumption of vitamins and nutraceuticals, e.g., toxicity [8, 9]. Our study findings revealed a troublingly low level of awareness regarding the active ingredient in the DS products, as demonstrated in Table II. This emphasizes the urgent need for greater attention and understanding in this area.

Hudson, Lopez, et al., 2018 reported that toxic compounds were included in the DS products [10]. A medical professional should supervise the consumption of dietary supplements. The current study's results indicated a low level of awareness regarding the active ingredients in dietary supplement products (see Table II).

The significance of conducting research in dietary supplement science cannot be overstated. In recent years, the use of dietary supplements has sharply risen, raising concerns within the medical community about their widespread consumption [11, 12]. Regularly engaging in health promotion activities is crucial to ensuring the safety of dietary supplement (DS) users. Our findings indicate that awareness levels regarding health promotion related to DS usage are moderate, as shown in Table III. Hence, there is an urgent need to ramp up health promotion efforts.

Studies have indicated that individuals between the ages of 20 and 35 are the primary users of DS [13, 14]. Of those users, athletes were the most significant portion [14, 15]. Our research results showed that athletes in Saudi Arabia were the most consistent consumers of dietary supplements, as indicated in Tables II and III

Previous studies have investigated the attitudes of DS users toward DS consumption [13]. Of those users, young people have consumed supplements for more than six months [13]. Our research findings indicated that Saudi athletes consumed DS products between three to six months (Tables II and III).

Contrary to previous studies that did not investigate the association between gender, education, medical condition status, and awareness level [16-19], our findings showed that both male and female athletes showed a similar level of awareness when it came to consuming dietary supplement products, as illustrated in Table III and Figure II.

Similarly, there is inconclusive evidence on the association between education level and DS intake awareness [18-20]. However, our study's results revealed a strong link between education level and awareness of dietary supplement intake.

Existing research suggests that future studies are needed to explore the potential health benefits of dietary supplement (DS) products for various medical conditions. Furthermore, further investigations are important to understand the association between maintaining a healthy diet and the frequency of using dietary supplements.

The study revealed significant findings, but the small size of the sample constrains its validity. Future research should involve a more extensive and diverse sample from multiple cities in Saudi Arabia to obtain more robust results. Another factor to consider is that this study relies on clinical data for dietary supplement (DS) products, which may present limitations. Notably, due to regulatory restrictions on the registration of DS products in Saudi Arabia, there are few definitive clinical studies demonstrating the efficacy of such products.

Conclusion

The findings of this research study emphasize the importance of being aware of dietary supplement (DS) intake under the supervision of medical professionals for optimal outcomes and user safety. The study revealed that Saudi athletes have moderate overall awareness regarding the consumption of DS products. Interestingly, both male and female athletes exhibited similar levels of awareness concerning DS intake. Furthermore, the research highlighted that athletes with higher levels of education demonstrated greater awareness of using DS products.

The current research explores the factors influencing awareness of dietary supplement (DS) usage among Saudi athletes. The study found that several factors contribute to increased awareness of DS products, including the athletes' level of education, their medical condition, the source of information about DS products, and the duration of DS product usage. Vitamin B-12 emerged as the most commonly used DS product, with gastrointestinal adverse effects being the most frequently reported after DS product usage.

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