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Original Research Article

Trends and types of dietary supplement usage amongst people visiting fitness centers in the Northern Border Region of Saudi Arabia

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Abstract

Purpose: *To determine the trends in dietary supplement (DS) usage and its socio-demographic determinants amongst fitness centre users in Arar, Saudi Arabia.*
Methods: *This cross-sectional survey was conducted among people visiting different fitness centers in Arar, Saudi Arabia, between December 2022 and March 2023. The sample comprised 150 people (male and female) aged ≥ 18 years, who completed a self-administered questionnaire.*
Results: *More than half (63.3 %) of the gym users regularly used DS, while the rest used DS occasionally. Young age (p < 0.001), female gender (p = 0.04), higher educational level (p = 0.006), single status (p = 0.001) and schooling (p < 0.001) had significant positive correlations with regular DS use, relative to occasional use. The most important reason for using DS was recommendation by physician (30.7 %), while the most common supplements used were multivitamins (alone or in combination with other drugs; 39.3 %). The participants were well-versed in the supportive role of DS, as well as the risks and adverse effects related to DS overuse.*
Conclusion: *The prevalence of DS usage is high among Saudi fitness center attendees, and it was significantly associated with socio-demographic and lifestyle variables. Furthermore, there are high levels of awareness among participants regarding the benefits and negative effects of DS.*

Keywords: *Dietary supplements, Trends, Fitness centres, Northern Border Region*

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INTRODUCTION

Dietary supplements (DS) are manufactured products that contain one or more nutritional elements such as vitamins, minerals, herbs or botanical products, fatty acids, and proteins for complementing the diet [1]. Usually, DS contain nutrients derived from dietary or synthetic sources, and they are taken in the form of a tablet, capsule, or pill. Dietary supplements (DS), especially multivitamins, have been increasingly popular in recent decades [2]. In developed countries, vitamin supplements are used by approximately half of the adult population [3]. Despite the fact that supplements are frequently used to improve or maintain health, fewer than a quarter of all supplement products are taken on the advice of a healthcare expert [4]. The use of

DS may be encouraged in some patients, especially cancer patients, due to evidence indicating that increased intake of some dietary elements may be associated with faster recovery from the disease [5].

Nearly half of the population of cancer patients consume DS as an unapproved alternative treatment. Furthermore, health foods such as vitamins and minerals are thought to be advantageous for cancer patients who are unable to eat owing to their condition [6]. Nonetheless, observational studies have produced inconsistent results about the health advantages of individual supplements or multivitamins/multi-minerals (MVMM), and randomized controlled trials (RCTs) have frequently failed to demonstrate the associated benefits [7,8]. Furthermore, a study has shown that certain supplements may have negative effects, thereby generating skepticism about their use [8].

Economic development in the Kingdom of Saudi Arabia has had a variety of effects on the general populace, including changes in daily lifestyle patterns and nutritional intake habits. Saudi Arabia is the largest market for DS in the Middle East, accounting for 4 % of overall pharmaceutical sales, with an estimated value of USD 2 billion [9]. Despite the apparent rise in interest in DS use amongst people who exercise recreationally in other to improve health and physical well-being, there is a dearth of published information on the relationship between gym-goers and DS use. The present study was undertaken to determine the trends in DS usage and its socio-demographic determinants among people attending fitness centers in Arar in the Northern Border Region of Saudi Arabia.

METHODS

Study design and participants

This cross-sectional survey was conducted amongst people visiting three different fitness centers in Arar, Saudi Arabia, between December 2022 and March 2023. A random sampling strategy was used. Participants from each of these fitness centers were randomly selected. The included subjects comprised 150 people of various nationalities, with a 1:2 ratio of men to women. The sample size was calculated based on the total number of enrolled participants in these fitness centers at the time of the study. Based on the figures, the number of active participants was 242, which was taken as the target population. The sample size was calculated using an online calculator (Qualtrics). Considering a 5 % margin of error and a 95 % confidence level, the required sample size was 149. Therefore, 150 participants were surveyed. All of the participants were given a self-administered questionnaire prepared in English and Arabic. A verbal consent was obtained from each of the participants, and information gathered was kept confidential. The study was approved by the Local Committee of Bioethics at Northern Border University, Arar, Saudi Arabia (approval no. HAP-09-A-043), and it was conducted according to the principles in the Helsinki Declaration [10].

Study setting

Three fitness centers in the city of Arar, Northern Border Region of Saudi Arabia participated and agreed to have their clients surveyed for the study. Data collection was done between December 2022 and March 2023, using the quantitative questionnaire prepared in Arabic and English. Data collection was done in the evenings on Mondays and Thursdays from December 1, 2022 to March 30, 2023. The questionnaire was handed over to the participants by the researchers, and they were informed orally about the goal of the study. Moreover, the participants were assured that the information provided would be used without disclosing their personal data. All subjects were notified that participation was voluntary and that filling out the anonymous questionnaire was considered informed consent to participate in the survey. All questionnaires were filled out anonymously.

Inclusion and exclusion criteria

The participants in this study were those aged > 18 years (male and female), available at the centers during the data collection period, willing to participate in the study, and taking DS regularly. The excluded individuals were those who were less than 18 years of age, and those who were unwilling to participate in the study.

Study instrument

A pre-structured questionnaire was used for data collection. The researchers created the questionnaire after a thorough examination of the literature, in addition to expert consultation. There were 31 questions in the survey. The survey was divided into four sections.

Socio-demographic information

The first section contained 7 questions on socio-demographic information such as age,

nationality, gender, occupation, educational level, marital status, and monthly income.

Attitudes and awareness of the participants

The second part of the questionnaire had 10 questions on opinions, attitudes and awareness of the participants.

Perceptions of DS use

The third section was based on 7 questions pertaining to perceptions of DS use. A three-point Likert scale (based on agree, disagree and undecided) was used for the questions in sections 2 and 3.

Use of DS

The fourth section of the questionnaire comprised 7 questions regarding the use of DS by participants, type of supplement consumed, reasons for intake, and adverse reactions experienced. In order to help the participants, close-ended options were available for identification of the types of supplements taken (5 options), the main reasons for use of supplements (10 options), and the adverse reactions experienced (5 options). Participants were permitted choice of more than one answer, if applicable. Furthermore, in all 3 topics, an additional open-ended question was included to allow answers other than those provided in the given list.

Statistical analysis

Data entry and analysis were performed using Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics was performed using frequencies and percentages for categorical variables. Chi-square test was used to assess the relationship between the frequency of DS intake and categorical variables. The level of statistical significance was fixed at $p < 0.05$.

RESULTS

The socio-demographic/lifestyle characteristics of the participants are shown in Table 1. Females outnumbered males by a ratio of 2:1. Majority of participants (61.3 %) were Saudis. Respondents aged between 18 and 22 years comprised 39.3 % of the studied population, while 63.3% of the participants were single. The participants were divided into five groups, based on occupation: employed (26 %), housewife (20 %), technical (7.3 %), teacher (6.7 %), and student (40 %). More than half of the respondents had a university degree or were studying in the university (56.7 %); 20 % had completed secondary education, while 8 % could read and write. The illiterate participants accounted for 3.3 %. Half of the participants were in low-monthly income (< 2000 SAR) category.

Table 1: Socio-demographic/lifestyle characteristics of participants

Demographic	n (%)
Age (years)	
18-22	59 (39.3)
23-27	41 (27.3)
28-32	22 (14.7)
33-37	16 (10.7)
>37	12 (8.0)
Nationality	
Non-Saudi	58 (38.7)
Saudi	92 (61.3)
Gender	
Male	52 (34.7)
Female	98 (65.3)
Occupation	
Employed	39 (26)
Housewife	30 (20)
Technical	11 (7.3)
Teacher	10 (6.7)
Student	60 (40.0)
Educational level	
Illiterate	5 (3.3)
Able to read and write	12 (8.0)
Primary	0 (0)
Intermediate	18 (12)
Secondary	30 (20)
University	85 (56.7)
Marital status	
Married	55 (36.7)
Single	95 (63.3)
Monthly income (SAR)	
<2000	75 (50)
2000-7000	62 (41.3)
>7000	13 (8.7)

The attitude of participants towards the use of DS was assessed using several statements, as shown in Table 2. The majority of the respondents (87.3 %) believed that DS is good for health; (74 %) of participants were of the view that DS is important for health and general well-being, while 96 % of the respondents believed that the use of short course DS helps in improving health during illness. Almost two-thirds (64%) of the participants were also aware of the adverse effects of DS. Moreover, 92 % of the respondents believed that DS should be taken on physician's recommendation and that DS misuse may lead to harmful effects. The respondents indicated that the three most important reasons for using DS were physician's recommendation (30.7 %), general health and well-being (24.7 %), and control of hair loss and skin care (18.7 %). These results are shown in Figure 1.

Table 2: Attitude and awareness of participants regarding the use of DS (n (%))

Statement	Agree	Disagree	Undecided
Dietary supplements (DS) are good for health.	131 (87.3%)	4 (2.7%)	15 (10%)
I believe inappropriate empirical choices may lead to an overdose of DS.	131 (87.3%)	0	19 (12.7%)
Use of short course of DS is useful in improving health during illness.	144 (96%)	0	6 (4%)
If used regularly, DS prevents chronic illness.	65 (43.3%)	5 (3.3%)	80 (53.3%)
Dietary supplements (DS) are safe, with minimal risk of adverse effects.	27 (18%)	96 (64%)	27 (18%)
When I feel aches and pains, DS helps me to get better more quickly.	66 (44%)	45 (30%)	39 (26%)
I should take DS more often to prevent infection.	60 (40%)	25 (16.7%)	65 (43.3%)
It is essential for everyone to take DS, regardless of age.	57 (38%)	19 (12.7%)	74 (49.3%)
Dietary supplements (DS) are important for health and general well-being.	111 (74%)	0	39 (26%)
Dietary supplements (DS) should be used only as per physician's recommendation, and DS are harmful if not used properly.	138 (92%)	0	12 (8%)

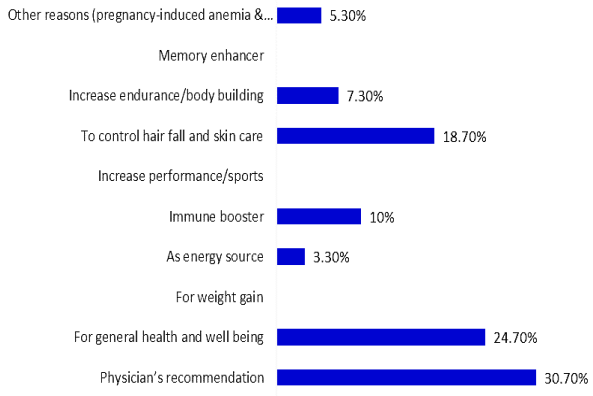

Figure 1: Reasons for the use of dietary supplements

Regarding the perception of participants towards DS usage (Table 3), most of them (80 %) believed that DS misuse is an important and serious public health issue worldwide, while 92.7 % were also of the view that DS misuse may lead to additional medical cost burdens. Moreover, 82.7 % of the participants believed that indiscriminate and injudicious use of DS may lead to more harm than good, while 85.3 % of the studied population were of the view that indiscriminate and injudicious use of DS may contribute to intoxication.

Table 4 displays the pattern of DS usage by participants. When asked how frequently DS was used, 63.3 % of the respondents said that they used DS regularly, while the other participants said they used DS occasionally. Majority of respondents spent 1000 SAR every month on DS. Moreover, 39.3 % of participants used multivitamin supplements alone or in combination with others; 27.3 % used calcium supplements, while 25.3 % used omega-3 fatty acid supplements. Half of the participants were aware of the negative effects of DS use, and 43.3 % of the study population had experienced some form of unpleasant reaction after using DS. The most common adverse effect reported by 60 % of the population were nausea, vomiting, and diarrhea, followed by rapid weight gain (21.5 %) and hair loss (18.5 %).

Table 3: Perception of participants regarding DS usage (n (%))

Statement	Agree	Disagree	Undecided
I believe widespread use of DS helps prevent illnesses, e.g., COVID-19 infection.	63 (42%)	8 (5.3%)	79 (52.7%)
Dietary supplements (DS) prevent illnesses from becoming worse.	56 (37.3%)	0	94 (62.7%)
I believe that indiscriminate and injudicious use of DS may lead to more harm than good.	124 (82.7%)	0	26 (17.3%)
I believe that illnesses and sickness are due to DS deficiency.	110 (73.3%)	0	40 (26.6%)
I believe that inappropriate duration or course of DS may be a contributing factor to DS intoxication.	128 (85.3%)	0	22 (14.7%)
I believe that DS misuse is an important and serious public health issue worldwide.	120 (80%)	8 (5.3%)	22 (14.7%)
I believe that indiscriminate and injudicious use of DS may lead to additional medical cost burdens.	139 (92.7%)	0	11 (7.3%)

Table 4: Practices related to the use of DS (n (%))

Statement	Response
How often do you take DS?	
Regularly	95 (63.3%)
Occasionally	55 (36.7%)
How much money (SAR) do you spend on DS every month?	
< 1000	122 (81.3%)
> 1000 - <5000	28 (18.7%)
> 5000	0
Do you know about adverse reactions associated with DS?	
Yes	79 (52.7%)
No	71 (47.3%)
Have you experienced any adverse reactions after taking DS?	
Yes	65 (43.3%)
No	85 (56.7%)
Types of DS used	
Multivitamins alone or in combination with others	59 (39.3%)
Ginseng and Gingko biloba	0
Omega-3 fatty acid	38 (25.3%)
Whey protein	0
Calcium	41 (27.3%)
Other supplements (prescription and natural products)	12 (8%)
What adverse reactions did you experience after taking DS?	
Nausea, vomiting & diarrhea	39 (60%)
Confusion, headaches	0
Hair loss	12 (18.5%)
Rapid weight gain	14 (21.5%)
Rapid weight loss	0
Others	0

Table 5: Association between the frequency of use of DS and various sociodemographic determinants (age, gender, marital status, education level and occupation); (n (%))

Socio-demographic determinant	Frequency of DS use		*P*-value
	Regularly	Occasionally	
Age (years)			<0.001
18-22	49 (83.1%)	10 (16.95%)	
23-27	22 (53.7%)	19 (46.3%)	
28-32	13 (59.1%)	9 (40.9%)	
33-37	8 (50%)	8 (50%)	
>37	3 (25%)	9 (75%)	
Gender			0.04
Male	20 (38.5%)	32 (61.5%)	
Female	55 (56.1%)	43 (43.9.2%)	
Marital status			0.001
Married	25 (45.5%)	30 (54.5%)	
Single	70 (73.7%)	25 (26.3%)	
Educational level			0.006
Illiterate	1 (20%)	4 (80%)	
Able to read and write	8 (66.7%)	4 (33.3%)	
Primary school	0	0	
Intermediate school	7 (38.9%)	11 (61.1%)	
Secondary school	16 (53.3%)	14 (46.7%)	
University	63 (74.1%)	22 (25.9%)	
Occupation			<0.001
Employed	27 (69.2%)	12 (30.8%)	
Housewife	7 (23.3%)	23 (76.7%)	
Professional	0	0	
Technical	6 (54.5%)	5 (45.5)	
Teacher	5 (50%)	5 (50%)	
Student	50 (83.3%)	10 (16.7%)	

$P < 0.05$ was considered statistically significant

The association between the frequency of DS use and various socio-demographic determinants is presented in Table 5. Younger age ($p < 0.001$), higher level of education ($p = 0.006$), female

gender (p = 0.04), unmarried status (p = 0.001) and schooling (p < 0.001) were significantly associated with the regular use of DS, rather than occasional use of DS.

DISCUSSION

The high demand for DS and multivitamins has led to the frequent purchase of these products over-the-counter without dietary guidance or prescription from a doctor. Despite the apparent rise in interest in DS use among people who exercise recreationally to improve their physique and health status, not much is known about the relationship between gym-goers and DS use. The purpose of this study was to learn more about the types and prevalence of supplements consumed by people who use fitness centers in the northern border region of Saudi Arabia.

Users of DS often take them every day, and many continue to use them for years. Thus, supplement use does not appear to be a transitory fad, but rather a well-planned approach that is frequently maintained over time. In the current study, it was found that 63.3 % of gym users regularly consumed DS. The noteworthy discovery is that younger people took DS more than the elderly ones, which may indicate concern about their own health or actual requirement for additional help. In terms of demographics, the majority of the DS consumers were females, which is consistent with findings in numerous other studies where women comprised the major consumers of DS [11,12]. Dietary and health surveys indicate that women may be more health-conscious than men. However, the higher rates of supplement use among women may also be partly explained by the rising popularity of supplemental calcium and vitamin D among women to preserve bone health throughout life and prevent the onset of osteoporosis during aging [13].

Several researchers have reported a link between DS use and various demographic factors [14-16]. Consistent with these findings, the present study demonstrated that DS use was significantly associated with gender, younger age, educational level, occupation and marital status. Respondents with university degrees and those studying for university degrees made up the largest group of supplement users (56.7 %). Studies have repeatedly shown that supplement use is higher in people with higher educational levels than in those with lower educational levels, perhaps as a result of a better understanding of nutritional needs [11]. A study has revealed that 84.5 % of dietary supplement users in Saudi Arabia were college graduates, and over 60 % of the participants were under the age of 25 [11]. A similar research found that approximately 74 % of DS consumers were under the age of 33, and more than 74.4 % of them had a bachelor's degree or higher education [17].

The participants in the present study were well-versed in the supportive role of DS, as well as the risks and adverse effects related to DS overuse. The majority of the participants agreed that DS is beneficial to health and overall well-being and that a brief course on DS is helpful in disease situations. Participants also agreed that DS should be used only on the advice of a doctor and that DS misuse may result in negative consequences. They stated that indiscriminate and injudicious use of DS may cause more harm than good, due to the likelihood of DS intoxication. This high level of awareness among participants may be attributed to their educational level, as most of the DS users were those who had either completed their university education or were university undergraduates. These findings are consistent with results from other studies that have reported high levels of awareness and knowledge regarding the use of DS [18-20].

Many of the DS users took more than one product, but those who took only one product were in the majority. The supplements used most frequently by participants in this study were multivitamins (alone or in combination with other drugs), followed by calcium and omega-3 fatty acids. The most frequently reported disadvantages linked to DS were nausea, vomiting and diarrhea. The most popular reason for taking supplements was doctor's advice, followed by general health and well-being, management of hair loss, and skin care. The findings in this study are in line with those of Alfawaz *et al* [21] who reported that more than half of the participants on DS took supplements on the advice of a doctor. A systematic evaluation of 76 studies has indicated that guidance from a healthcare expert was the most important factor driving people to use DS [22]. Most users desired advice from healthcare specialists on the intake of nutraceuticals [23-25].

Limitations of the study

Before extrapolating the findings in the current study to the general public, it is important to take into account the associated limitations. Due to the limited sample size which is not representative of the fitness center users as a whole in Saudi Arabia, the current findings cannot be generalized. The reported associations, particularly with regard to socio-demographic/lifestyle characteristics, may not

demonstrate causation due to the cross-sectional methodology of this study. Additionally, self-reported use of DS may not reflect the actual intake of DS.

CONCLUSION

The current study has added to the understanding of the high incidence of DS usage among fitness center users in Saudi Arabia. The study reveals a significant positive association between DS use and young age, female gender, higher degree of education, single status, and occupation (students). Majority of DS consumers understand the beneficial role of supplements and are aware of the associated risks and negative effects. Supplement use is more common among younger people, which could be an indication of anxiety about personal health or a genuine need for more support. Since the majority of participants were knowledgeable about the benefits and side effects of multivitamins and DS, their main recommendation was to use supplement products on doctor's advice because they may be helpful in treating certain conditions. This demonstrates the need for greater involvement of educational institutes, as well as primary care and family physicians in the health and awareness of communities.

DECLARATIONS

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Ethical approval

None provided.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

We declare that this work was done by the author(s) named in this article, and all liabilities pertaining to claims relating to the contents of this article will be borne by the authors. Each author contributed to the work as follows: Nida Suhail: conceptualization and study design, writing of the original draft of the manuscript, project administration, and supervision; Anshoo Agarwal: methodology, resources, data collection, writing, review and editing of the manuscript; Baraah Tomah Abu Alsel: data curation, formal analysis, writing, review and editing of manuscript; Tehreem Aftab: data entry into SPSS, data analysis and interpretation, writing, and review and editing of manuscript. All authors read and approved the final manuscript for publication.

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