

Use of dietary supplements among 2nd professional year medical students during COVID-19 pandemic at a tertiary care teaching hospital

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Abstract

Introduction: COVID-19 pandemic as well as modern lifestyle have substantially increased dietary supplements (DS) use especially in college students, despite lack of proven efficacy and safety.

Aim: To evaluate knowledge, attitude and use of dietary supplements among 2nd professional year medical students at tertiary care teaching hospital.

Materials and methods: A cross-sectional, questionnaire-based study was conducted among 2nd professional year undergraduate medical students at a tertiary care teaching hospital in Gujarat, India. A questionnaire was constructed using google form containing 3 sections. Total number of questions were 6 including 6a to 6h. Data were analyzed using descriptive statistics, Likert scale and unpaired t test.

Results: A total of 209 out of 270 students (77.4% response rate) completed study. Majority of students (61.1%) were aware of meaning of DS. 36.84%

respondents have used DS. 52% respondents reported once daily use of DS. Most frequent reasons for consuming DS were to improve general health (77.90%) and to strengthen immunity/prophylaxis to prevent COVID-19 infection (55.80%). Most common types of DS used were multivitamins (62.34%) and individual minerals (54.55%). Single DS use was reported by 7 respondents whereas 70 participants were using multiple DS. Vitamin C (72.72%), zinc (59.74%) and Vitamin D (40.25%) were most specific DS used by respondents. Chyavanprash(19.48%) and Ashwagandha(18.18%) were commonly used herbal supplements by medical students. 58.4% students strongly agreed to report adverse reactions related to DS. 3.90% respondents reported mild adverse reactions.

Conclusion: The use of DS was high among medical students mainly to improve general health and to prevent COVID-19 infection. However, their overall attitude towards efficacy and safety of DS indicates the need for

further education among 2nd professional year medical students.

Keywords: Dietary supplements, herbal supplements, medical students, pharmacological education, vitamins.

Introduction

Modern lifestyles built around automation, reduced physical activity and other socio-economic factors have contributed to the rising trend in non-communicable diseases (NCDs). Consumers now recognize the need to improve their diets with additional nutrition and healthy options. In addition to fortified foods, alternative options of non-prescribed vitamin and mineral as well as herbal and various other supplements augments nutrient intakes.

The 1994 Dietary Supplement Health and Education Act (DSHEA) [1], approved by the USA Food and Drug Administration (FDA), defined Dietary supplements (DS) as a specific category of food intended to supplement the diet, but not intended to treat diseases or disorders of the human body. As a result of DSHEA, DS are not subjected to the same rigorous regulations and testing as products classified as prescription drugs. In India, the legal framework for health supplements provided in the Food Safety and Standards Act [2] is based on these pre-existing Acts and regulations. Once a supplement has been marketed, the FDA must show that the supplement is unsafe prior to taking action to restrict its sale or to remove the product from the market. [3,4] In other words, as stated by the American Cancer Society's webpage on dietary supplements, "drugs are viewed as unsafe until proven safe" whereas "dietary supplements are viewed as safe until proven unsafe."

Health supplements with combinations of vitamins and/or minerals are a major segment by demand globally. The World Health Organization (WHO)

estimates that worldwide, 'more than 2 billion people experience deficiencies in essential vitamins and mineral intakes. [5] Changes in the regulatory status of DS have reduced or eliminated regulatory requirements that existed before DSHEA. [6] Today, DS are readily available and can easily be obtained via the internet. [7] Based on recent data, the Indian market of DS has already reached to \$4 billion in the year 2018. Further, it is also likely to show the significant growth of 40% in India by 2025 & expected value of sales would be \$20-25 billion. [8]

Although dietary supplements are not regulated as strictly as other products, consumers from various demographics believe that the products they take are safe and/or effective for helping them to meet their health goals. [9-12] More than 70% of Indian population still use these non-allopathic systems of medicine. Currently, there is no separate category of herbal drugs or dietary supplements, as per the Indian Drugs Act. [13]

A desire to experiment may increase the desire to try new things, including alternative forms of medicine and health promoting activities. Additionally, college students may be concerned with body image. [14,15] This could lead young adults to use DS in an effort to increase physical appearance. Irregular and inappropriate nutrition, insufficient physical activity, the pace of lifestyle and stress are considered some of the causes of increased use of DS in order to achieve and maintain good health.

DS are often taken without consultation with healthcare professionals, as they can be purchased without prescriptions at low cost. Customers may not have enough knowledge about the possible harmful effects that the DS might have. Consequently, identifying the cause of specific symptoms or of their worsening is

often difficult. It is recognized that even vitamins and minerals can cause adverse reactions. [16] There is evidence that certain DS may cause adverse reactions such as liver and kidney damage, heart attack or death. [17-19] People with low immunity are more prone for this world pandemic named as Novel COVID-19. To help or boost the immunity, the plant-based foods play vital role along with various vitamins like vitamin C, D3, and E and minerals like zinc, calcium. Various herbal & non-herbal supplements like arsenicum album, samshamni vati, etc. also plays important role to prevent and fight against cytokine storm in the disease. [20] This has also increased usage of DS.

There is limited information regarding the usage of DS among medical students in India. The present study aims to evaluate demographic characteristics, knowledge, attitude and use of dietary supplements among 2nd Professional year medical students at tertiary care teaching hospital.

Materials and Methods

The observational, prospective, single centre Study was carried out in May 2021 at Department of Pharmacology, B.J. medical college, Ahmedabad over 15 days. The data were collected by a cross-sectional study, using a pre-validated questionnaire. The questionnaire and study protocol were approved by Institutional Ethics Committee of B.J. medical college, Ahmedabad.

Participants

All 2nd year MBBS students (n=271) from B.J. Medical College, Ahmedabad, who were willing to participate were included in this study.

Questionnaire

A questionnaire was prepared by the Investigator which was then validated by 5 faculties. Changes suggested by

faculty members were done in the questionnaire. Final validated questionnaire was constructed through google form and circulated among 2nd year MBBS students through WhatsApp message. WhatsApp numbers of the students were obtained from the official records. The google form was containing 6 questions (including 6.a to 6.h) divided into 3 sections. Section 1 included information regarding personal data, contact details, other behavioural & lifestyle details e.g., exercise, health status, tobacco use and consent to participate in the study. Only after completion of Section 1, the students were allowed to proceed to Section 2. Section 2 included questions regarding knowledge and attitude towards DS among 2nd Professional year medical students. Those who have taken DS previously or currently using it were allowed to proceed to section 3. Section 3 included questions related to source of information, type, dosage from, frequency, duration since individual was taking DS, reason for use and adverse reaction if any relate to DS.

Questionnaire was sent through email and Whatsapp message simultaneously to all the participants. 3 days were provided to send their responses. Two reminders (one at the end of 5th day and the next one at the end of 7th day) were also sent to those participants who had not submitted their responses. Thereafter, all the responses obtained were analysed.

Statistical analysis

The data analysis was conducted using Microsoft excel 2019. Descriptive statistics (mean, standard deviation, median and ratio) were used to describe continuous variables. Frequency statistics (number and percentage) were used to describe categorical variables. Likert scale and unpaired t test were used to analyse attitude of

students towards DS. P-value of <0.05 was considered statistically significant.

Results

This is an observational, cross-sectional, questionnaire-based study carried out over 15 days. All 2nd professional year medical students from B.J. Medical College, Ahmedabad, who are willing to participate included in the study. A questionnaire has been sent to 270 students. Initially 135 students responded; after sending one reminder, another 74 students completed the questionnaire. The response rate for sample respondents was 77.40% (209/270). The results of the study are as follows:

Demographic Details with lifestyle/ behavioral characteristics:

Demographic Details with lifestyle/ behavioral characteristics are shown in table-1.

Out of 209 students, majority of students (106,50.71%) were 19 years old, whereas 81(38.75%) students were 20 years old, 15(7.17%) students were 18 years old and 7(3.34%) students were 21 years old. The mean age of the students was found to be 19.38 years (± 0.67 SD). 71.80% were male students and 28.20% were female students. The male-to-female ratio was found to be 2.54:1. 59.30% of students were living in a hostel whereas 40.70% of students were living at home. The hostel-to-home residence ratio was found to be 1.45:1.

Table 1 : Demographic Details with lifestyle/ behavioral characteristics of 2nd professional year medical students

Variables	Respondents, n (%), (n=209)
Age (years)	
18	15(7.17%)
19	106(50.71%)
20	81(38.75%)
21	7(3.34%)

79.40% of students were vegetarian and 20.60% of students were non-vegetarian. The vegetarian-to-non vegetarian ratio was found to be 3.86:1. No students were consuming tobacco products previously as well as currently.

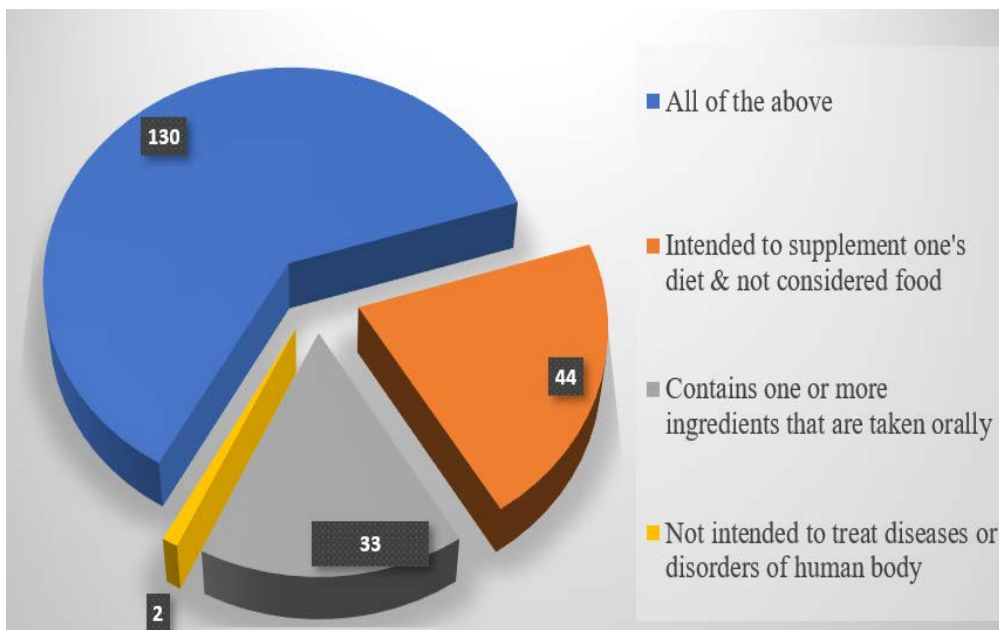
Out of 209 students, 48(23%) students were not doing exercise, 118(56.50%) students were doing exercise for <30 minutes and 43(20.60%) students were doing exercise for >30 minutes. A total of 191(91.40%) students mentioned their health status as good whereas 18(8.60%) students mentioned their health status as poor. Out of this 18 students, males were 13 and females were 5. 8/13 male students had not used dietary supplements (DS), whereas 3/5 female students had not used DS.

Questions

The study questionnaire was having 3 sections. Section 1 includes information regarding personal data, contact details, other behavioural & lifestyle details e.g., exercise, health status, tobacco use and consent to participate in the study. Section 2 was about questions (Question 2 to 5) related to knowledge and attitude towards DS. Those who had used DS previously or currently using it, had completed section 3. Questions (6.a to 6.h) in the section 3 were related to source of information, type, dosage form, frequency, duration since respondent was taking DS, reason for use and adverse reaction if any related to DS.

Gender	
Male	150(71.80%)
Female	59(28.20%)
Male-to-Female ratio	2.54
Residence	
Hostel	124(59.30%)
Home	85(40.70%)
Hostel to Home ratio	1.45
Diet	
Vegetarian	166(79.40%)
Non-vegetarian	43(20.60%)
Vegetarian to non vegetarian ratio	3.86
Tobacco use	
Yes	0
No	209(100%)
Exercise (physical activity)	
Yes	161(77%)
No	48(23%)
Exercise Duration	
<30 min	118(56.50%)
>30 min	43(20.60)
Exercise frequency	
1-3 days per week	69(33.01%)
4-7 days per week	92(44.01%)
Self-reported health	
Good	191(91.40%)
Poor	18(8.60%)

Figure 1: Evaluation of Response-rate of 2nd professional year medical students on the knowledge-based question on dietary supplements (n=209)

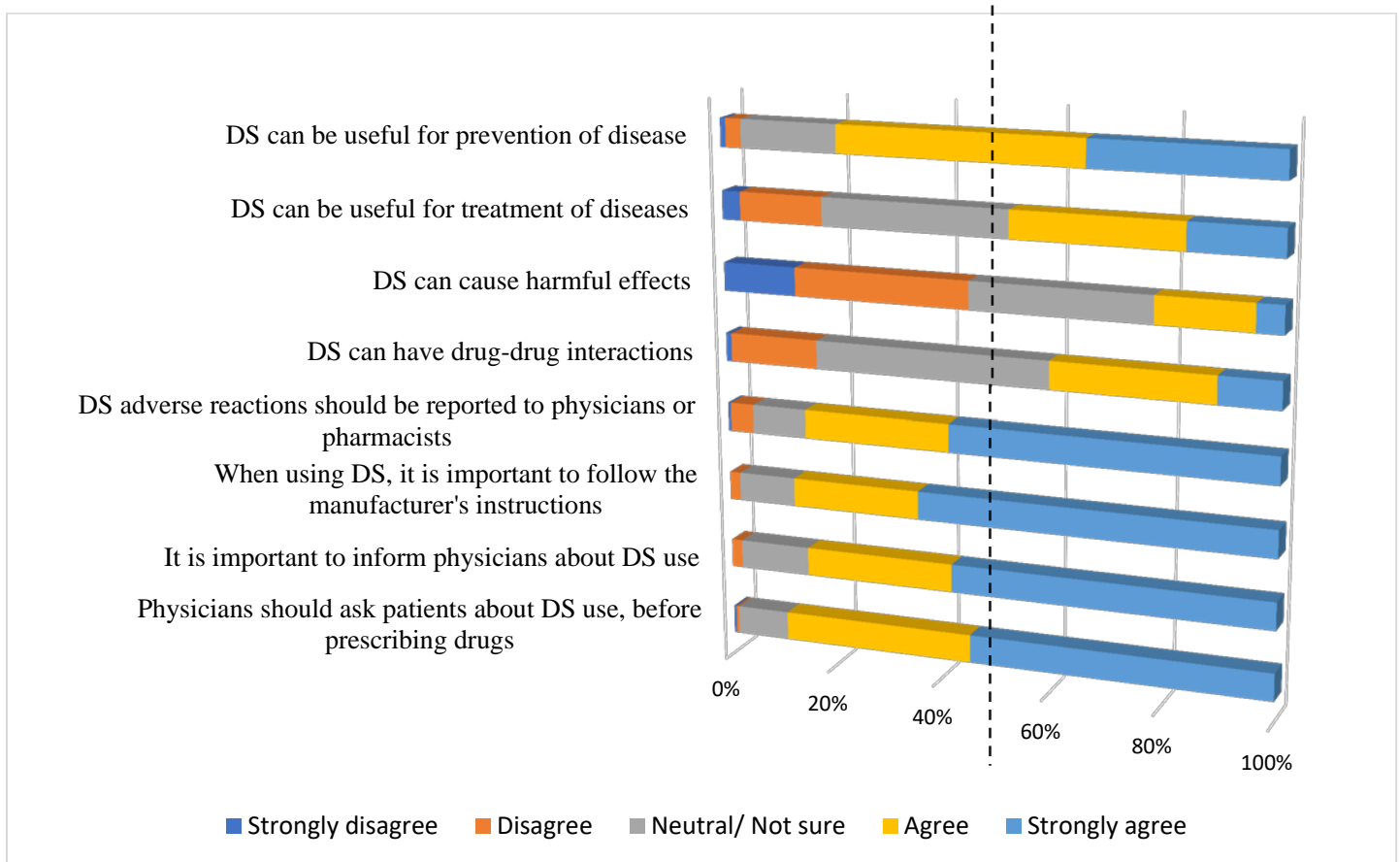


Many students (130, 61.1%) responded correctly about the meaning of DS(Figure-1). Almost all ,205(98.10%) students wanted to learn about DS in their curriculum whereas only 4(1.90%) students were not willing to have a session about DS in their course. 183(87.60%) respondents preferred to recommend DS to others.

Attitude about the efficacy and safety of dietary supplements use

The students' attitude regarding the efficacy and safety of DS are shown in figure 2. A decent number of students agreed that DS can be useful in the prevention of diseases. (44.5%, Likert scale mean= 4.07), however they were not sure about DS can be useful for the treatment of diseases (34%, Likert scale mean= 3.42), DS can cause harmful effects (32.3%, Likert scale mean= 2.67) and interactions with conventional drugs (42.6%, Likert scale mean= 3.33).

Figure 2: Likert scale chart showing attitude of 2nd professional year medical students towards efficacy and safety of DS (n=209)



Most of the students strongly agreed that suspected adverse reactions with DS use should be reported to physicians or pharmacists (58.4%, Likert scale mean= 4.38) and following the manufacturer’s instructions about DS use is of great importance (64.1%, Likert scale mean= 4.49). Similar results were obtained concerning informing physicians about DS use (57.9%, Likert scale

mean= 4.41) and physicians should ask patients about DS use before prescribing drugs (54.5%, Likert scale mean= 4.42).

Among the 209 respondents, 77 (36.84%) students had taken dietary supplements. Among them, 50 (64.9%) students had used DS in past and 27(35.10%) students were using DS during study period.

Table 2: Attitude of respondents towards DS (those who have not used any DS Vs those who have used DS)

	Group -1 (Those who have not used DS) (n=132)	Group- 2 (Those who have used DS) (n=77)
	Mean of Likert scale	
a.) DS can be useful for prevention of disease	4	4.19
b.) DS can be useful for treatment of diseases	3.34	3.55
c.) DS can cause harmful effects	2.68	2.66
d.) DS can have drug-drug interactions	3.27	3.42
e.) DS adverse reactions should be reported to physicians or pharmacists	4.37	4.38
f.) When using DS, it is important to follow the manufacturer's instructions	4.43	4.6
g.) It is important to inform physicians about DS use	4.39	4.44
h.) Physicians should ask patients about DS use, before prescribing drugs	4.3	4.48

(1 = strongly disagree, 2 = disagree, 3 = neutral/not sure, 4 = agree, 5 = strongly agree)

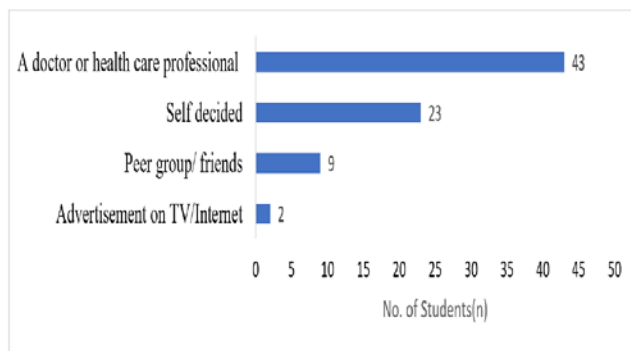
P value and statistical significance: The two-tailed P value equals 0.7329. By conventional criteria, this difference is considered to be not statistically significant. The difference in attitude about DS among those who have used DS and not used DS is statistically not significant.

Source of information for using DS

The required information related to DS use is widely available and can be obtained through various sources

e.g., print media, internet, etc. But the information is often confusing and contradictory.

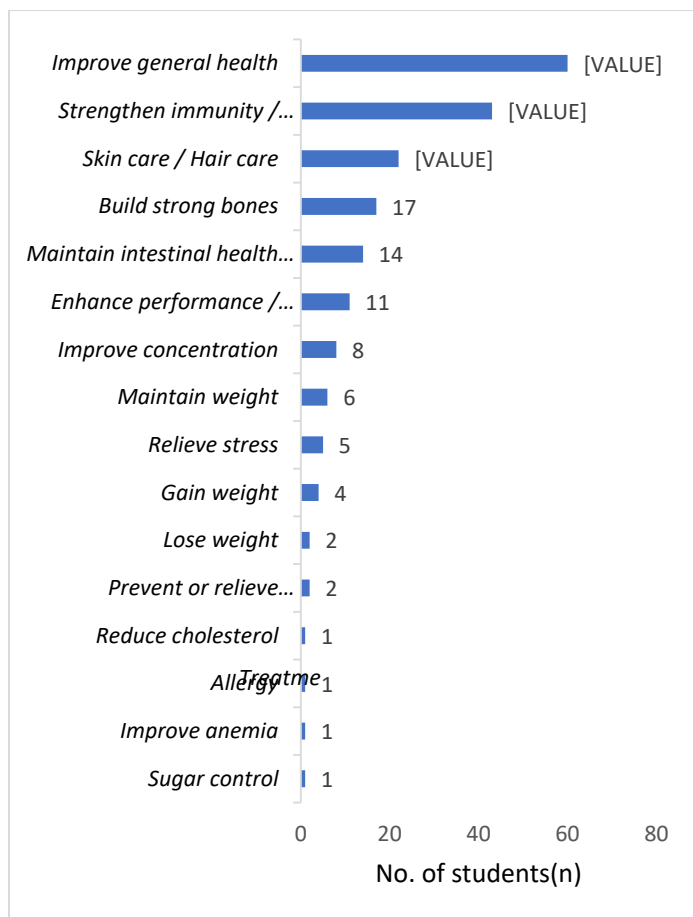
Our findings revealed that the most common source of information for DS use among medical students was a recommendation by the professional health care provider (55.55%) (Figure-3).



(n=number of 2nd professional year medical students, n=77)

Figure 3: Sources of information about dietary supplement use among 2nd professional year medical students(n=77)

Reasons for dietary supplement use



(n=number of 2nd professional year medical students who have used DS, n=77)

Figure 4 outlines reported reasons for DS use. Respondents were allowed to choose multiple options in

the question regarding reasons for DS use. The most common reasons for DS use selected by the respondents were to improve general health (60,77.90%), to strengthen immunity / prophylaxis to prevent COVID-19 infection (43,55.80%), for skin care / hair care (22,28.60%), for bone health (17,22.10%), to maintain intestinal health e.g., constipation, bloating (14,18.20%) and to enhance performance / increase muscle mass (11,14.30%).

Types of DS use

Table 3: Types of DS used by 2nd professional year medical students

Types of DS use	No. of Students(n=77)	Percentage (%)
Individual vitamins	24	31.17
Individual minerals	42	54.55
Multivitamins	48	62.34
Multimineral	23	29.87
Individual Herbal DS	9	11.69
Multiple Herbal DS	26	33.77
Other DS	19	24.68

(n=number of 2nd professional year medical students who have used DS, n=77)

A list of various types of DS reportedly used by respondents is included in Table 3. Respondents were allowed to choose multiple options in the question regarding type of DS used. Out of the 77 participants who completed the section of dietary supplement use, single DS use was reported by 7 respondents whereas 70 participants were using multiple DS. Vitamin C, vitamin D, zinc, vitamin B complex were used as single DS. 93.50 % students reported to have taken vitamins and 84.15 % students reported minerals as DS, whereas

percentage of respondents using herbal and other DS were 45.45% and 24.68% respectively.

The most specific DS reported was vitamin C (72.72%) followed by zinc (59.74%), vitamin D (40.25%), calcium (33.76%) and vitamin B complex (33.76%). Common herbal DS used among respondents were chyavanprash(19.48%), ashwagandha(18.18%) and samshamni vati(giloy)(12.98%). Detailed analysis of commonly used DS among 2nd professional year medical students has been shown in figure 5.

Pattern of DS use among 2nd professional year medical students

The evaluation of the frequency of DS use showed that 52% of respondents used once daily use followed by once weekly (19.48%). The majority of medical students (71.40%) reported that they were using DS for less than 3 months.

Table 4: Evaluation of frequency of dietary supplements usage pattern among 2nd professional year medical students

Frequency	No. of Students (n=77)	Percentage (%)
Once daily	40	51.95 %
Twice daily	13	16.88 %
Thrice daily	1	1.30 %
Once weekly	15	19.48 %
Twice weekly	5	6.49 %
Thrice weekly	3	3.90 %

(n=number of 2nd professional year medical students, n=77)

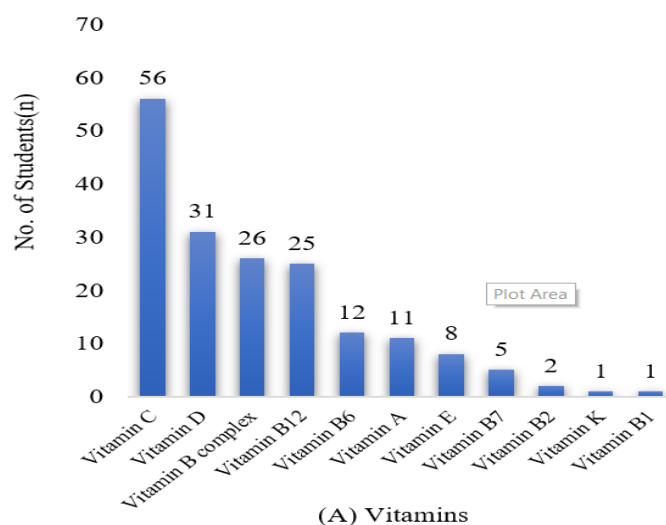
Respondents were allowed to choose multiple options in the question regarding dosage form of DS. The most common dosage form of DS used by 2nd professional year medical students was tablet (77.90%); followed by powder (24.70%), capsule (22.10%), liquid (14.30%), gummies (5.20%) and soft gels (3.90%).

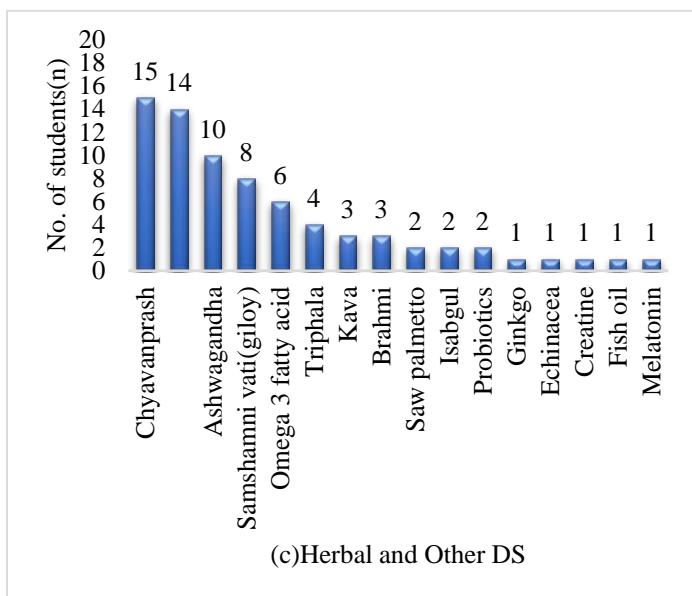
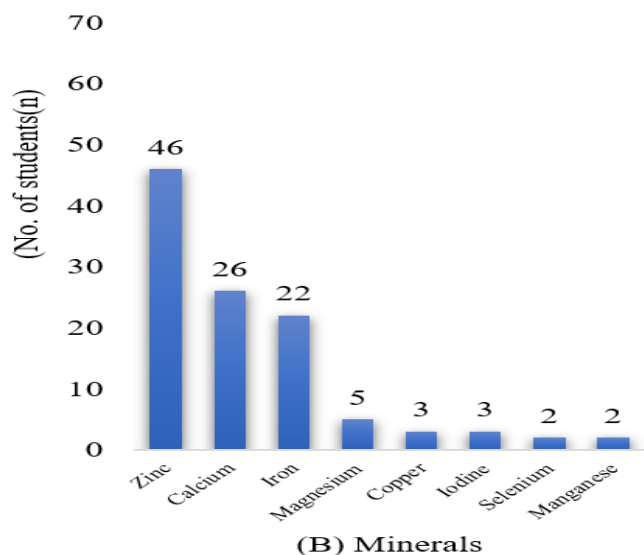
Table 5: Evaluation of duration of dietary supplements usage pattern among 2nd professional year medical students

Duration	No. of Students (n=77)	Percentage (%)
<3- month	55	71.4%
3-6 month	11	14.3%
6-12 month	6	7.8%
>12 month	5	6.5%

(n=number of 2nd professional year medical students, n=77)

Figure 5: Analysis of commonly used DS among study participants: (A) Vitamins (B) Minerals (C) Herbal and Other DS (n=77).





(n=number of 2nd professional year medical students, n=77)

Benefits and Adverse events:

Out of 77 students who had received DS, 70(90.90%) students mentioned that they felt health related benefits of using DS and 7 (9.10%) students reported no benefits of using DS. Only 3.90% of respondents reported mild adverse reactions after taking DS. Adverse reactions included nausea, headache and abdominal cramps. Reported ADRs were associated with body building supplements (protein and amino acid supplements) and omega 3 fatty acid preparations.

Discussion

This was an observational, cross-sectional, questionnaire-based study carried out over 15 days period among 2nd professional year medical students. A questionnaire regarding DS use had been sent to 270 students; a total 209 students responded. The response rate for sample respondents was 77.40%. A study done by Stanojević-Ristić, Z in medical students showed response rate 89%, a higher percentage can be due to more sample size.[21] Moreover, current study was conducted online using google form (due to COVID-19 pandemic) could be a reason for discrepancy in response rate. Of 209 students, mean age of the students was found to be 19.38 years (± 0.67 SD). A study done by Stanojević-Ristić, Z in medical students showed similar results as both studies done in medical students. [21] In current study male to female ratio was 2.54: 1, which is in contrast to 0.67:1 in a study done by Owens, C in rural adults, a difference can be justified as both study population are different.[22]

In current study no students were consuming tobacco products, while a study done by Stanojević-Ristić, Z showed 22% usage of tobacco products among medical students.[21] In present study, 23% students were not doing exercise while a study done by Stanojević-Ristić, Z showed 78% were not doing exercise.[21] In current study 20.60% students were doing exercise for >30 minutes which is similar to the study done by Barnes, K in Australian university population.[23] Majority of student (91.40%) in our study reported their health status as good whereas 8.60% students mentioned their health status as poor. Among 209(36.84%) medical students, who have used DS, 77 were using DS during study period. While study done by Barnes, K in Australian university population reported higher (74%) usage of

DS. [23] Different cultural and social factors between study populations according to different countries can be reason for discrepancy.

For the knowledge-based question- “knowledge about meaning of dietary supplements” 62% students responded correctly. In present study, majority of students agreed to the use of DS in prevention of disease which is similar to the study done by Owens, C in rural adults. [22] Whereas students were not sure about- use of DS in treatment of disease, DS can cause harmful effects and DS can have interactions with the conventional drugs. These finding reflects attitude of the students that DS improves the general health and immunity. The most common source of information about the DS among medical students was recommendation from the health care provider, while study done by Owens, C reported internet being a source of information. [22]

Most common dosage form of DS used by medical students was tablet (77.90%) followed by powder (24.70%). Frequency of using DS in medical students was once daily (51.95%) followed by once weekly (19.48%), which is similar to study done by Owens, C in rural population daily use of DS (71%). The most frequent reasons for using DS selected by respondents were to improve general health (90%) and to strengthen immunity especially in pandemic like COVID-19 (55.80%), previous studies also found similar reasons for using DS. [21,22,23]

Multivitamin was the most common (62.34%) DS used by the medical students followed by individual mineral usage (54.55%), which is in context with study done by Owens, C in rural population observed 83.1% usage of vitamin & minerals as DS.[22] Vitamin or mineral use 69% and 63% of participants observed in study done by

Barnes, K in Australian university population [23].Chyavanprash, ashwagandha and samshamni vati (giloy) were commonly used herbal DS among medical students in our study which is in contrast to study done by Stanojević-Ristić, Z in medical students: Echinacea, ginseng and St. John’s wort. A difference in use of herbal products as per availability in different countries could be a reason for difference in selection of herbal DS. [21]

Majority of students (91%) felt health related benefits of using DS. A very less number (3.90%) of medical students reported mild adverse reaction after taking DS such as nausea, headache and abdominal cramps. The most likely DS causing ADRs include protein & amino acid supplements and omega-3 fatty acid. These findings are supported by a study done by Stanojević-Ristić, Z in medical students. [21]

Our study also has limitations like small sample size, not representing all medical students as the study was carried out only among 2nd professional year medical students, not included all available market preparations and study was carried out online using google form-based questionnaire. However, the present study is one of the few studies carried out at our center which represents usage pattern as well as the attitude of medical students towards DS especially during this COVID-19 pandemic.

Conclusion

The prevalence of DS consumption was high among 2nd professional year medical students during this COVID-19 pandemic. Most of students consumed DS to improve general health and protecting oneself from the infectious diseases such as COVID-19. Multivitamin was the most common DS used by the study participants followed by individual mineral DS. Being common consumers of

DS, awareness regarding specific use, overall benefits and risk associated with DS should be integrated in curriculum of undergraduate medical students.

Conflict of interest

The authors declare that there is no conflict of interest.

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