

# Knowledge, Attitude and Practices Related to Dietary Supplements and Micronutrients in Health Sciences Students

AJITHA SHARMA<sup>1</sup>, SHALINI ADIGA<sup>2</sup>, ASHOK M.<sup>3</sup>

## ABSTRACT

**Objectives:** Little is known about supplement users and their dietary behavior in India. This study was conducted with the following objectives: 1. To determine the usage of dietary supplements in health sciences students. 2. To determine their knowledge, attitudes and beliefs regarding micronutrients.

**Materials and Methods:** Cross-sectional, questionnaire based study conducted at a University in south India, which included second year students pursuing medical, dental and nursing courses. Data was analysed using SPSS version 19.

**Results:** The commonest reasons for consuming supplements were to maintain good health (136, 40.1%) and ensure adequate nutrition (125, 36.9%). The respondents' opinions about dietary supplements were generally between 'unsure' and 'agree'. Medical students scored the highest percentage (44.84%) in

their knowledge about micronutrients as compared to nursing (43.17%) and dental (37.8%). There was a significant difference between the scores of medical and dental students ( $p=0.005$ ) while the scoring of students of medical and nursing did not vary significantly. There was no significant difference between the scoring percentage of males and females in medical and dental groups while in the nursing group female students scored a better percentage as compared to males ( $p=0.036$ ).

**Conclusion:** Although, the usage of dietary supplements in health sciences students is high, there is a dearth of knowledge, especially regarding role of micronutrients in health and disease. Hence, it is crucial this information must be highlighted in the health sciences curriculum with the objective of producing well-informed professionals who can later on have a positive impact on the health of society.

**Keywords:** Attitude, Dietary supplements, Health sciences, Knowledge, Practices

## INTRODUCTION

Diet and nutrition play a key role in the maintenance of good health and prevention of disease. While a well-balanced diet aims at providing the essential nutrients, the role of dietary supplements in complementing the diet cannot be undermined. Dietary supplements represent an important source of essential nutrients and may confer various health benefits, including chronic disease prevention [1]. However, wide usage of supplements is often a cause for concern because of potential adverse effects like neurologic disturbances, gastrointestinal symptoms, hepatotoxicity, birth defects and drug interactions [2].

Malnutrition is the leading cause of ill health in the developing world with micronutrient deficiencies taking the centre stage. Supplementation of food with these micronutrients has proven to greatly benefit the cure of these deficiencies [3]. The role of micronutrients in health and disease is being extensively studied and they have been found to be essential for cell defense, antioxidant defense mechanisms and prevention of chronic diseases [4]. Increasing awareness about the role of micronutrients in health and disease has resulted in the extensive development of supplements and their consumption.

Healthcare practitioners, nurses, pharmacists and health sciences students can widely influence the beliefs and practices regarding health in the general population. They can advice people regarding the usage of dietary supplements and the effects of those supplements on health [5,6]. Since, it is believed that the health behaviour of health sciences students will be reflected in their attitude while counseling patients regarding diet and nutrition, it is important to collect their dietary supplement use data [7,8]. Little is known about supplement users and their dietary behaviour in India. With this background, the study was conducted with the following

objectives: 1. To determine the usage of dietary supplements in health sciences students. 2. To determine their knowledge, attitudes and beliefs regarding micronutrients.

## MATERIALS AND METHODS

This descriptive, cross-sectional, questionnaire based study was conducted on medical, dental and nursing students of Manipal University after gaining the approval of the Institutional Ethics Committee (IEC), during the period of January-February 2013. A structured questionnaire was formed based on a review of the dietary supplements literature and a pilot study was done on 25 students and responses evaluated [Table/Fig-1]. The questionnaire was then standardized for use in the study. A total of 450 students pursuing second year of study in medical, dental and nursing courses were requested to fill the questionnaire form after explaining the importance of the study and their contribution to it. They were also asked to sign consent form if they wished to participate in the study. Out of 450 only 339 completed questionnaires were received, the others either did not wish to participate in the study or did not sign the consent form or returned incompletely filled questionnaires. Among the 339 participants, 242 were females, and 97 males 167 were pursuing medical course, while 80 students belonged to dental course and the remaining 92 were pursuing nursing course. The questionnaire included three sections: i) Demographic details and lifestyle; ii) Supplement use, knowledge and opinion about dietary supplements iii) Awareness and the knowledge of the recommendations about micronutrients and deficiency states. The responses were all documented and analysed. The scoring for the last section was calculated as the total number of correct responses and then average percentage of scores was calculated gender-wise in all the groups.

Serial number	Questions	True	False	Don't know
1.	Tryptophan is a precursor of niacin			
2.	Folate can increase plasma homocysteine levels and increase the risk of heart attack			
3.	The recommended dietary allowance (RDA) for thiamine is 0.9-1.2 mg/day for adults			
4.	Both iron overload and iron deficiency result in alterations in the immune response of humans			
5.	Women taking oral contraceptive agents have an increased risk of developing riboflavin deficiency			
6.	Microbial synthesis supplies the body with a large proportion of the daily vitamin K requirements			
7.	Prolonged intake of zinc interferes with copper metabolism			
8.	Acute and chronic infections and disease can reduce levels of vitamin C in plasma and leucocytes			
9.	Exposing carotenoids to heat generally decreases their bio-availability			
10.	The major promoters of non-heme iron absorption are phytates and phosphates			
11.	Vitamin A deficiency produces scurvy			
12.	Daily intakes of vitamin A exceeding 100000IU by pregnant women can result in fetal abnormalities			
13.	Folate deficiency often resembles the haematologic features of vitamin B12 deficiency			
14.	Magnesium deficiency is characterised by nausea, muscle weakness, personality changes and vomiting			
15.	Avidin present in egg white, increases the absorption of biotin			
16.	$\alpha$ -tocopherol increases the oxidative damage due to free radical generation			
17.	Early symptoms of riboflavin deficiency include photophobia, soreness of lips, mouth and tongue			
18.	Selenium impairs short term memory			
19.	Increasing amounts of PUFA in the diet increase the vitamin E requirements			
20.	A very high intake of calcium, in the presence of vitamin D can lead to excessive calcification in soft tissues			
21.	Green leafy vegetables are the major dietary sources of vitamin B12			
22.	Dairy products and fish are deficient in iodine			
23.	Pyridoxine deficiency causes glossitis, stomatitis and growth retardation			
24.	Pantothenic acid deficiency causes leg cramps, paresthesias and insomnia			
25.	High doses of zinc sulphate (2g/day or more) can cause gastrointestinal irritation and vomiting			

[Table/Fig-1]: Questionnaire used to determine knowledge, attitudes and beliefs of study participants regarding micronutrients

## STATISTICAL ANALYSIS

Analysis of the results was done using SPSS version 19.0. ANOVA was used to evaluate knowledge and attitude towards nutrition between students and an independent t-test was used to compare the nutrition knowledge, attitude and beliefs between males and females. Statistical results were considered to be significant at  $p \leq 0.05$ .

## RESULTS

In our study, majority of the participants were females (71.4%). This was because of the large number of female students opting for the nursing course as compared to males. Majority of them were in the age group of 20-25 yr (67.5%) and the rest were <20 yr of age (32.5%). Out of the 339 participants, 167 (49.3%) were pursuing medical course, while 80 (23.6%) students belonged to

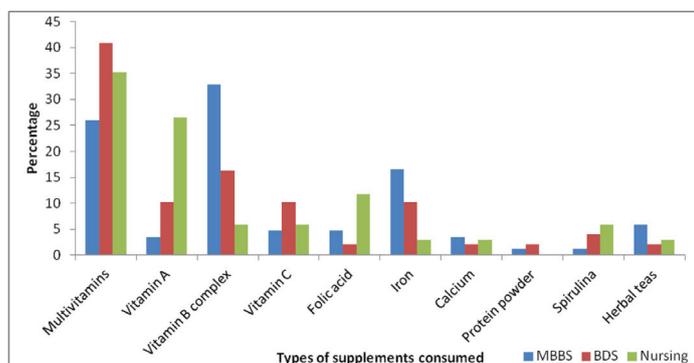
Variable		N	%
Gender	Male	97	28.6
	Female	242	71.4
Age	<20 years	110	32.5
	20-25 years	229	67.5
Course	MBBS	167	49.3
	BDS	80	23.6
	Nursing	92	27.1
Nationality	India	318	93.8
	Malaysia	12	3.6
	Nepal	3	0.9
	Canada	1	0.3
	China	1	0.3
	Singapore	1	0.3
	Tanzania	1	0.3
	Thailand	1	0.3
	USA	1	0.3
BMI	Underweight (16-18.49)	48	14.2
	Normal weight (18.5-24.99)	233	68.7
	Overweight (25-29.99)	48	14.2
	Obese class I (30-34.99)	8	2.4
	Obese class II (35-39.99)	2	0.6

[Table/Fig-2]: Socio-demographic characteristics of study participants (n=339)

Variable		N	%
Diet	Vegetarian	89	26.3
	Non-vegetarian	250	73.7
Smoking	Never	321	94.7
	Occasionally	8	2.4
	2-3 times a week	3	0.9
	Daily	7	2.1
Alcohol Consumption	Never	260	76.7
	Consume socially	72	21.2
	2-3 times a week	3	0.9
	Daily	4	1.2
Exercise	Never	68	20.1
	Whenever I find time	183	54
	2-3 times a week	45	13.3
	Daily	43	12.7
Supplement Consumed	Yes	168	49.6
	No	171	50.4
Frequency of Supplement Consumption	Occasionally	45	26.8
	3-5 times a week	24	14.3
	Daily	99	58.9

[Table/Fig-3]: Distribution of lifestyle practices among study participants (n=339)

dental course and the remaining 92 (27.1%) were pursuing nursing course. Students of various nationalities took part in the study; while majority of them were Indians (93.8%), few were Malaysians (3.6%) and the rest hailed from Nepal, Canada, China, Singapore, Tanzania, Thailand and USA. Most of the students had a normal body weight (68.7%) while some were underweight (14.2%) and some were overweight (14.2%) and a few others were obese (3%) [Table/Fig-2]. Most of the students consumed non-vegetarian diet (73.7%), never smoked (94.7%), never consumed alcohol (76.7%), but exercised



[Table/Fig-4]: Types of dietary supplements consumed.

Reason	N	%
Maintain good health	136	40.1
Ensure adequate nutrition	125	36.9
Weight loss	13	3.9
Enhance appearance	17	5.0
Meet increased energy needs	11	3.2
Prevent disease	34	10.0
No specific reason	03	0.9

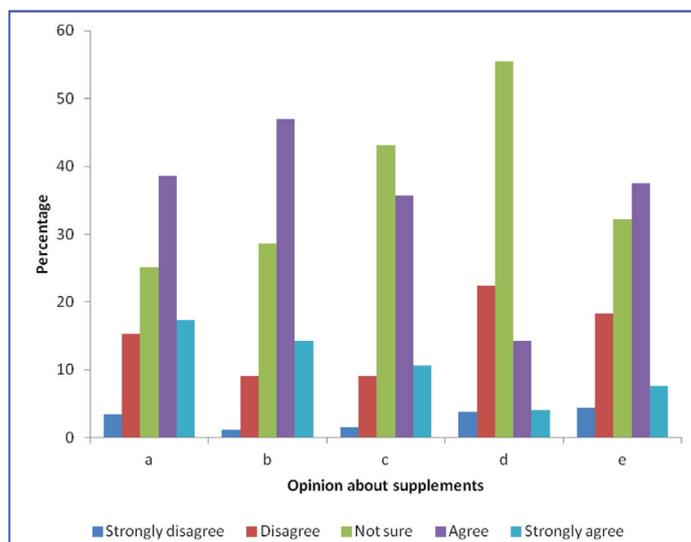
[Table/Fig-5]: Reasons for consuming dietary supplements (n=339)

Source	N	%
Magazines/Newspapers	8	2.3
Internet	40	11.8
Family	58	17.1
Friends	16	4.7
Doctor	167	49.2
Television/Radio	4	1.2
Workshops/Discussions/Lectures	7	2.1
Formal books	16	4.7
Others	23	6.7

[Table/Fig-6]: Sources of information about dietary supplements (n=339)

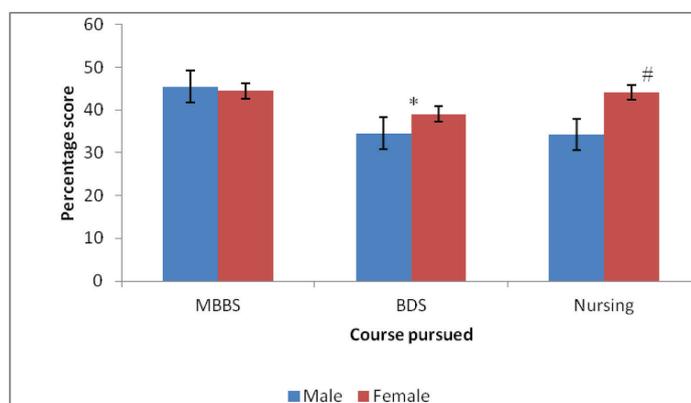
irregularly (54%). Almost half of the participants consumed dietary supplements (49.6%) [Table/Fig-3]. It was found that most of the supplement users were females (medical - 69.4%, dental - 75.5%, nursing - 97.1%). The supplements most commonly used in all the 3 study groups were multivitamins, vitamin C and vitamin B complex, followed by vitamin A, iron, folic acid, protein powders, spirulina, calcium and herbal teas [Table/Fig-4].

The commonest reasons for consuming dietary supplements were to maintain good health (40.1%) and ensure adequate nutrition (36.9%). Others felt that supplements were used to prevent disease (10%), to enhance appearance (5%), to meet increased energy demands of the body (3.2%), for weight loss (3.9%) and the rest for no specific reason (0.9%) [Table/Fig-5]. The students reported various sources of information regarding dietary supplements with most of them relying on their doctors (49.2%), while some were motivated by family (17.1%) and a few others found information on the internet (11.8%). The rest relied on various other sources of information [Table/Fig-6]. The respondents' opinions were asked, whether they considered that dietary supplements were necessary for all ages, whether they were generally harmless, whether the regular use of supplements prevented occurrence of chronic diseases and cancers and whether health personnel should promote the use of supplements. The respondents had five options to express their opinions namely, 'strongly disagree', 'disagree', 'unsure', 'agree' and 'strongly agree'. The responses were



[Table/Fig-7]: Opinion about dietary supplements

a - Dietary supplement is necessary for all ages; b - Dietary supplement is generally harmless; c - Regular use of supplement prevents chronic diseases; d - Dietary supplements can prevent cancers; e - Health personnel should promote use of supplements



[Table/Fig-8]: Percentage score of knowledge, attitude and beliefs regarding micronutrients

\* p=0.005 (as compared to MBBS group);  
# p=0.036 (as compared to males in nursing group)

generally between 'unsure' and 'agree' [Table/Fig-7]. Regarding the knowledge, attitudes and beliefs of study participants about micronutrients, the average percentage of total scores for students in each group was determined gender-wise and then compared. Medical students scored the highest percentage (44.84%) as compared to nursing (43.17%) and dental (37.8%). There was a significant difference between the scores of medical and dental students ( $p=0.005$ ) while the scoring of students of medical and nursing did not vary significantly. There was no significant difference between the scoring percentage of males and females in medical and dental groups while in the nursing group female students scored a better percentage as compared to males ( $p=0.036$ ) [Table/Fig-8].

## DISCUSSION

It is a well-known fact that a balanced diet and adequate nutrition is very essential in maintaining good health. With growing awareness among people about health and preventing diseases, usage of dietary supplements is rampant [1,2]. It is documented from various studies that awareness regarding nutrition is increasing in the general population and also among specific groups of people like athletes, people undergoing cancer therapy and healthcare professionals [1,5,6,9,10]. The study done by Radimer et al., suggests that there is a dramatic increase in supplement usage and nutritional awareness in the developed countries [11]. Healthcare professionals play an enormous role in moulding the public opinions and beliefs regarding health-related issues and hence, it is crucial that the prescribing

fraternity should be well-informed about nutrition and its role in maintaining health [7,8]. Hence, this study was conducted in order to gain an insight into the usage of dietary supplements in health sciences students.

Nearly half of the study subjects were found to consume dietary supplements, which is in accordance with the findings in similar studies [2,5,7]. Also, it was found that female students were more likely to use supplements, which is consistent with results found in other studies [7,12]. There was a significant association between supplement usage and avoidance of alcohol ( $p=0.01$ ) and exercise ( $p=0.03$ ). Studies have found that many of the lifestyle characteristics of supplement users are health related [13-15]. These reports are further supported by the findings in our study as majority of the supplement users were found to have healthy lifestyle practices like avoiding smoking and consumption of alcohol and maintaining a normal body weight although they exercised irregularly.

Regarding the reasons for consuming dietary supplements among university students, majority of the respondents used supplements to maintain good health and ensure adequate nutrition. Similar findings were reported in studies by Al-Naggar et al., and Suleiman AA et al., [2,16]. The various sources of information regarding supplements were doctor, family or internet which is in concordance with findings in other studies [2,13]. The commonest supplements used were multivitamins, vitamin B complex and vitamin A which are similar to findings of other studies [2,5,16].

Though, almost half of the students used dietary supplements, their opinions regarding supplements were generally between 'unsure' and 'agree'. We are not sure of the reason for this ambiguity though similar findings were seen in the study conducted by Teng CL et al., [5]. These findings suggest that there is a deficiency in the knowledge of health sciences students pertaining to the health benefits of supplements. Medical students scored the highest percentage in knowledge, attitudes and beliefs regarding micronutrients, with a significant difference between the scores of medical and dental students while the scoring of students of medical and nursing did not vary significantly. This difference may be because of a better knowledge regarding nutrition, in students from medical faculties than those who were not from medical faculties. Similar findings were reported in other studies [2,17].

## LIMITATION

A limitation of the study was that the study population was not equally distributed with a large number of female participants as compared to males. This is because of the discrepancy in gender during admission to the nursing course.

## CONCLUSION

Although, the usage of dietary supplements in health science students is high, there is a dearth of knowledge, especially regarding role of micronutrients in health and disease. Hence, it is crucial that this information be highlighted in the health sciences curriculum with the objective of producing well-informed professionals who can later on have a positive impact on the health of society.

## REFERENCES

- [1] Block G, Jensen CD, Norkus EP, Dalvi TB, Wong LG, McManus JF, et al. Usage patterns, health, and nutritional status of long-term multiple dietary supplement users: a cross-sectional study. *Nutr J*. 2007;6:30.
- [2] Al-Naggar RA, Chen R. Prevalence of vitamin-mineral supplements use and associated factors among young Malaysians. *Asian Pacific J Cancer Prev*. 2011;12:1023-29.
- [3] Woodside JV, McCall D, McGartland C, Young IS. Micronutrients: dietary intake v. supplement use. *Proc Nutr Soc*. 2005;64:543-53.
- [4] Visser J. Micronutrients: do small things matter? *S Afr J Clin Nutr*. 2010;23(1):S58-S61.
- [5] Teng CL, Tey KK, Lim PH, Cheng SF, Nordin MS, Ng CM et al. Dietary supplements: usage and opinions among health sciences students. *International e-Journal of Science, Medicine and Education*. 2008;2:30-2.
- [6] Gardiner P, Woods C, Kemper KJ. Dietary supplement use among health care professionals enrolled in an online curriculum on herbs and dietary supplements. *BMC Complement Altern Med*. 2006;6:21.
- [7] Spencer EH, Bendich A, Frank E. Vitamin and mineral supplement use among us medical students: a longitudinal study. *J Am Diet Assoc*. 2006;106:1975-83.
- [8] Spencer EH, Frank E, Elon LK, Hertzberg VS, Galuska D, Serdula MK. Predictors of nutrition counseling behaviors and attitudes among US medical students. *Am J Clin Nutr*. 2006;84:655-62.
- [9] Molinero O, Márquez S. Use of nutritional supplements in sports: risks, knowledge, and behavioural-related factors. *Nutr Hosp*. 2009;24(2):128-34.
- [10] Norman HA, Butrum RR, Feldman E, Heber D, Nixon D, Picciano MF, et al. The Role of Dietary Supplements during Cancer Therapy. *J Nutr*. 2003;133(11 Suppl 1):3794S-9S.
- [11] Radimer K, Bindewald B, Hughes J, Ervin B, Swanson C, Picciano MF. Dietary Supplement Use by US Adults: Data from the National Health and Nutrition Examination Survey, 1999-2000. *Am J Epidemiol*. 2004;160:339-49.
- [12] Azizi M, Rahmani-Nia F, Malaee M, Malaee M, Khosravi N. A study of nutritional knowledge and attitudes of elite college athletes in Iran. *Brazilian Journal of Biometrics*. 2010;4:105-12.
- [13] Ishihara J, Sobue T, Yamamoto S, Sasaki S, Tsugane S. Demographics, lifestyles, health characteristics, and dietary intake among dietary supplement users in Japan. *Int J Epidemiol*. 2003;32:546-53.
- [14] Slesinski MJ, Subar AF, Kahle LL. Dietary intake of fat, fiber and other nutrients is related to the use of vitamin and mineral supplements in the United States: the 1992 National Health Interview Survey. *J Nutr*. 1996;126:3001-08.
- [15] Foote JA, Murphy SP, Wilkens LR, Hankin JH, Henderson BE, Kolonel LN. Factors Associated with Dietary Supplement Use among Healthy Adults of Five Ethnicities The Multiethnic Cohort Study. *Am J Epidemiol*. 2003;157(10):888-97.
- [16] Suleiman AA, Alboqai OK, Yasein N, Al-Essa MK, El-Masri K. Prevalence of vitamin-mineral supplement use among Jordan university students. *Saudi Med J*. 2008;29:1326-31.
- [17] Azizi M, Aghaee N, Ebrahimi M, Ranjbar K. Nutrition knowledge, the attitude and practices of college students. *Facta Universitatis*. 2011;9:349-57.

### PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Pharmacology, Pondicherry Institute of Medical Sciences, Puducherry, India.
2. Professor, Department of Pharmacology, Kasturba Medical College, Manipal University, Manipal, India.
3. Business Executive, Ranbaxy Pharmaceuticals, Bangalore, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Ajitha Sharma,  
Assistant Professor, Department of Pharmacology, Pondicherry Institute of Medical Sciences,  
Puducherry - 605014, India.  
Phone : +919894338105, E-mail : drajithasharma@gmail.com, ajithasharma2002@yahoo.co.in

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Mar 19, 2014**

Date of Peer Review: **May 24, 2014**

Date of Acceptance: **Jun 17, 2014**

Date of Publishing: **Aug 20, 2014**