

Original Research Article

Study on pattern of consumption of fruits and vegetables and associated factors among medical students of Delhi

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ABSTRACT

Background: Fruits and vegetables are a rich source of essential micronutrients i.e. vitamins/minerals and dietary fibers required for the normal daily functionality of the body. Young adults such as medical students are a particularly vulnerable population in terms of health issues and adequate diet. Objective of the study was to find the pattern of fruits and vegetables consumption in undergraduate medical students of Delhi.

Methods: A cross-sectional study was planned among 300 undergraduate students from medical college in New Delhi. The questionnaire consisted of questions about identification data, pattern of fruit and vegetable consumption. Data was analyzed by SPSS software version 21.0 and for qualitative data analysis chi-square test was used.

Results: Mean age of study subjects was 20.82±2.1 years and females (52.7%) were more as compared to (47.3%) males. Out of 300 participants, only one third (33.3%) of study participants consumed more than five servings of fruits and vegetables. More than half of study participants felt that unsafe use of pesticides, difficult to eat five servings in a day, poor handling and poor quality of fruits and vegetables were the most common barriers in consumption of FVs. Age and semester of study participants and education status of mothers were found significant predictors of consumption of recommended number of serving of FVs in day.

Conclusions: This study concludes that only one third of study participants consumed more than five servings of fruits and vegetables which is recommended number of serving in a day. So, there is a need to increase awareness about importance of fruits and vegetables consumption among study population.

Keywords: Fruits and vegetables, Medical students, Cross-sectional, Servings, Barriers and facilitators

INTRODUCTION

Fruits and vegetables form a very important part of a balanced diet and inadequate consumption of them can have a great impact on the overall health of the students and is a matter of great concern. Globally, a large portion of disease burden is contributed by dietary factors. According to a recent survey, eleven million deaths and 255 million DALYs were attributable to dietary risk factors.¹ One of the major contributory factors for the increased incidence of cardiovascular diseases and cancers

in world is low consumption of fruits and vegetables.² Fruits and vegetables are a rich source of essential micronutrients i.e. vitamins/minerals and dietary fibers required for the normal daily functionality of the body. WHO recommends intake of a minimum of 400 grams or five servings of fruits and vegetables per day to improve overall health and decrease the risk of NCDs. A global survey conducted in 52 low-and middle-income countries showed that more than 75% of men and women consumed inadequate servings of FVs. India reported. that 74% of adults consumed less than recommended amounts of FVs.³

According to a study (2016), Indian diet which is predominantly a cereal staple diet, only nine per cent of total calories was contributed by FVs with an average intake of 3.5 servings/day. The younger generation's (18-24 years) intake was <3 serving/day.⁴

Young adults (18-24 years) such as medical students are a particularly vulnerable population in-terms of health issues and adequate diet. Exploring first time independent decision, many living independently and easy access to junk food makes them a particularly vulnerable population. There is paucity of literature regarding pattern of FVs consumption and associated factors among medical students. Objective of the study was to find the pattern of FVs consumption in medical students and also the barriers/facilitators to consuming the recommended amount of FVs among them.

METHODS

Study area

Vardhman Mahavir Medical College and Safdarjung Hospital is a prominent medical institution in India under the Ministry of Health and Family Welfare and is well known for its quality of health services to all strata of society. This cross-sectional study was conducted by the department of community medicine, Vardhman Mahavir Medical College and Safdarjung Hospital, among undergraduate medical students.

Study population

Inclusion criteria were undergraduate medical students of 1st, 3rd, 5th, 7th and 9th semester. Students who were absent on the day of study and those who did not give consent were excluded from the study. The data collection was done over a period of 20 days from 01 September 2018 to 20 September 2018.

Sample size

According to the World Health survey report of WHO, the prevalence of inadequate FVs consumption in India is 74%; so, taking the prevalence (p) to be 74% i.e. 0.74, absolute error to be 5%; the sample size comes out to be 307 by the formula,

$$N = \frac{4pq}{L^2}$$

Further adding the non-response rate of 10%, the sample size comes out to be 300.^{1,9}

Sampling method

Stratified random sampling

According to the list from the academic section of the college, the total number of currently enrolled

undergraduate medical students was 900 (5 semesters+interns). The five semesters were 1st, 3rd, 5th, 7th and 9th and each semester had strength of 150 students. The sample size of 300 was covered in these five semesters and interns by stratified random sampling technique. A sample of 50 students was covered from semester. List of students according to university roll number of each semester was taken from the academic section. Random number tables were used in selecting participants from each semester.

Study tools

A pre-designed, pre-tested, semi-structured, self-administered questionnaire in English language was used in the study to get relevant information. The questionnaire included questions covering the following components such as socio-demographic information, pattern of fruit and vegetable consumption (WHO-STEPS questionnaire was modified to find the pattern of fruits and vegetable consumption) and barriers and facilitators for fruits and vegetable consumption.⁵

Data collection

Before administering the questionnaire to the study participants in their respective lecture halls, the importance of study was explained to them. A pre-designed, pre-tested, semi structured questionnaire was filled by the study participants after explaining the questionnaire in detail to them. Students were encouraged to fill all the particulars of the questionnaire and were instructed not to leave any question unanswered. The data was collected between 01 September 2018 to 20 September 2018.

Statistical analysis

The data was exported into Microsoft Office excel spreadsheet and analysis was done using SPSS version 21. Descriptive analysis was done by calculating proportions, means and standard deviation. Data was presented as tables and appropriate diagrams. Association between qualitative variables was assessed using chi square/Fishers exact test.

Ethics

Permission was obtained from the administrative authorities and approval was sought from the institutional ethics committee. Voluntary informed consent was taken from all participants after explaining the purpose of the study. The data was kept confidential and used for study purpose only.

RESULTS

Table 1 shows that the mean age of the study participants was 20.82±2.1 years (range 17-25). Maximum (41.0%) number of study participants belonged to age group 20-22 years. Among the study participants females (52.7%) were more as compared to (47.3%) males. Majority of fathers

and mothers of study participants were post graduate (60.0%) and graduates (61.3%) respectively. There were no illiterate, primary school and middle school education status was present among the parents of study participants. Among the fathers of the study participants, majority (80.0%) of them were professionals. Among the mothers

of the study participants, majority (92.0%) were housewife. More than half (57.3%) of the study participants belonged to upper middle class while only (2.0%) of belonged to lower middle. Majority (89.6%) of the study participants was Hindus while only (1.67%) were Muslims.

Table 1: Distribution of study population according to socio-demographic characteristics (N=300).

Variables	Number	Percentage (%)
Age group (years)		
17-19	88	29.3
20-22	123	41.0
23-25	89	29.6
Gender		
Females	158	52.7
Males	142	47.3
Education status of father		
Higher secondary school	4	1.3
Graduate	116	38.7
Post graduate	180	60.0
Education status of mother		
Higher secondary school	32	10.7
Graduate	184	61.3
Post graduate	84	28.0
Occupation of father		
Skilled workers and shop and market sales workers	20	6.7
Semi-professionals	40	13.3
Professionals	240	80.0
Occupation of mother		
Housewife	276	92.0
Semi-professionals	3	1.0
Professionals	21	7.0
Socioeconomic status*		
Lower middle	6	2.0
Upper middle	172	57.3
Upper	122	40.7
Religion		
Hindu	269	89.6
Sikh	21	7.0
Muslim	5	1.6
Others*	5	1.6

* By modified revised Kuppuswamy scale

Table 2: Distribution of study participants according to pattern of fruits and vegetables consumption (N=300).

Variables	Number	Percentage (%)
Servings of FVs per day		
<2	24	8.0
2-4	176	58.7
≥5	100	33.3
Number of days of fruits consumption per week		
Not consumed at all	6	2.0
1 -2 days	50	16.6
3-4 days	131	43.66
≥5 days	113	37.66
Number of days of vegetables consumption per week		
Not consumed at all	0	0

Continued.

Variables	Number	Percentage (%)
1-2 days	27	9.0
3-4 days	50	16.66
≥5 days	223	74.33
Common fruits consumption		
Banana	247	84.01
Apple	206	70.06
Watermelon	90	30.61
Papaya	74	25.17
Kiwi	41	13.94
Others ^{\$}	28	9.52
Common vegetables consumption		
Beans	179	59.6
Carrot	173	59.1
Cabbage	156	52.0
Spinach	128	42.6
Cauliflower	89	29.6
Others [#]	9	3.0
Common form of fruit consumption in last 1 week		
Juices	227	77.2
Whole fruits	201	68.3
Chopped fruits	106	36.0
Common form of vegetable consumption in last 1 week		
Cooked vegetables	186	62.0
Raw salad	2	0.6
Both	112	37.3
Number of days salad consumed in the past 1 week		
≤2	76	66.7
3-5	32	28.1
>5	6	5.2

*multiple response, \$- guava, mango, grapes, orange, pear, pineapple, pomegranate, strawberry, #- cucumber, ladyfinger

Table 3: Distribution of study participants according to barriers and facilitators of fruits and vegetables consumption (N=300).

Barriers	Number	Percentage (%)
Unsafe pesticides	161	53.7
Difficult to eat 5 servings a day	154	51.3
Poor handling	153	51.0
Poor quality of FVs	151	50.3
Expensive	122	40.7
Availability (no FVs market nearby)	96	32.0
No proper storage space	81	27.0
Prefer non-veg diet	61	20.3
No taste	47	15.7
Facilitators		
Awareness on benefits of FVs	253	84.3
Affordable cost	234	78.0
Availability of nearby FVs market	157	52.3
Information about market hours	95	31.7

*Multiple responses

In Table 2, among the study participants, more than half (58.7%) of them consumed two to four servings of fruits and vegetables in a day. Only one third (33.3%) of study participants consumed more than five servings of fruits and vegetables which is recommended number of serving in a day. Majority (74.3%) of participants consumed vegetables on more than five days in a week while only

one third (37.6%) consumed fruits on more than five days. Most common (84.1%) fruit consumed was banana while beans (59.6%) and carrot (59.1%) were the most common vegetable consumed. Most common (77.2%) form of fruit consumed was juices while cooked vegetable (62.0%) was the most common form of vegetable consumed. About two third (66.7%) of study participants consumed salad only on

two or less than two days in a week. The average daily serving of FVs consumed by the students in the last 1 week was 4.27 ± 2.411 servings/day (range 1-12 servings/day) with an average serving of fruits was 2.03 ± 1.756 servings/day (range 0-7 servings/day) and 2.24 ± 1.150 servings/day of vegetable (range 1-7 servings/day).

Table 3 shows that more than half of study participants felt that unsafe use of pesticides, difficult to eat five servings in a day, poor handling and poor quality of fruits and vegetables were the most common barriers in consumption of them. Among the facilitators of FVs consumption, most common were awareness on benefits

of FVs and affordable cost. In Table 4, on analyzing consumption of recommended number of serving of FVs in day with socio-demographic factors, it was observed that semesters, age and education status of mothers of study participants were statistically significantly ($p < 0.001$) associated.

Factors like gender, education status of fathers, occupation of parents and religion of participants had no statistically significant association with number of recommended serving consumption of FVs.

Table 4: Distribution of fruits and vegetable consumption according to socio-demographic factors among the study population (N=300).

Variables	Serving of fruits and vegetables		Total N (%)	P value
	≥5 servings N (%)	<5 serving N (%)		
Semester				
First year	13 (26.0)	37 (74.0)	50 (100.0)	0.001
Seconds year	50 (50.0)	50 (50)	100 (100.0)	
Third year	23 (23.0)	77 (77.0)	100 (100.0)	
Interns	14 (28.0)	36 (72.0)	50 (100.0)	
Age (years)				
17-19	28 (31.8)	60 (68.2)	88 (100.0)	0.023
20-22	51 (41.5)	72 (58.5)	123 (100.0)	
23-25	21 (23.6)	68 (76.4)	89 (100.0)	
Gender				
Males	45 (31.7)	97 (68.3)	142 (100.0)	0.624
Females	55 (34.8)	103 (65.2)	158 (100.0)	
Education status of father				
Higher secondary school	1 (25.0)	3 (75.0)	4 (100.0)	0.598
Graduate	35 (30.2)	81 (69.8)	116 (100.0)	
Post graduate	64 (35.6)	116 (64.4)	180 (100.0)	
Education status of mother				
Higher secondary school	8 (25.0)	24 (75.0)	32 (100.0)	0.022
Graduate	54 (29.3)	130 (70.7)	184 (100.0)	
Post graduate	38 (45.2)	46 (54.8)	84 (100.0)	
Occupation of father				
Skilled workers and shop and market sales workers	6 (30.0)	14 (70.0)	20 (100.0)	0.438
Semi- professionals	10 (25.0)	30 (75.0)	40 (100.0)	
Professionals	84 (35.0)	156 (65.0)	240 (100.0)	
Occupation of mother				
Housewife	92 (33.3)	184 (66.6)	276 (100.0)	1.000
Semi- professionals	1 (33.3)	2 (66.6)	3 (100.0)	
Professionals	7 (33.3)	14 (66.6)	21 (100.0)	
Socioeconomic status*				
Lower middle	3 (50.0)	3 (50.0)	6 (100.0)	0.488
Upper middle	60 (34.8)	112 (65.1)	172 (100.0)	
Upper	37 (30.3)	85 (69.6)	122 (100.0)	
Religion				
Hindu	88 (32.7)	181 (67.2)	269 (100.0)	0.502
Others	12 (38.7)	19 (61.2)	31 (100.0)	

*Multiple responses

DISCUSSION

In the present study, carried among 300 medical college students, females (52.7%) were more as compared to (47.3%) males. The distribution of the participants is similar to studies conducted among university students in Maharashtra where there were 56% females and 44% males, in Iran where there were 55% females and 45% males and also in California, where there were 55.2% females and 44.8% males.⁶⁻⁸

The mean age of the students in the present study was found to be 20.82 years with the maximum students lying in 20-22 years age group. This is consistent with a study conducted in California among university students which found mean age of the students to be 20.2 years and maximum students in the age group 18-21 years.⁸ In this study, the average daily consumption of fruits and vegetables among the study participants was 4.27 ± 2.4 servings; average daily fruit consumption was 2.03 ± 1.7 servings and average daily vegetables serving consumption was 2.24 ± 1.1 . Almost similar results were found by Christiane et al among university students of California where average daily serving consumption of fruits and vegetables was 3.91 and that of fruits and vegetables was 1.88 and 2.03 respectively.⁸ In another study by Ali et al among university students living in dormitory in Iran, it was also found that daily frequency of fruits consumption was 2.4 ± 0.9 and vegetables to be 3 ± 1 serving.⁷

This study examined the consumption of fruits and vegetables among medical college students and found that the daily consumption of fruits and vegetables combined was less than 2 servings in only (8%) of the students, 2-4 servings in about half (58.7%) of the students and ≥ 5 servings in one third (33.3%) of students. Lower proportion of adolescents were found to be having 3-5 servings of fruits and vegetables per day in a study conducted by Shokrvash et al in Iran, where only 30% participants were having fruits and 32.8% were having vegetables.⁹

This difference can be attributed to the fact that in the current study only medical students were included, while in the study conducted in Iran, adolescents of different age groups and from various schools were included. Medical students' awareness regarding the importance of fruits and vegetables in their diet might be more than that of adolescents in school. Furthermore, in a cross-sectional study conducted by Al et al among female students studying in a university of Saudi Arabia, it was found that about one fourth (22%) of students were having 5 servings of fruits and vegetables per day.¹⁰ This is in contrast to the results of the present study, which can be due to the wide variation in the study area of the two studies.

In the present study, various barriers and facilitators for consumption of fruits and vegetables were identified. Around half of the study participants found that it is

difficult to eat 5 servings per day, two fifth (40%) of them felt that fruits and vegetables are expensive, about one third (32%) stated non-availability of fruits and vegetables nearby, and only (15.7%) found taste as the hindering factor in consumption of fruits and vegetables. Difficulty in eating fruits and vegetables everyday was reported by Mariam et al in one third (38%) University students of Bengehazi.¹¹ Al et al reported similar barriers among Saudi University students, that is, difficult to eat 5 servings of fruits and vegetables/day, fruits and vegetables are expensive and they are not delicious.¹⁰ Perera et al found that non-availability of fruits and vegetables at the proximity to residence of undergraduate students was the most important barrier in consumption of fruits and vegetables.¹² The important facilitators identified in the present study were awareness on benefits (84.3%) and affordable cost (78%). Although in a study conducted by Christiane et al in California, no significant relation was found between self-rated health and nutrition knowledge and frequency of fruits and vegetables consumption.⁸

In our study, age of the participants and education of mother were found to be significantly associated with number of servings of fruits and vegetables in a day. Females were found to be having slightly more servings than males, but the difference was not statistically significant. Comparable results were reported by Izzah et al in Malaysia, where women were consuming more fruits and vegetables than men without any significant difference.¹³ Though there was no significant association between socio-economic status and consumption in the present study, Ruel et al reported significant socio-economic differentials in consumption of fruits and vegetables with steady increase in consumption as income increased in a multi country comparison in the Sub-Saharan Africa.¹⁴ This could be due to the fact, that our study is conducted in a medical college among students, where not much socio-economic difference could be identified, but at the country level where the disparities are obvious these differences were easily appreciated.

The self-reporting of consumption of fruits and vegetables by the study participants is considered as the limitation of the present study. In addition, data on seasonal pattern, family support, cultural factors and quantification of serving of fruits and vegetables consumed by participants was not collected which can further influence the pattern of consumption.

CONCLUSION

This study concludes that only one third of study participants consumed more than five servings of fruits and vegetables which is recommended number of serving in a day. Age and semester of study participants and education status of mothers were found significant predictors of consumption of recommended number of serving of FVs in day. So, there is a need to increase awareness about importance of fruits and vegetables consumption among study population. As we can't

conclude regarding causal relationship from results of this cross-sectional study so, additional research is needed to determine the casual predictors of FVs consumption in order to design health promotion and education programs for adolescents.

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