NUTRITIONAL STATUS, EATING HABIT AND DIETARY/HEALTH PERCEPTIONS AMONG SCHOOL GOING ADOLESCENTS IN MUMBAI, INDIA

K. Anil Kumar*

Sandhya K. Ramakrishnan**

N. Hemalatha***

Abstract

This paper examines the nutritional status, dietary pattern and perceptions of school going adolescents in Mumbai, India with special focus on the differences between boys and girls. A largely structured, pre-tested questionnaire was used to collect data. Height and weight of adolescents were measured. The study was conducted in four Schools in Mumbai, India. Data were collected from 540 adolescents who were studying in 8th and 9th standard from adolescents in two government run and two private schools.

The study shows a very high extent of under nutrition (70 percent) and relatively low extent of overweight/obesity (4.4 percent). A moderate extent of self reported nutritional deficiency disorders was reported. Eating habit of adolescents showed a pattern of skipping meals with breakfast being the most skipped meal. Significant difference exists in skipping meals between boys and girls; while more boys skip breakfast more girls tend to skip lunch or dinner. The consumption of snacks in between the meals is found considerably high (45%). There is a moderate understanding of nutritional diet among the selected adolescents but the observed

* Professor, Centre for Health and Social Sciences, School of Health Systems Studies, Tata Institute of Social Sciences, Deonar, Mumbai, India

** Assistant Professor, Centre for Health Policy, Planning and Management, School of Health Systems Studies. Tata Institute of Social Sciences, Deonar, Mumbai, India

*** Research Associate, Tata Institute of Social Sciences, Mumbai, India

nutritional status does not match with this. And, more males than females perceive their health status as excellent or good**.**

Nutritional status should become an important concern in adolescent targeted interventions. Adolescents need to be enlightened on the importance of nutrition, the consequences of skipping meals and on the quality of snacks consumed. The schools, both government and private, should recognise their responsibility in imparting nutrition education.

Key Words: Nutritional Status; Eating Habit; Dietary Perceptions; School Adolescents

Introduction

Malnutrition among adolescents is of public health significance all over the world. There is no doubt that diet has profound influence on human health particularly during adolescence due to the increased growth and changes in body composition associated with puberty [1,2]. The dramatic increase in energy and nutrient requirements coincides with other factors that may affect adolescents' food choices and nutrient intake, and thus nutritional status. These factors, including the quest for independence and acceptance by peers, increased mobility, greater time spent at school and/or work activities, and preoccupation with self-image, contribute to the erratic and unhealthy eating behaviors that are common during adolescence [1,3].

Various studies have found that adolescents often fail to meet dietary recommendations for overall nutritional status and for specific nutrient intakes [4-7]. Many adolescents receive a higher proportion of energy from fat and/or added sugar and have a lower intake of a vitamin A, folic acid, fiber, iron, calcium, and zinc than is recommended [4, 8-12]. The low intake of iron and calcium among adolescent girls is of particular concern. Iron deficiency can impair cognitive function and physical performance, and inadequate calcium intake may increase fracture risk during adolescence and the risk of developing osteoporosis in later life [13-,17]. World Health Organization [18] has recommended various indices based on anthropometry to evaluate the nutritional status of the school aged children; Body Mass Index (BMI) is considered as an appropriate indicator to study the nutritional status among adolescents [19,20].

While a great deal of research has been conducted on child and adult malnutrition in India, there are only a handful of studies on adolescent malnutrition [21-24], despite the fact that they constitute 22 percent of India's population. Based on the total population size from 2011 Census and the

share of adolescents in the population (based on 2001 Census), the number of adolescents in India would now be around 266 million. Young people are considered as a great 'demographic dividend' offering a dependable potential to drive and sustain economic growth in India's eleventh five year plan (2007-2012) and beyond [25]

Malnutrition is a grave concern not limited to the rural areas of India, but in the urban areas as well [26]. With more than 16.4 million inhabitants, Mumbai, considered as India's commercial capital, is the most populous city in India and hosts about 3.6 million adolescents. Mumbai's residents are characterized by social heterogeneity which cuts across regional, ethnic, cultural and linguistic lines. The existing infrastructure is overburdened, and rich, poor and diverse cultures coexist intimately. And, the sheer numbers involved in a city like Mumbai make it very important to examine the extent of malnutrition [24,27]. The present paper is an attempt to examine the nutritional status of school going adolescent in Mumbai, their eating habits, including skipping meals, dietary and health perceptions with a special focus on gender differences.

Materials and Methods

This study was conducted in Mumbai among adolescents from four schools. From a list of schools in Mumbai metropolitan area, four schools, two government schools and two private co-education schools, were selected at random. The adolescents for this study comprised of students from 8th and 9th standard. Two divisions were selected from each standard in each school and all students who were present on the dates of data collection were included in the study if they were willing to participate. Thus, data was collected from 540 students using a pre-tested mostly structured questionnaire with only a few open ended questions. Anthropometric measurements such as height and weight were taken for all students.

Nutritional status was measured using Body Mass Index (BMI) calculated using height and weight and also using self reported nutritional deficiency diseases. Both mean BMI and the distribution into 'low' (BMI below 18.5), 'normal' (18.5 to 24.99) and 'high' BMI (25 and above) categories were used in the analysis. Adolescents were asked whether they were suffering from scurvy, night blindness, anemia or rickets. The symptoms of each of these were explained to them before they began completing the questionnaire.

Dietary pattern was studied using variables such as number of meals in a day, regularity of meal pattern, skipping of meals, habit of having snacks between two meals, and type of food usually consumed. While a number of questions were asked on perceptions, the present paper considers perceptions about healthy diet, understanding of nutritious diet, perceived adequacy of nutritional intake, perceptions about physical exercise, perceptions about vegetarian and non-vegetarian diet and perceived health. Chi-square test was used to examine the difference between boys and girls for all the variables except mean BMI.

Results

Sample Characteristics

Most of the selected adolescents were below 15 years (88 percent); age range was from 12 to 17 years (Table 1). Out of the selected 540 adolescents, 308 (57%) were males making a sex ratio of 1273 boys per 1000 girls. More than three fourths of respondents were Hindus, Muslims constituted 9.8 per cent while the remaining 5.9 percent were Christians. While more than half of the respondents did not know their caste group, 20 percent were from forward caste groups, 12 percent belonged to scheduled caste and scheduled tribes and 16 percent were from other backward castes. Birth order of the selected adolescents was one for about 43 percent and 2 or three for another 48 percent. More or less equal number of respondents was from the 8^{th} and 9^{th} standards.

In 17 percent of the cases the respondent's mother was illiterate while in 5.4 percent cases the father was illiterate. Educational status of fathers was better as compared to that of mother. Most of the mothers were not working (80 percent) while most of the fathers were working (84 percent), with 1.5 percent reporting that their father was unemployed and another 14 percent did not know the work status of father. Even in the case of education, close to 10 percent of adolescents did not know the educational status of their parents.

More than half of the respondents stay in slum type residences (55 percent) and close to 20 percent in rented or leased households. More than 60 percent of adolescents are from nuclear families. Around 40 percent of the selected adolescents stay in households that do not have a separate room for kitchen. Most of the adolescents reported as having access to adequate water

supply. A little above 12 percent of adolescents reported that their households do not use iodized salt for cooking while 10 percent reported that they are not aware about the status. A little higher than one fifth of the adolescents are from the lowest standard of living group whereas close to 15 percent belong to the high standard of living category.

Nutritional Status

The mean body mass index in the sample was 17.8, slightly below the suggested normal level of 18.5, with no significant difference between boys and girls (Table 2). The distribution according to BMI levels shows that close to 70 percent of adolescents have lower than normal BMI, suffering from under nutrition. Only a little greater than a quarter of adolescents have normal BMI. The extent of under nutrition among school going adolescents in Mumbai is much higher than reported in many studies [28-32], but similar to that observed in some others [33-34]. An analysis based on the National Family Health Survey 2005-06 found that in the 15-19 age group, the extent of under nutrition is 58 and 47 percent respectively (rural and urban areas combined) [35]. An earlier study in Mumbai also found that the nutritional status of school going adolescents is much worse than one would expect [36]. An analysis based on NFHS 3 data reports that youth in Mumbai (15-24 years) are more likely to be thin as compared to those in seven other large cities in India [35].

The fact that 4.4 percent of adolescents have a high BMI, suggesting overweight or obesity, indicates the status of nutritional transition underway in India especially in its urban areas. However, the extent of overweight/obesity observed in the present study is lower as compared the level reported by some recent studies in India. A recent study in another Indian city, Hyderabad, showed that the extent of overweight/obesity among school going children aged 12-17 years as 6.1 percent among boys and 8.2 percent among girls [37]. Another study in a city of Kerala state [38] found that among college going girls aged 17 years the extent of overweight or obesity was 22 percent. A study in Goa among school going children aged 10-19 years during 2008-09 found that 38 percent boys and 28 percent girls were overweight [39]. Yet, the above finding that a very high extent of under nutrition and some extent of overweight/obesity co-exist requires urgent attention.

Self reported extent of nutritional deficiency diseases shows that such diseases are moderately prevalent among school going adolescents in Mumbai. It is quite possible that that there is a low level of perceived nutrition related illness among school going adolescents, despite having a generally low BMI. While the reported prevalence of scurvy and night blindness do not differ significantly between males and females, the sex differences were statistically different for self reported anemia, and rickets. One fifth of selected adolescents reported that they suffer from at least one of the nutritional deficiency disorders mentioned above with significant difference between males and females. This implies that many of those reporting one type of disorder have also reported other types of disorders.

In a study it has been reported that 56 per cent of school children from drought affected areas of India showed signs of vitamin A deficiency. Vitamin A deficiency among underprivileged school age children is considered to be a public health problem [(40)]. More than a quarter of school age children suffered from vitamin A deficiency diseases in India [(41)]. Compared to these figures, the extent reported in this study is low. A comparison can also be made about the level of anemia prevalence among adolescents in the present study with that from NFHS 3 data. While 7 percent of males and 13 percent of females in the present study reported that they suffer from anemia, the analysis based on NFHS data (using anemia measured by hemoglobin levels) showed that 30 and 56 percent respectively of males and females in the age group suffered from anemia. This can be taken as an indication of the positive self perception about one's own nutritional status among adolescents. A multi centric study by the Indian Council of Medical Research (ICMR) found that average overall anemia levels among adolescent girls are about 90 percent throughout the country while the average vitamin A intake was only about 50 percent of the recommended daily allowance (RDA) in most part of the country [(42)]. Data from National Nutrition Monitoring Bureau [(43)] indicated that nutrient deficit among adolescents is higher than energy deficiency; the study concluded that qualitative aspects of food consumption is of concern. A review of various surveys shows that the extent of anemia among adolescents is very high in India as compared to many other Asian countries [(44)].

Eating Habit

Eating habit of adolescents is a function of individual and environmental factors. A number of variables were considered in the present study to understand the eating pattern of selected adolescents (Table 3). Mean number of meals per day was 2.8 with females having an average value of 2.6. More than four fifth of adolescents reported a regular meal pattern with more females following an irregular meal pattern. While 88 percent reported that they have lunch every day, 93 percent reported that they have dinner regularly, with no significant gender difference.

Close to half of adolescents tend to skip at least one meal; the percentage is higher among girls. Breakfast is the usually skipped meal with about 45 percent of adolescents usually skipping breakfast. In the present sample, the pattern of skipping meals differs between males and females with more males skipping breakfast whereas more females tend to skip lunch or dinner. About 45 percent of adolescents reported that they usually have snacks between meals; however the quality of snacks could be questionable as a WHO report points out [(44)]. Two third of the sample adolescents are non-vegetarian; the sex difference is marginal.

The respondents who mentioned that they usually skip meals were further asked about the reasons for doing so. The most cited reason is lack of time followed by lack of interest in eating. The other reasons mentioned were that there is no choice of food items or that they perceive that they will become fat if all meals were eaten. The reasons reported though are similar between boys and girls, the relative importance of a particular reason differs between them; for example, while 45 percent boys reported lack of time as the reason, 28 percent of girls reported the same factor reason for skipping meals.

Perceptions about Diet and Health

Dietary perceptions and perceptions about health are important factors that can affect the eating habits and nutritional status. Table 4 presents dietary and health perceptions of selected adolescents and sex differences. More than 60 percent of adolescents perceive tasty food as healthy food while 55 percent perceive that food items that are rich in protein are healthy and close to 60 percent perceive that vitamin contents decide whether food items are healthy or not.

Based on the responses to various items in the questionnaire regarding perceptions about healthy food, the adolescents were classified as having adequate understanding of nutritious diet and as having a moderate understanding. Only two respondents were categorized as having a low understanding of healthy diet. While 55 percent of adolescents did have an adequate understanding of healthy diet, 45 percent had moderate understanding with only marginal sex difference.

Another important factor that may affect eating habits and nutritional status is the perceived adequacy of nutritional intake. In the sample, 82 percent perceived that their nutritional intake is adequate, again with only marginal sex difference. A vast majority of adolescents (94.1 percent) believe that physical exercise is important for health. In contrast with this encouraging perception, 82 percent think that expensive food items are generally healthy. Respondents were asked about their perceptions about vegetarian and non vegetarian food. More than two third of respondents stated that a combination of vegetarian and non vegetarian food items is healthy while close to 30 percent opined that vegetarian food is healthy. A large majority of adolescents (86 percent) rated their health as excellent or good while 2 percent reported that they have poor health status; the difference between males and females in perceived health is statistically significant at 1 percent significance level. While more males perceive their health as excellent, females generally rate their health status as good.

Discussion

A major observation from the present research is the very high extent of under nutrition along with some extent of overweight/obesity among school going adolescents. Given that the government efforts have not succeeded in reducing anemia levels significantly, the future scenario would be that of a large proportion of adolescents having low BMI along with a considerable proportion having overweight/obesity. High extent of under nutrition may be partially due to inappropriate eating habits as found in other studies.

There appears to be an under reporting of nutritional deficiency diseases in comparison with the observed low level of nutritional status among the study adolescents. Adolescents reporting one type of disorder tend to mention that they suffer from other types of nutritional disorders also.

The absence of an association between BMI levels and reported extent of nutritional disorders indicates positive self perception about nutrition among adolescents while the fact is far from this. The low level of reported disorders while the BMI level is low or high merits further notice as this necessitates appropriate nutrition education programmes which are mostly absent in the schools. Similarly, the extent of perceived adequacy of nutritional intake is quite high; this is to be noted along with the high extent of under nutrition and the moderate extent of disorders reported.

The present study shows that skipping of meals is common among school going adolescents in Mumbai. While other studies have also shown such a pattern, the importance of focusing on this issue is not adequately understood. It has to be noted that meal skipping happens not because of non-availability of food, but because of lack of time, lack of interest in eating, lack of food choice and worry about becoming fat, showing a lack of understanding. Regularity of meal pattern is lower among girls; the pattern of skipping meals also differs between boys and girls. Whether the high extent of irregular meal pattern among girls is due to gender bias is not clear from this study. Also, the meal skipping pattern shows that more boys skip breakfast while more girls skip lunch or dinner.

Skipping of breakfast is highly associated with nutritional status. Though breakfast is universally considered very important meal, in India the relative importance given to this as compared to lunch and dinner is less. This means that more boys skip a meal that is generally considered as of less importance while more girls skip lunch or dinner the important meals of a day. The consumption of snacks in between the meals is 45 percent; although it is not a bad practice on its own, the quality of the snacks should be a matter of concern. Snacks chosen by adolescents, in general, tend to be high-sugar or high fat foods.

The study found that the perception of the adolescents about the healthy diet was based more on taste preference than on the nutritional contents. Around 62 percent of the surveyed adolescents believed tasty food as a healthy diet. Yet, when we computed the understanding of nutritional diet, 55 percent of them had enough understanding and the remaining had moderate

understanding. This shows that understanding about nutritional diet does not have much of an influence on their eating habits.

Research has shown that there is a discrepancy between teenagers' health knowledge and their behavior. Although teenagers may generally be well informed about good health practices, their knowledge is often not translated into behavior; this needs to become a focus in interventions among adolescents. The absence of an association between perceived health status and the nutritional situation clearly implies that there is an urgent need to educate adolescents about nutrition and other aspects of being healthy.

If we should learn from experience of other nations, it is time to focus also on obesity prevention in urban areas of India along with attempts to improve the under nutrition; such an attempt would help to prevent the next generation from experiencing both high extent of under nutrition and the pandemic of obesity. This study shows the need to actively implement school based programmes for improving their nutritional status. Further, there is a need to enlighten adolescents on importance of nutrition, consequences of skipping meals and on the quality of snacks consumed. Nutrition counseling and health education to mothers should also be an important component of health services which will help to decrease the effect of ignorance and faulty practices. Factors that impact adolescents' eating behavior should be researched so that appropriate interventions could be planned.

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Table 1: Individual and Household Characteristics of Selected Adolescents (n=540)

Characteristics	Percent	Characteristics	Percent	Characteristics	Percent
Age group		**Mother's education**		**Ownership of any**	
<15	87.6	Illiterate	16.5	**agricultural land**	
15 and above	12.4	Up to secondary	43.7	Yes	50.4
		Higher secondary and above	28.7	No	49.6
		Don't know	11.1		
Sex		**Father's education**		**Type of family**	
Male	57.0	Illiterate	5.4	Nuclear	60.9
Female	43.0	Up to secondary	43.1	Joint	33.9
		Higher secondary and above	42.6	Extended	5.2
		Don't know	8.9		
Religion		**Mother's Work status**		**Separate room for**	
Hindu	75.0	Working	13.4	**kitchen**	
Muslim	9.8	Not Working	79.8	Yes	60.2
Christian	5.9	Don't Know	6.7	No	39.8
Others	9.3				
Caste		**Father's occupation**		**Source of drinking water**	
SC	9.4	Professional Workers	28.5	d water (piped into	64.8
ST	2.4	Services	25.0	residence/yard/plot)	
OBC	16.1	Business	23.7	Piped water (public tap)	27.4
Others	19.8	Unemployed	1.5	d pump (in	
Don't know	52.2	Others	7.6	residence/yard/plot)	
		Don't know	13.7	Hand pump (public)	1.7
				Tanker truck	0.9
				Other sources	3.1
Birth order		**Ownership of house**		**Household has iodized**	
One	42.7	Owned	81.3	**salt for cooking**	
Two to three	47.7	Rented	15.0	Yes	77.4
More than three	9.6	Others	3.7	No	12.4
				Don't know	10.2
Completed education		**Type of house**		**Standard of living**	
7^{th} standard	50.2	Chawl	55.0	Low	20.2
8^{th} standard	49.8	Flat	29.1	Medium	65.4
		Row house	7.4	High	14.4

		Independent house	5.9		
		Others	2.6		
Total	**100.0**	**Total**	**100.0**	**Total**	**100.0**

Note: For all the variables n= 540 except for birth order (n=522) and source of drinking water (n=529)

Mean of selected adolescents is 13.5 years

Table 2: Body Mass Index and Nutrition Related Diseases

	Male	**Female**	**Total**
Mean BMI	17.9	17.6	17.8 ^{ns}
Low BMI	211 (68.7)	161 (69.7)	372 (69.1)^{ns}
Normal BMI	80 (26.1)	62 (26.8)	142 (26.4)
High BMI	16 (5.2)	8 (3.5)	24 (4.4)
Suffer from Scurvy	19 (6.2)	18 (7.8)	37 (6.9)^{ns}
Suffer from Night Blindness	13 (4.2)	5 (2.2)	18 (3.3)^{ns}
Suffer from Anemia	22 (7.1)	30 (12.9)	52 (9.6)**
Suffer from Rickets	15 (4.9)	20 (8.6)	35 (6.5)**
Suffer from any of the above four illnesses	50 (16.2)	59 (25.4)	109 (20.2)***

Note: n=540 for nutritional deficiency diseases and 538 for BMI

*p≤0.1; ** p≤0.05; *** p≤0.01

Table 3: Eating Habit of Adolescents (n=540)

Habit	**Male**	**Female**	**Total**
Average number of meals per day	2.9	2.6	2.8***
Follow a regular meal pattern	268 (87.0)	175 (75.4)	443 (82.0)***
Have breakfast everyday	264 (85.7)	183 (78.9)	447 (82.8)**
Have lunch everyday	272 (88.3)	204 (87.9)	476 (88.1)^{ns}

Have dinner everyday	292 (94.8)	212 (91.4)	504 (93.3)^{ns}
Skip at least one meal	142 (46.1)	116 (50.0)	258 (47.8)^{ns}
Meals usually skipped			
Breakfast	71 (51.4)	41 (36.6)	112 (44.8)*
Lunch	46 (33.3)	46 (41.1)	92 (36.8)
Dinner	21 (15.2)	25 (22.3)	46 (18.4)
Reason for skipping meal(s)			
(n=126 males and 106 females)			
Lack of time	57 (45.2)	30 (28.3)	87 (37.5)
Lack of interest/Don't like to eat	22 (17.5)	26 (24.5)	48 (20.7)
No choice of food	16 (12.7)	27 (25.5)	43 (18.5)
Will become fat	10 (7.9)	12 (11.3)	22 (9.5)
Other reasons	21 (16.7)	11 (10.3)	32 (13.9)
Have snacks between meals	147 (47.7)	99 (42.7)	246 (45.6)^{ns}
Type of food usually consumed			
Vegetarian	91 (29.5)	84 (36.2)	175 (32.4)^{ns}
Vegetarian and Non-vegetarian	217 (70.5)	148 (63.8)	365 (67.6)

Figures in brackets show percentages

*p≤0.1; ** p≤0.05; *** p≤0.01 ; ns not significant

Table 4: Perceptions about Diet and Health

	Male	**Female**	**Total**
Perception about Healthy Diet (n=536)			
Tasty food	181(54.5)	151(45.5)	332(61.9)^{ns}
Rich in Calorie	46(15.1)	33(14.2)	79(14.7)^{ns}
More in Quantity	32(10.5)	19(8.2)	51(9.5)^{ns}
Spicy food	58(19.1)	49(21.1)	107(20.0)^{ns}
Rich in Protein	163(53.6)	129(55.6)	292(54.5)^{ns}
Rich in Vitamins	178(58.6)	141(60.8)	319(59.5)^{ns}
Rich in Carbohydrates	72(23.7)	38(16.4)	110(20.5)**
Rich in Fat	41(13.5)	15(6.5)	56(10.4)***
Understanding of Nutritious Diet (n=536)			
Moderate Understanding	159(52.1)	136(59.4)	295(55.3)^{ns}
Adequate Understanding	146(47.9)	93(40.6)	239(44.8)

Perceived Adequacy of Nutritional Intake (n=539)			
Adequate	257(83.7)	186(80.2)	443(82.2)^{ns}
Inadequate	50(16.3)	46(19.8)	96(17.8)
Perceived Importance of Physical Exercise (n=538)			
Important	292(95.4)	214(92.2)	506(94.1)^{ns}
Not Important	14(4.6)	18(7.8)	32(5.9)
Perceive that Expensive Food is Healthy Food (n=538)	61(19.8)	34(14.7)	95(17.6)^{ns}
Perception about Vegetarian and Non-vegetarian Food (n=532)			
Vegetarian Food is Healthy	79(26.2)	74(32.2)	153(28.8)^{ns}
Non-vegetarian Food is Healthy	17(5.6)	9(3.9)	26(4.9)
Combination of Vegetarian and Non-vegetarian Food is Healthy	206(68.2)	147(6.39)	353(66.4)
Like home cooked food (n=540)			
Yes	207 (67.2)	169 (59.9)	346 (64.1)*
No	22 (7.1)	13 (5.6)	35 (6.5)
Sometimes don't like	79 (25.6)	80 (34.5)	159 (29.4)
Perceived Health Status (n=527)			
Excellent	82(27.4)	31(13.6)	113(21.4)***
Good	181(60.5)	161(70.6)	342(64.9)
Fair	30(10.0)	31(13.6)	61(11.6)
Poor	6(2.0)	5(2.2)	11(2.1)

Note: Understanding of nutritious diet is computed from the responses to the questions on what they understand by nutritious diet (adequacy of quantity, balanced diet, low calorie food, moderate quantity of food, and variety of items)

*p≤0.1; ** p≤0.05; *** p≤0.01; ns: not significant

n varies across items due to non response.