

Study of Dietary Patterns in School Going Adolescents of District Ghaziabad

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ABSTRACT:

Background: The term adolescence is derived from the Latin word ‘adolescence; meaning “to grow, to mature” It has been defined by the World Health Organization (WHO) as the period of life from 10 to 19 years and is characterized by rapid physical growth, significant emotional, psychological and spiritual changes; and evolving personal relationships.

Objectives: To study the physical activity levels and dietary patterns of adolescents in Ghaziabad district.

Methods: A School based epidemiological study was conducted among 552 adolescents (11-15 years age group) in urban areas of district Ghaziabad. Multistage sampling technique was used to cover the sample size for present study. A pilot study was carried out in a higher secondary school other than the selected areas for the actual study to test the study schedule.

Results: Out of the 550 adolescents, the nutritional status of 334 (60.72%) was in the normal range, 60 (10.9%) were underweight and 156 (28.36%) were overweight or obese. Majority of the adolescents had a moderate level physical activity. Among the adolescents with low level of physical activity, majority (74.3%) were females while 25.69% were males. majority consumed 1 serving of fruits and vegetables per day. Majority ate fast food/outside meal food 1-2 times a week.

Keywords: School health, Diet, adolescence, nutritional status.

INTRODUCTION:

The word "adolescence" comes from the Latin "adolescence," which means "to develop, to mature." The World Health Organization (WHO) has identified it as the decade of life from

10 to 19 years, which is marked by rapid physical development, major emotional, psychological, and spiritual changes, as well as developing interpersonal relationships [1].

Adolescents make up one in five individuals worldwide, and they reside in developing nations in excess of 85% of the time. Several circumstances or behaviours that initially emerge in adolescence are strongly linked to a significant number of fatalities and diseases, chief among them being dietary and physical activity habits.

Especially in developing nations, the globe today suffers from a twin burden of malnutrition, which comprises both undernutrition and obesity [3].

Malnutrition poses a serious hazard to human health and development in all of its manifestations. A generation or more can be affected by poor nutrition, which begins before birth and continues through adolescence and adulthood. Investments in nutrition over the course of a person's life will have both immediate and long-term economic and social benefits⁴. For the purpose of developing effective interventions, it is crucial to understand the nutritional condition of adolescents in a community at the outset.

A "double burden" of sickness is currently being felt by many low- and middle-income nations, according to the WHO Health Report (2006). In addition to the ongoing issues with infectious diseases and malnutrition, they are also dealing with a sharp rise in factors that increase the chance of developing chronic diseases, like obesity and overweight, especially in the developing world.

To prevent nutritional deficits in kids, it is vital to come up with prevention measures for both underweight and overweight/obesity. They would be better able to participate in extracurricular activities and academics, and they would be able to develop into whole people with strong mental and physical faculties⁵. Adolescence, which is marked by an incredibly quick rate of growth and serves as a transitional stage from infancy to maturity, assumes a crucial role in the course of human development. Many boys and girls in low- and middle-income countries are entering adolescence with stunting brought on by micronutrient deficiencies and anaemia brought on by inadequate food intakes and persistent childhood illnesses. Undernutrition affects the potential for growth and development, as well as the likelihood of intrauterine growth retardation in the foetuses of pregnant adolescent females, which raises the baby's risk of obesity and non-communicable diseases later in life (e.g. cardiovascular diseases and type 2 Diabetes) [7].

The overarching goal of the current study was to increase students' knowledge of food and nutritional practises while also raising awareness of these topics among them.

OBJECTIVES:

1. To study the physical activity levels and dietary patterns of adolescents in Ghaziabad district.

MATERIALS AND METHODS:

“Organization of Study: Santosh Medical College, Ghaziabad”

“Place of Work: The study was carried out in-

* Higher secondary schools in urban area of district Ghaziabad

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“Study Design: School based epidemiological study”

“Sampling Frame: Higher secondary schools in the urban areas of Ghaziabad district”

“Sample Size: According to NFHS-4 and several other studies conducted in India by World Health Organization and the World Bank (69-70) the prevalence of malnutrition is 42%.

The sample size was calculated by the formula ($n = Z.Z. P.Q/L.L.$)

Sample Size (n)= $4*42*58/4.2*4.2 = 552.38$

N is the desired sample size

P is prevalence of malnutrition among adolescents in India= 42

Q = (100-p)

L =10%

Substituting all the values we get sample size (n) = 552”

“Inclusion Criteria:

1. Students in age group of 11-15 years in urban area of Ghaziabad district
2. Students who are willing to give consent”

“Exclusion Criteria:

1. Students not in age group of 11-15 years
2. Students who are not willing to give consent
3. Students who give incomplete responses”

Sampling Technique: Multistage sampling technique was used to cover the sample size for present study.

Stage 1. A list of all the higher secondary schools in the District of Ghaziabad's urban region was compiled for this study's purposes. The schools within 12 kilometres of Santosh Medical

College and Hospital were chosen for the study because of their ease of access to the schools. 11 of these schools were chosen using simple random sampling.

Stage 2: From each class, one portion was randomly chosen (VIth to Xth). The first consenting pupils in each of these sections were then chosen. 50 students were chosen in this way, one from each of the 11 schools.

“Study Population: All the school going adolescents in Ghaziabad district”

“Study Unit: All adolescents in age group of 11-15 years in higher secondary schools in urban areas of Ghaziabad district”

“Study Schedule: The following set of schedules was used for the study-

1. Family schedule
2. Individual schedule”

Data Collection: Before beginning the official study, the study schedule was put to the test in a higher secondary school outside of the areas that were chosen for it in a pilot study.

In order to obtain complete cooperation from the respondents and to perform the study successfully, the chosen schools were visited, and the respondents received a thorough explanation of the study's goals and a signed consent. With prior approval from the school's head, a self-administered, carefully created, pre-tested, and closed-ended questionnaire was used to interview these 50 students from each school. Their heights were measured from the top of their heads to the bottom of their heels using a stadiometer to the nearest 0.1 cm, and their weights were determined using a typical portable electronic weighing machine to the nearest 0.1 kg.

Data Processing and Analysis: Data was coded, moved to a master chart, and then compiled and analysed using basic and association tables and the proper statistical tests, like the Chi-square test with Yates adjustment when applicable.

RESULTS:

Table 1: Distribution of study subjects according to socio-economic status (SES)

| Socio-economic status | Total (N=550) | |
|-----------------------|---------------|-------|
| | N | % |
| I | 99 | 18 |
| II | 185 | 33.63 |
| III | 195 | 35.45 |
| IV | 71 | 12.9 |

(According to Kuppuswamy's socio-economic status scoring)

Majority of the adolescents (35.45%) belonged to SES III.

Table 2: Distribution of study subjects according to nutritional status based on BMI for age.

| Gender | Underweight (BMI for age <5 th percentile) | Normal (BMI for age 5 th to 85 th percentile) | Overweight/Obese (BMI for age > 85 th percentile) | Total (N=550) |
|----------------|---|---|--|------------------|
| Male (n=352) | 31 (8.8) | 265 (75.2) | 56 (15.9) | 352 (100) |
| Female (n=198) | 29 (14.6) | 69 (34.8) | 100 (50.5) | 198 (100) |
| Total | 60 (10.9) | 334 (60.7) | 156 (28.3) | 550 (100) |

Numbers in parenthesis indicate row wise percentage

$$\chi^2 = 91.6$$

$$df = 2$$

$$p < 0.05$$

“Out of the 550 adolescents, the nutritional status of 334 (60.72%) was in the normal range, 60 (10.9%) were underweight and 156 (28.36%) were overweight or obese.

Additionally, it can be seen that majority of the males (75.28%) had normal BMI for age while majority of the females (50.5%) were overweight or obese. The association between gender of the adolescents and their nutritional status was found to be statistically significant”.

Table 3: Distribution of study subjects according to level of Physical Activity (PAQ-A) Score.

| Level of physical activity | Male (N=352) | Female (N=198) | Total (N= 550) |
|------------------------------------|--------------|----------------|----------------|
| Low physical activity (n=144) | 37 (25.69) | 107 (74.3) | 144 (100) |
| Moderate physical activity (n=254) | 190 (74.8) | 64 (25.2) | 254 (100) |
| High physical activity (n=152) | 125 (82.2) | 27 (17.8) | 152 (100) |
| Total | 352 (64) | 198 (36) | 550 (100) |

Numbers in parenthesis indicate column wise percentages

$$\chi^2 = 126.515$$

$$df = 2$$

$$p < 0.05$$

It was seen that majority of the adolescents had a moderate level physical activity. Among the adolescents with low level of physical activity, majority (74.3%) were females while 25.69% were males. Majority of the high physical activity was seen in male adolescents (82.2%).

Table 4a): Distribution of study subjects according to dietary preference

| Dietary preference | Male (N=352) | Female (N=198) | Total (N=550) |
|--------------------|--------------|----------------|---------------|
| | N (%) | N (%) | N (%) |
| | | | |

| | | | |
|------------------------|-------------|-------------|-----------|
| Vegetarian (n=140) | 89 (63.57) | 51 (36.42) | 140 (100) |
| Non-vegetarian (n=410) | 263 (64.14) | 147 (35.85) | 410 (100) |

It was found that majority (74.55%) of the adolescents were non vegetarian. Among the non-vegetarians, 64.14% were males and 35.85% were females.

Among the vegetarians, 63.57% were males and 36.42% were females.

Table 4b): Distribution of study subjects according to frequency of consumption of non-vegetarian food in a typical week

| No. of times non veg food is consumed in a typical week | Male (N=263) | Female (N=147) | Total (N=410) |
|---|--------------|----------------|---------------|
| | N (%) | N (%) | N (%) |
| < 1 / week (n=111) | 66 (59.46) | 45 (40.54) | 111 (100) |
| 1-2 times / week (n=99) | 78 (78.78) | 21 (21.21) | 99 (100) |
| 3-4 times / week (n=60) | 37 (61.66) | 23 (38.34) | 60 (100) |
| 5-6 times / week (n=73) | 42 (57.53) | 31 (42.46) | 73 (100) |
| 1-2 times / day (n=67) | 40 (59.7) | 27 (40.29) | 67 (100) |
| Total | 263 (64.14) | 147 (35.85) | 410 (100) |

Numbers in parenthesis indicate row wise percentage

$$c^2 = 12.412$$

$$df = 5$$

$$p < 0.05$$

It was found that out of the total 410 adolescents who ate non-vegetarian, the majority ate non-vegetarian food less than once a week. Out of the adolescents who ate non-vegetarian food less than once a week, 40.54% were females while 59.46% were males. Among the adolescents who ate non-vegetarian food 1-2 times a week, 78.78% were males while only 21.21% were females. Among the adolescents who ate non-vegetarian food 1-2 times a day, 59.7% were males and 40.29% were females. The association between gender of the adolescents and the frequency of consumption of non-vegetarian food was found to be statistically significant ($p < 0.05$).

Table 5: Distribution of study subjects according to number of servings of fruits and vegetables consumed on a typical day over last one week

| Servings of fruits and vegetables | Male (N=352) | Female (N=198) | Total (N=550) |
|-----------------------------------|--------------|----------------|---------------|
| | N (%) | N (%) | N (%) |
| None (n=27) | 17 (62.96) | 10 (37.03) | 27 (100) |
| 1 serving (n=246) | 164 (66.67) | 82 (33.33) | 246 (100) |
| 2 servings (n=228) | 134 (58.78) | 94 (41.22) | 228 (100) |
| 3 servings (n=31) | 22 (70.96) | 9 (29.03) | 31 (100) |

| | | | |
|--------------------------|------------|-----------|-----------|
| 4 servings (n=14) | 11 (78.57) | 3 (21.43) | 14 (100) |
| 5 or more servings (n=4) | 4 (100) | 0 | 4 (100) |
| Total | 352 (64) | 198 (36) | 550 (100) |

Numbers in parenthesis indicate row wise percentage

$\chi^2 = 5.218$ $df = 5$ $p > 0.05$ (Using Yates Correction for Chi Square test)

Out of the 550 adolescents, the majority consumed 1 serving of fruits and vegetables per day. Only 4 of the adolescents ate 5 or more servings of fruits and vegetables per day. Out of the adolescents who ate 1 serving per day, 66.67% were males while 33.33% were females.

Among the adolescents who ate 2 serving per day, 58.78% were males while 41.22% were females. Among those that ate 3 servings per day, 70.96% were males while 29.03% were females. Out of the adolescents who ate 4 or more servings of fruits and vegetables, majority were males. The association between sex of the adolescents and the fruit and vegetable Consumption frequency was statistically insignificant.

Table 6: Distribution of study subjects according to consumption of one glass (about 250 ml) of non diet soda drinks in a typical week

| Consumption of soda / soft drink | Male (N=352) | Female (N=198) | Total (N=550) |
|----------------------------------|--------------|----------------|---------------|
| | N (%) | N (%) | N (%) |
| Never (n=4) | 0 | 4 (100) | 4 (100) |
| < 1 / week (n=138) | 83 (60.14) | 55 (39.85) | 138 (100) |
| 1-2 / week (n=121) | 67 (55.37) | 54 (44.62) | 121 (100) |
| 3-4 / week (n=116) | 77 (66.37) | 39 (33.62) | 116 (100) |
| 5-6 / week (n=99) | 68 (68.68) | 31 (31.31) | 99 (100) |
| 1-2 / day (n=47) | 35 (74.46) | 12 (25.53) | 47 (100) |
| 3-4 / day (n=25) | 22 (88) | 3 (12) | 25 (100) |
| Total | 352 (64) | 198 (36) | 550 (100) |

Numbers in parenthesis indicate row wise percentage

$\chi^2 = 16.878$ $df = 6$ $p < 0.05$ (Using Yates Correction for Chi Square Test)

It was found that out of 550 adolescents, 138 (25.09%) consumed non diet soda drinks less than once a week, 121 (22%) consumed 1-2 times in a week and 116 (21.09%) adolescents consumed one glass of non diet soda 3-4 times in a typical week. Among the adolescents

drinking less than one glass a week, 60.14% were males while 39.85% were females. Out of the adolescents who consumed 1-2 glasses per week, 55.37% were males and 44.62% were females. However, among the adolescents who consumed 1-2 glasses per day, 74.46% were males while 25.53% were females, among those who consumed 3-4 glasses per day, 88% were males while only 12% were females. The association between gender of the adolescents and the frequency of consumption of non-diet soda drinks is statistically significant ($P < 0.05$).

Table 7: Distribution of study subjects according to consumption of fast food / outside meal in a typical week

| Fast food / Outside meal consumption | Male (N=352) | Female (N=198) | Total (N=550) |
|--------------------------------------|--------------|----------------|---------------|
| | N (%) | N (%) | N (%) |
| Never | 19 (86.36) | 3 (13.63) | 22 (100) |
| < 1 / week | 37 (71.15) | 15 (28.84) | 52 (100) |
| 1-2 times / week | 89 (53.61) | 77 (46.38) | 166 (100) |
| 3-4 times / week | 94 (60.64) | 61 (39.35) | 155 (100) |
| 5-6 times / week | 87 (79.1) | 23 (20.9) | 110 (100) |
| 1 or more time / day | 26 (57.78) | 19 (42.22) | 45 (100) |
| Total | 352 (64) | 198 (36) | 550 (100) |

Numbers in parenthesis indicate row wise percentage

$\chi^2 = 23.403$ $df = 5$ $p < 0.05$ (Using Yates Correction for Chi Square Test)

It was found that out of the total 550 adolescents, the majority ate fast food/outside meal food 1-2 times a week. Out of the adolescents who ate fast food less than once a week, 71.15% were males while 28.84% were females. Among the adolescents who ate fast food 1-2 times a week, 53.61% were males and 46.38% were females. Out of the adolescents who ate fast food 3-4 times a week, 60.64% were males while only 39.35% were females. Of the adolescents who ate outside 5-6 times a week, 79.1% were males while only 20.9% were females. Of Those who ate fast food 1-2 times a day, 57.78% were males and 42.22% were females. The association between gender of the adolescents and the frequency of consumption of fast food/outside meal was found to be statistically significant.

DISCUSSION:

Of the total number of teenagers polled, 334 (60.72%) had nutritional status that was within the normal range (BMI for age below the 85th percentile), 60 (10.9%) were underweight (BMI for age at the 5th percentile), and 156 (28.36%) were overweight or obese (BMI for age at the 85th percentile or higher) (Table 2). In their study, Rawat R. et al. (2012)⁸ discovered that 13.5% of kids were overweight or obese, while Bharti et al. (2008)⁹ discovered that

4.3% of kids in school were overweight or obese, and a study conducted by Sachan B. et al. (2013)¹⁰ revealed that the prevalence of underweight was 17% overall and the prevalence of overweight and obesity was discovered to be 5.4% in adolescent girls in the Lucknow district. According to the research done by Baral S et al (2021)²⁰, the majority of teenage pupils (62.5%) were of normal weight, followed by underweight students (29.9%) and a small percentage of overweight students (7.6%). Study conducted by Meher S et al. (2018)¹⁹ revealed that 12% of schoolchildren were undernourished and 48% were overnourished. According to a study by Lakshmi E (2021)²¹, 14.28% of teenage females were classified as preobese, 45.16% of them were underweight, and 40.55 percent had normal BMIs. More than 8 in 10 of the teenagers in the sample had normal anthropometric status, according to Abizari AR's study from 2019²³, whereas only 6% of them were overweight or obese.

Majority (75.28%) of the males had normal BMI for age while majority (50.5%) of the females were overweight or obese. **Tharkar S et al (2009)**¹¹ obtained similar results in their study wherein the prevalence of overweight and obesity was significantly higher among girls than boys ($P < 0.05$) in adolescence.

According to the present study, majority of the adolescents had a moderate level of physical activity. Among the adolescents with low level of physical activity, majority (74.3%) were females while 25.69% were males. Out of the adolescents that had a moderate level of physical activity, maximum (74.8%) adolescents were males and 25.2% were females. The association between gender of the adolescents and their physical activity level was found to be statistically significant ($p < 0.05$) (Table 3). Majority of the high physical activity was seen in male adolescents (82.2%). In a study on school going adolescents, **Kotian MS et al (2010)**¹² found that the prevalence of overweight was higher among those participating for less than two hour/week in any type of physical activity. Similar results were also obtained by **Ramachandran A et al (2002)**¹³.

In the present study, it was found that majority of the adolescents (74.55%) were non-vegetarian (Table 4). Majority ate non vegetarian food less than once a week. The association between gender of the adolescents and the frequency of consumption of non-vegetarian food was found to be statistically significant ($p < 0.05$). The study done by **Lakshmi E (2021)**²¹ showed that majority (90.79%) of the adolescents were non vegetarian. About 51.61% consumed nonvegetarian. Items such as fish and mutton were consumed weekly only. In contrast, the study done by **Thakre BS et al (2011)**¹⁴ showed that the risk of overweight or obesity was significantly higher among children who were non vegetarians ($P < 0.001$).

In this study, majority (44.72%) of adolescents consumed 1 serving of fruits and vegetables per day. 99.27% adolescents consumed less than the recommended five servings of fruits and vegetables per day (Table 5). The association between fruits and vegetables consumption and nutritional status was found to be statistically significant ($p < 0.05$) (Table 5).

In a study done by **Peltzer K et al (2012)**¹⁵, 76.3% adolescents consumed less than the recommended five servings of fruits and vegetables per day and 28% consumed less than one serving per day. Our results are similar to a study done by **Singh AK et al (2006)**¹⁶ where it was found that there was an overall extremely low consumption of fruits and vegetables.

Likewise, **Rani A. et al (2013)**¹⁷, in their study, found that 40.7% students ate fruits one or more times per day and 74.5% ate vegetables one or more times per day. The study done by **Gupta M et al (2022)**²² showed that most of the individuals consuming fruits in a week on daily basis were about 44.16%, the rest of them consuming fruits less frequently or not consuming. Most (44.16%) of the individuals were consuming fruits on daily basis, while 26.54% were consuming 4-6 days a week, about 6% were consuming fruits less frequently or not consuming.

It was found that out of 550 adolescents, 25.09% consumed non diet soda drinks less than once a week, 22% consumed 1-2 times in a week and 21.09% adolescents consumed one glass of non diet soda 3-4 times in a typical week (Table 6). The association between gender of the adolescents and the frequency of consumption of non-diet soda drinks was found to be statistically significant ($p < 0.05$).

It was also seen that out of the total 550 adolescents, the majority ate fast food/outside meal food 1-2 times a week. Out of the adolescents who ate fast food less than once a week, 71.15% were males while 28.84% were females. The association between gender of the adolescents and the frequency of consumption of fast food/outside meal was found to be statistically significant ($p < 0.05$) i.e. males consumed more fast food than females (Table 7).

According to the research done by Arya G et al in 2013 [18], more adolescents eat fast food or junk food than they do fruits and vegetables. In Pokhara, school-aged teenagers consumed healthy food (50.33%), junk food (40.22%), and traditional cuisine (57.33%), according to a study by Baral S et al (2021)²⁰. The study also revealed that gender was substantially connected with the junk food pattern. Females had a 2.2-times greater chance than males of eating junk food (AOR=2.272, 95%CI=1.455-3.549). According to a study by Lakshmi E (2021)²¹, 54.37% of participants consumed chat foods such panipuri and bhelpuri on a weekly basis. This snack was seen being sold by street vendors for a fair price. "Chinese foods such as noodles and Maggie were consumed to an extent of 26.27% daily". The study done by **Gupta M et al (2022)**²² showed that more than 50% of them consumed high-calorie food such as chocolates, cake, pastries, burger, pizza, Chinese food, and beverages.

CONCLUSION:

In India, there is a double burden of nutritional disorders, ie, undernutrition and overnutrition due to scarcity of resources on one hand and junk/fast food habits on the other hand respectively. It was seen that majority (50.5%) of the females were overweight or obese. So, female adolescents need to focus on their diet and correct their dietary pattern. It was seen

that majority of the adolescents had a moderate level physical activity and among the adolescents with low level of physical activity, majority (74.3%) were females while 25.69% were males, so adolescents, specially female adolescents should be educated to indulge themselves more in physical activities. Out of the adolescents who ate 1 serving per day, 66.67% were males while 33.33% were females, so females should be stressed upon to increase their fruits intake. Majority ate fast food/outside meal food 1-2 times a week, so adolescents should be educated to cut down their fast food intake. Recently, market trends have changed and the market is pushing on junk foods. More of the adolescents are taking unhealthy foods.

ETHICAL CONSIDERATION: Permission was obtained from the Institutional Ethical Committee of the Santosh Medical College, Ghaziabad, U.P., before commencing the study.

CONFLICT OF INTEREST: None

SOURCES OF SUPPORT: Nil

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