ISSN 2581 – 4346

Available Online at www.ijms.co.in
Innovative Journal of Medical Sciences 2022; 6(4):11-19

RESEARCH ARTICLE

Analysis of nutritional status among high school-going adolescent students in Gadag town, Karnataka

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Received on: Aug 10 2022; Revised on: Sep 20 2022; Accepted on: Oct 10 2022

ABSTRACT

Background: Adolescents are nutritionally vulnerable because of the nutritional demand of the pubertal spurt. At this age, adequate nutrition, nutritional education, and counseling are critical to halting the consequences and their impact on this population segment. Calorie and micronutrient deficiencies are known to cause growth retardation in children and adolescents. It is recognized that a variety of foods must be consumed to meet nutrient requirements. Dietary diversity is a serious issue among poor populations in the developing world. The extent of variation in nutrient intake that occurs in a homogeneous population is useful. Malnutrition is a major component of school health services because it leads to poor cognitive performance and physical growth in children. Adolescents who have an unbalanced diet are more likely to develop chronic diseases, especially if they live an unhealthy lifestyle. The purpose of this study was to determine the nutritional status and factors influencing the nutritional status among Gadag City high school-going adolescents aged 12–19 years. **Objectives:** (1) To assess the nutritional status of Gadag City's high school adolescent students. (2) To explore about the factors that influence the nutritional status of high school students. **Materials and Methods:** A cross-sectional study was conducted on adolescent students aged 12–19 in Gadag city's government and private schools. Permission was obtained from the block education officer and principal of the respective school. Students provided informed consent after a brief explanation of the study's purpose. The data was collected using the proportional sampling technique, with a sample size of 150. Students from both schools were distributed a semi-structured questionnaire. The World Health Organization formula was used to calculate the body mass index. The data was entered into the Excel sheet at the same time. The results were given as a frequency and a percentage. **Results:** It has been discovered that the nutritional status of private school students in the overweight category is 7.6% higher than that of government school students. When compared to private schools, government schools had 6.4% more underweight students. It has also been discovered that the average weight of students attending government schools is 3.1% higher than that of students attending private schools. One of the major findings of this survey was that overweight students were more prevalent in private schools than in government schools, with less physical activity and junk food consumption being major influencing factors. **Conclusion:** Students in government schools are more likely to be underweight than students in private schools, according to the current study findings. To address the issue, government school students' nutritional status should be addressed, and health education and health promotion are important intervention methods.

Keywords: Diet, Obesity, Overweight, School children, Underweight, Influencing factors, Malnutrition

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INTRODUCTION

The WHO defines any person between ages 10 and 19. However, the sexual feelings follow the

latent sexuality of childhood. It is also termed the crucial phase in an individual's life. Adolescence, Latin adolescertice from adolescence, means to grow up children, in their teenage, behave differently as they witness the outside world and are unable to understand their emotional, moral, psychological, and physical changes. However, the adolescent stage is divided into three stages based on the challenges they face. Early adolescence lasts from the ages of 10–14, mid-adolescence lasts from the ages of 15–17, and late adolescence lasts from the ages of 18–24. As a result, it is common to discover that the nature of behaviors differs greatly. This is the stage at which people develop psychologically and socially into young adults. Adolescence allows a person to mature as an individual with more social responsibility, and they strive to make progress. A few adolescent characteristics are identified. The most important characteristics of adolescent children are biological growth and development, an undefined status, increased decision-making, increased pressures, and the search for self.[1]

The nutritional status of teenagers is an important element of the adolescent era in most developed and developing countries. In Bangladesh, teenagers account for more than one fifth of the population, or 36% of the adolescents' age group, and suffer from various problems. Poor nutrition is also a determining factor in health outcomes later in life.[2] According to 2011 census data, adolescents make up 20.9% of the total population in India and 18.9% of the total population in Karnataka. This is a significant opportunity with the potential to transform the country's social and economic fortunes. Malnutrition and anemia affect a significant number of adolescents in Southeast Asia, harming their health and development. Malnutrition, which includes both undernutrition and overnutrition, causes significant physical and emotional suffering in children and violates their human rights. They both make a child more vulnerable to a variety of diseases later in life. The well-being of children.[3]

The National Family Health Survey-4 in India estimates "undernutrition or overweight in adolescents aged 12–16 years using their nutritional status." The current situation necessitates attention

Table 1: Socio-demographic details of the study participants

Characteristics	Frequency	Percentage
Gender		
Male	72	48
Female	78	52
Schools		
Government	74	49.3
Private	76	50.6
Age		
13 years	30	20
14 years	40	26.6
15 years	40	26.6
16 years	50	33.3
Class		
8th	65	43.3
9th	50	33.3
10th	35	23.3
Type of Family		
Nuclear	116	77.3
Joint	34	22.6
Religion		
Hindu	140	93.3
Muslims	9	6.6
Christians	01	0.6
Education of Mother		
Primary	76	50.6
Secondary	59	39.3
Illiterate	15	10
Graduate	0	0
Higher secondary and above	0	0
Education of Father		
Primary	44	29.3
Secondary	87	58
Graduate	11	7.3
PG and above	0	0
Illiterate	8	5.3
Socioeconomic Status		
Higher	3	1.7
Middle	76	45
Lower	90	53.2
Occupation of the Father		
Employment	14	9.3
Unemployment	2	1.3
Labour	78	52.3
Business	32	21.3
Agriculture	24	16
Income (INR)		
30000–50000	60	40
20000–30000	89	59.3
50000–10000	1	0.6

Table 2: Distribution of V.D.S.T. school students nutritional status

Gender	Nutritional status	Frequency	Percentage
Male (*n*-10)	Underweight	3	30
	Normal	4	40
	Overweight	3	30
Female (*n*-14)	Underweight	4	28.5
	Normal	6	42.8
	Overweight	4	28.5

Table 3: Distribution of C. S. Patil school students nutritional status

Category	Nutritional status	Frequency	Percentage
Male (*n*-8)	Underweight	6	75
	Normal	2	25
	Overweight	0	0
Female (*n*-11)	Underweight	7	63.6
	Normal	3	27.3
	Overweight	1	9.1

Table 4: Distribution of J. T. school students nutritional status

Category	Nutritional Status	Frequency	Percentage
Female (*n*-8)	Underweight	3	35.3
	Normal	3	35.3
	Overweight	2	25
Male (*n*-10)	Underweight	4	40
	Normal	3	30
	Overweight	3	30

Table 5: Distribution of Basaveshwar school students nutritional status

Category	Nutritional status	Frequency	Percentage
Male (*n*-9)	Underweight	5	55.5
	Normal	2	22.2
	Overweight	2	22.2
Female (*n*-6)	Underweight	4	66.7
	Normal	2	33.3
	Overweight	0	0

Table 6: Distribution of government school students nutritional status

Category	Nutritional status	Frequency	Percentage
Male (*n*-21)	Underweight	14	66
	Normal	3	14.2
	Overweight	4	19.0
Female (*n*-23)	Underweight	12	52.1
	Normal	8	34.7
	Overweight	3	13.4

Table 7: Distribution of S. M. Krishna Nagar school students nutritional status

Category	Nutritional status	Frequency	Percentage
Male (*n*-5)	Underweight	4	80
	Normal	1	20
	Overweight	0	0
Female (*n*-10)	Underweight	8	80
	Normal	2	20
	Overweight	0	0

Table 8: Distribution settlement school students nutritional status

Category	Nutritional status	F	Percentage
Male (*n*-6)	Underweight	4	66.7
	Normal	2	33.3
	Overweight	0	0
Female (*n*-2)	Underweight	0	0
	Normal	1	50
	Overweight	1	50

Table 9: Distribution of S. H. R. J. school students nutritional status

Category	Nutritional status	Frequency	Percentage
Female (*n*-5)	Underweight	3	60
	Normal	2	40
	Overweight	0	0
Male (*n*-2)	Underweight	1	50
	Normal	1	50
	Overweight	0	0

Table 10: Comparison between the gender of government school

Gender	Nutritional status	Government school	
		F	%
Male	Underweight	25	67.5
	Normal	08	21.6
	Overweight	04	10.8
Female	Underweight	21	56.7
	Normal	12	32.4
	Overweight	04	10.8

Table 11: Comparison between the gender of private school

Gender	Nutritional status	Private School	
		F	%
Male	Underweight	17	48.5
	Normal	11	31.4
	Overweight	07	20
Female	Underweight	19	46.3
	Normal	14	34.1
	Overweight	08	19.5

Table 12: Government and Private school students nutritional status

Gender	Nutritional status	Government and private school	
		F	percentage
Male	Underweight	42	28
	Normal	19	12.7
	Overweight	11	7.3
Female	Underweight	40	26.7
	Normal	26	17.3
	Overweight	12	8

Table 13: Distribution of factors affect the nutritional status according to age

Category	Nutritional status	Frequency	Percentage
13 years (*n*-34)	Underweight	20	13.3
	Normal	8	5.3
	Overweight	3	2
14 years (*n*-41)	Underweight	17	11.3
	Normal	14	9.3
	Overweight	8	5.3
15 years (*n*-41)	Underweight	23	15.3
	Normal	11	7.3
	Overweight	2	1.3
16 years (*n*-52)	Underweight	22	14.6
	Normal	12	8
	Overweight	10	6.6

Table 14: Distribution of factors affecting the nutritional status on the base of education of father

Category	Nutritional Status	Frequency	Percentage
Primary	Underweight	22	50
	Normal	17	38.6
	Overweight	5	11.4
Secondary	Underweight	52	60.2
	Normal	23	26.1
	Overweight	12	13.6
Graduate	Underweight	7	66.6
	Normal	2	18.2
	Overweight	2	18.2
No Formal education (Illiterate)	Underweight	6	75
	Normal	2	25
	Overweight	0	0

Table 15: Distribution of factors affecting the nutritional status on the base education of mother

Category	Nutritional status	Frequency	Percentage
Secondary	Underweight	40	41.6
	Normal	20	20.8
	Overweight	16	16.6
	Underweight	40	67.7
Primary	Normal	14	23.7
	Overweight	5	8.4
	Normal	6	40
	Overweight	3	20

Table 16: Do you think food advertisement is influencing on school children

Category	Frequency	Percentage
Yes	125	83.3
No	25	16.6

Table 17: Sleeping characteristics which influences the nutritional status

Category	Frequency	Percentage
Good sleep	121	80.6
Bad Sleep	29	19.3

Table 18: Distribution of Junk food influencing the nutritional status

Category	Government schools (F)	Percentage
1 time	0	0
2 times	37	50
3 times	23	31.0
No consumption	14	18.9
Category	**Private schools (F)**	**Percentage**
1 time	2	2.6
2 times	44	57.8
3 times	30	39.4
No consumption	0	0

Table 19: Distribution of habit of Skipping Break-fast influencing the nutritional status

Category	Frequency	Percentage
Yes	65	43.3
No	85	56.6

to the physical and mental health of the younger generation, and the current subject was chosen for investigation in response to this need. Although the government's mid-day meal program helps children in government schools balance their nutrition, their socioeconomic background has deprived them of adequate nutrition.[4]

Underweight is a serious problem in many low and middle-income countries; however, weight gain is now a public health concern, as the global

Table 20: Distribution of consumption of chocolate it influencing the nutritional status

Category	Frequency	Percentage
1 time	50	33.3
2 times	99	66
3 times	0	0
No consumption	1	0.6

prevalence rate of overweight adolescents, both men and women, increased by 28.8%, 29.8%, and 38%, respectively, between 1980 and 2013.[5]

Physical growth and development maturation lead to an increased need for nutrients and micronutrients, which, when combined with inadequate dietary intake, contribute to adolescents' poor weight status. In addition, adolescents face a number of health issues. Anemia, poor nutrition, and sexual behaviors are all factors that influence health.[6]

A variety of factors influence children's dietary requirements and consumption. Age, gender, growth, and disease are among the most important biological and non-biological factors. Non-biological factors, such as socioeconomic circumstances, are also important. Poverty is a major public health issue, and dietary changes affect nutritional requirements. Sociocultural elements include religion, eating habits, food, the environment, hereditary factors, and parental education.[7]

Hunger, appetite, and taste are biological influences, as are social determinants such as culture, religion, peers, and meal patterns. Nutritional status influences psychological determinants such as stress, emotion, and food knowledge.[8]

MATERIALS AND METHODS

Source of data

A primary source of data was collected using a semi-structured interview schedule.

Study place

In the urban area of both private and government schools in Gadag city.

Study unit

Government and private schools.

Study participants

Adolescent students of both private and government schools in Gadag city.

Study design

School-based cross-sectional study.

Sampling design

Proposanate sampling technique was adopted.

Sample size estimation

Sample size 150 was calculated using the prevalence-based formula 4pq/L2, with the prevalence of overweight and obesity among adolescent schoolchildren at 10%, taking allowance error at 5%. Whereas p - prevalence - 10 % Q- (100-1) L = error (5%)

$n = 4(10)\ (100\text{-}90)/(52)$

$n = 3600/25 = 144$

$n = 150$

Sampling size: 150.

Data collection tool

A semi-structured interview schedule was used to gather the data.

Statistical analysis

Microsoft Excel was used to analyze the data entered in the Excel sheet, and the results are expressed in frequency and percentage.

Ethical approval

Ethical clearance was obtained from the ethics committee of Karnataka State Rural Development and Panchayat Raj University Gadag.

Distribution of study participantes according to gender

According to the study, male participants were less than female participants (48%) and women (52%). When compared to other categories of students, there are more 16-year-olds among the 150 participants. Twenty percent of students in the 13th and 15th categories are in the same age range.

There are approximately 150 study participants: 116 nuclear families and 34 (22.6%) joint families. Hindus outnumber Muslims and Christians among the 150 participants in the study. Hindu (93.3%), Muslim people (6.6%) and Christians people who (0.6%).

According to the current study, fathers with secondary education are more likely to be illiterate than those with primary education. Around 150 study participants have more primary education than secondary education and are illiterate. Secondary school and above Lower economic status is more than 53.2% when compared to the other categories [Table 1].

Based on the V.D.S.T.C. school survey results, it appears that there is little difference between underweight, normal, and overweight students. Students in each category were compared based on their gender. Male and female students are in the same range, and the percentage of malnourished students in government schools is higher than in private schools [Table 2].

Female students are more overweight than male students, and the percentage of malnourished students in government schools is higher than in private schools [Table 3].

Male and female students are in the same age range, and the overall percentage of malnourished students in government schools is higher than in private schools [Table 4].

Both male and female students are in the same weight range, but in that school, underweight and normal students are in the same weight range, and male students are more overweight than female students. Furthermore, the overall percentage of malnourished students in government schools is higher than in private schools [Table 5].

We can conclude that the number of underweight students in school is higher and has nothing to do with gender, whereas we can see good normal female students compared to normal male students, and at that school, both male and female overweight students are in the same range. Overall, students' nutritional range should be adequate so that underweight students are reduced [Table 6].

Based on the survey results for the S. M. Krishna Nagar government school mentioned above, We can summarize below that the number of underweight students in school is increasing and has nothing to do with gender. Whereas we can see good normal female students compared to normal male students, the overall statement is that students' nutrition range should be poor, resulting in an increase in underweight students [Table 7].

The number of underweight students in school is higher, and it is unrelated to gender, whereas we can see good, normal female students compared to normal male students. The overall statement is that students' nutrition range should be good, so that underweight students are reduced [Table 8].

The number of underweight students in school is higher, and it is unrelated to gender, whereas we can see good, normal female students compared to normal male students. The overall statement is that students' nutrition range should be good, so that underweight students are reduced.

The male underweight percentage is 67.5%, while the female underweight percentage is 56.7%. The male overweight percentage is 10.8%, and the female overweight percentage is 10.8%. Based on our observations, we can conclude that the male underweight percentage is higher than the female underweight percentage, and the female and male overweight percentages are in the same range. Females have a higher normal percentage than males [Table 9].

Based on the findings, we can conclude that no differences in nutritional status have been observed between genders. As a result, we can conclude that gender differences in nutritional status are observed in public schools but not in private schools [Table 10].

Overall comparison of public and private schools

According to the results of the above survey, students in government schools are less overweight than students in private schools. As a result, the nutritional status of government school students is lower than that of private school students [Table 11].

According to the survey results, more students are underweight in the 13-year-old age group when compared to the 14-year-old, 15-year-old, and 16-year-old age groups. In the 14-year-old age group, there are more normal-weight students than in any other age group. According to the survey, there are more overweight students [Table 12] in the 14-year-old age group than in the other age groups of 13, 15, and 16 [Table 13].

Based on the above survey, there are more illiterate students in underweight classes when compared to primary, secondary, and graduate students. There are more primary students in the normal weight category if we compare them with other categories. When we come to overweight, there are many graduate students compared to primary, secondary, and illiterate students[Table 14].

Based on the survey, there are more Primary education of mother students are underweight category when compared to other secondary and illiterate. there more secondary students are normal. Category when compared to others, when we come overweight in secondary education, of mother students are more overweight. Compare to the other two categories [Table 15].

Yes, based on the survey result, overall food advertisement has more impact on people's lives. According to the survey results, overall food advertisements have a greater impact on people's life. It additionally has an impact on adolescents in private and public schools [Table 16]. As per the survey conducted, it is a known fact that every schoolchild has to know the food items advertised in the media, and accordingly, they are influencing the advertised food items [Table 17]. According to the survey report, it will be understood that more private and Government schoolchildren are having more impact due to the media's advisement and the comparatively second survey undertaken [Table 18].

Based on the survey report, we can understand that more children in neither government nor private schools will have good sleep [Table 19]. Because of the activities undertaken by the school authorities in public and private schools children. As per a survey conducted, getting bad sleep for government and private school children is very less [Table 20].

According to the results of the survey, students at government schools consume less junk food than students at private schools. When we compared the use of junk food by private school children and government school children, we found that private school children used less junk food than government school children. According to the third survey, private school students consume more junk food than our government school students.

According to the results of the survey, private school students consume more junk food than public school students.

The majority of students in both public and private schools skip their breakfast. According to the survey, more students are skipping their breakfast.

According to the results of the above survey, both government and private school students consume chocolate twice as much as one time and the other category. As a result, students' nutritional status is influenced.

DISCUSSION

Malnutrition remains one of the most serious issues, with nearly 30% of the world's population suffering from one or more of the various forms of malnutrition. Undernutrition among adolescents is a serious public health issue, particularly in developing countries. As a result, this study was carried out to determine the magnitude and associated factors of nutritional status among high school adolescents.[9]

According to NCHS standards, the prevalence of thinness is higher in Indian adolescents, particularly among boys. When compared to girls, boys have a lower body mass index. This is consistent with the observations. Thinness is more prevalent in the 15–16-year-old age group. This could be due to the growth spurts and sudden height increases that occur in this age group. Thinness is more prevalent in Indian girls than in their counterparts in the UAE, and the overall prevalence of thinness is lower in girls than in boys.[10]

Overall comparison of public and private schools According to the results of the above survey, students in government schools are less overweight than students in private schools. As a result, the

nutritional status of government school students is lower than that of private school students.[11,12]

It has also been discovered that the percentage of overweight students in private schools is significantly higher than in public school students. When comparing private to government, the normal range is roughly the same. As a result, the conclusion is that students in government schools are underweight and have poor nutritional status. Furthermore, the proportion of overweight students in private schools is nominally high.[13]

Undernourishment was found in 16.9% of boys and 15.8% of girls in the study. In contrast, Chakraborty and Bose conducted a similar study. Nandi Gram Primary School, Purba Medinipur District, West Bengal The combined prevalence of thinness in boys and girls was 62.9% and 61.6%, respectively.[14] Similar findings found in study conducted by Sulakshana et. al in 2014 at rural settings.[15] Another study conducted by S Banerjee et.al in the mining region of rural Goa's North belt found 214 (37.8 percent) underweight boys and 124 (37.8 percent) underweight girls (27.5 percent).[16]

A similar study conducted by Hassan and Zulkifli among Government schools in Bangalore's Azad Nagar area found that the prevalence of malnutrition in males and females was 57.94 percent and 42.06 percent, respectively. [17]

A similar study among Lodha Tribal children in the village of Paschim Medinipur found 9.1%, 9.7%, and 3.6% of the children to be severely underweight, stunted, and wasted.[18]

CONCLUSION

According to the current study findings, students in public schools are more likely to be underweight than students in private schools. To address the issue, the nutritional status of government school students should be addressed, and health education and health promotion are important intervention methods.

One of the survey's key findings was that overweight students were more prevalent in private schools than in public schools, with less physical activity and junk food consumption being major contributors.

ACKNOWLEDGMENTS

We feel it is a great privilege to express our heartfelt thanks and deep sense of gratitude to Dr. Prof. Vishnukat S. Chatpalli, Vice-Chancellor, and Prof. B. L. Lakkannavar, Registrar of Karnataka State Rural Development and Panchayat Raj University, Gadag, for their encouragement and support.

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