



A STUDY TO ASSESS THE PREVALENCE OF OBESITY WITH ITS CONTRIBUTING FACTORS REGARDING CHILDHOOD OBESITY AMONG ADOLESCENTS AT SELECTED SCHOOLS, COIMBATORE.

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ABSTRACT Childhood obesity is a growing global health issue, with a significant rise in prevalence worldwide. This increase is attributed to factors like unhealthy diets, reduced physical activity, and changes in social and economic environments. **Objectives :** This study aimed to assess the prevalence of obesity with its contributing factors regarding childhood obesity among adolescents. **Methodology:** A cross sectional survey was conducted among adolescents studying in classes 8 and 9th standard in four schools, in Coimbatore. Height and weight measurements were taken and the body mass index was classified according to WHO guidelines. The collected data were analyzed and used to evaluate the associated factors. **Results:** Among the total 976 adolescents, 4.91% were obese, 17.41% were overweight, 68.44% were normal weight and 9.22% were underweight. The findings revealed a notable percentage of overweight and obese adolescents, with contributing factors such as mode of transportation, sports activities in school, high consumption of non vegetarian, preference of eating fast food, consuming carbonated drinks, physical inactivity, excessive screen time, and a family history of obesity. Although a majority of participants demonstrated basic awareness about obesity and its health consequences, there were noticeable gaps in comprehensive knowledge and a range of attitudes towards body image and healthy habits. **Conclusion:** The study underscores the importance of early education and intervention in schools to promote healthier lifestyles and build a strong foundation of knowledge to prevent childhood obesity.

KEYWORDS : Childhood Obesity, Adolescents, Obesity Prevalence, Contributing Factors, School- based Study, Lifestyle Behaviors

INTRODUCTION

Childhood obesity has become one of the most serious public health challenges of the 21st century, with its prevalence rising at an alarming rate across the globe. Obesity during adolescence not only increases the risk of various immediate health issues, such as diabetes, hypertension, and orthopedic problems, but also significantly elevates the likelihood of obesity and related non-communicable diseases in adulthood. Rapid urbanization, changing dietary habits, decreased physical activity, and increased screen time have contributed to this growing epidemic, particularly among school-going children.

In India, including urban centers like Coimbatore, the pattern of childhood obesity mirrors global trends, compounded by a lack of awareness, unhealthy lifestyle choices, and socio-cultural factors. Adolescents, being at a crucial stage of physical and psychological development, are particularly vulnerable to the influences of modern lifestyles. Therefore, understanding the prevalence of obesity and identifying the associated contributing factors among adolescents is essential for planning effective interventions.

This study was undertaken to assess the prevalence of obesity among adolescents in selected schools in Coimbatore, to identify the contributing factors, towards childhood obesity. The findings are intended to inform educators, healthcare providers, and policymakers in designing targeted strategies to promote healthier lifestyles and curb the rising tide of childhood obesity.

Background Of The Study

The increasing prevalence of childhood obesity has emerged as a major concern in the healthcare and education sectors globally. Traditionally, obesity was viewed as a problem limited to high-income countries; however, in recent decades, it has become increasingly prevalent in low- and middle-income countries, including India. The World Health Organization (WHO) has identified childhood obesity as one of the most serious public health challenges of the 21st century, with global estimates showing that over 340 million children and adolescents aged 5–19 were overweight or obese in 2016 a figure that continues to grow.

In India, urbanization and economic growth have led to significant lifestyle changes, especially in metropolitan and semi-urban areas like Coimbatore. The widespread availability of processed and fast foods, combined with reduced physical activity and increased sedentary behaviors like screen time, has contributed to an alarming rise in obesity among school-aged children.

The healthcare industry has responded to this crisis with initiatives promoting physical activity, nutrition education, and preventive screenings in schools. Simultaneously, the education sector is increasingly involved in implementing health education programs aimed at instilling awareness about healthy living among children. Despite these efforts, there remains a significant gap in awareness, knowledge, and attitudes toward obesity, especially among adolescents, who are at a critical age for forming lifelong health habits. The National Family Health Survey (NFHS) and other national health reports have recorded a consistent increase in the proportion of overweight and obese children over the past two decades. According to a global analysis the total number of children, adolescents and adults worldwide living with obesity has surpassed one billion.¹⁴ The analysis of global data by the NCD Risk Factor Collaboration (NCD-Risc)¹⁵ and the World Health Organization (WHO) estimates that among the world's children and adolescents, the rate of obesity in 2022 was four times the rate in 1990. Among adults, the obesity rate more than doubled in women and nearly tripled in men. In total, 159 million children and adolescents and 879 million adults were living with obesity in 2022.

In Tamil Nadu, studies indicated an increasing trend of childhood obesity, with some research suggest that overall prevalence of overweight and obesity was 13.28% of adolescent school students in Kanchipuram district.¹⁸ This background underscores the importance of conducting localized studies to understand obesity trends and their influencing factors at the community level. The present study in Coimbatore aims to contribute to this effort by providing current data on obesity prevalence and exploring their contributing factors among adolescents.

OBJECTIVES OF THE STUDY

- To assess the prevalence of obesity among adolescents
- To identify the contributing factors associated with childhood obesity among adolescents.
- To associate the contributing factors with their selected demographic variables among adolescents.

MATERIALS AND METHODS

Study Design:

This study adopted a descriptive cross-sectional design to assess the prevalence of obesity with its contributing factors regarding childhood obesity among adolescents in selected schools in Coimbatore.

Study Population:

The target population for this study included adolescents aged 13–15 years studying in selected schools in Coimbatore. The schools were selected using a stratified random sampling method, ensuring representation from different socio-economic backgrounds.

Sample Size:

The sample size was calculated using standard statistical methods for estimating proportions in a population. Based on a prevalence of childhood obesity in India (approx. 10-15% among school-going children) and a 95% confidence level with a margin of error of 5%, the sample size was determined to be approximately 200 adolescents.

Inclusion Criteria:

- Adolescents aged 13–15 years.
- Adolescents who provided informed consent (or whose guardians provided consent for minors).
- Adolescents who were available on the day of the survey.

Exclusion Criteria:

- Adolescents with known medical conditions that affect weight (e.g., thyroid disorders, genetic conditions).
- Who were physically challenged.

Data Collection Tools:

1. Socio-Demographic Questionnaire: It was used to collect information on the adolescents' age, gender, year of studying, socio-economic status, family history of obesity, dietary habits, occupation of parents, education of the parents, and Body Mass Index.

2. Anthropometric Measurements (BMI):

o **Height:** Measured using a stadiometer to the nearest 0.1 cm.

o **Weight:** Measured using a digital weighing scale to the nearest 0.1 kg.

o **Body Mass Index (BMI):** BMI was calculated using the formula:

$$BMI = \frac{\text{Weight(kg)}}{\text{Height}^2(\text{m}^2)}$$

Obesity (>95 percentile) and overweight (85 to 95 percentile) were categorized based on the WHO BMI-for-age percentiles for adolescents.

Contributing Factors Regarding Childhood Obesity

It is a self structured interview schedule to identify the contributing factors regarding childhood obesity. It consists of 25 multiple choice questions based on Lifestyle practices, physical activity and dietary pattern of childhood obesity.

Ethical Consideration

The study was conducted in selected schools in Coimbatore. After

obtaining necessary permissions from the school authorities. Ethical clearance had been approved from The Institutional Human Ethics Committee (IHEC), PSG Institute of Medical Science and Research, had reviewed the proposal on (Ref No 19/297, dt.26.02.2020) and approved to conduct the study. After getting the clearance from IHEC the researcher obtained the informed consent from the study participant and their parents and assent from the adolescents. Confidentiality of personal information was ensured, and participants were informed that they could withdraw from the study at any point without consequence.

Data Collection Procedure

A formal permission has been obtained from Chief Educational officer and Principals from Government and private schools, Coimbatore for data collection. The prevalence was observed among 976 samples, and screening of overweight/obesity among adolescents were done by checking their height and weight and then calculated the BMI and interpretation of calculated BMI with WHO's guidelines in two Government and two private school. In which 215 samples with overweight and obese were identified and by using simple random sampling technique (lottery method) 200 samples were selected from both the schools and divided into interventional and control group. The socio demographic factors and contributing factors were assessed by self-structured interview schedule among adolescents and intervention was given to the interventional group.

Statistical Data Analysis

Data were analyzed using SPSS (Statistical Package for the Social Sciences) version 22. Descriptive statistics such as frequencies, percentages, mean and standard deviations were used to summarize the demographic variables, prevalence of obesity and contributing factors. Chi-square tests were performed to examine associations between categorical variables. Multiple regression analysis was used to identify factors significantly associated with obesity prevalence and contributing factors.

RESULTS

Section A : Distribution Of Adolescents Based On Prevalence Of Obesity.

Table 1 : Frequency And Percentage Distribution Of Prevalence Of Obesity Among The Adolescents N-976

Prevalence of Obesity	f	%
Underweight	90	9.22
Normal weight	668	68.44
Overweight	170	17.41
Obese	48	4.91

The above table 1 denoted that over all prevalence among 976 adolescents, 90 (9.22%) were underweight, 668 (68.44%) were normal weight, 170 (17.41%) were overweight and 48 (4.91%) were obese.

Table 2 : Frequency And Percentage Distribution Of Lifestyle Contributing Factors Associated Regarding Childhood Obesity Among Adolescents In The Interventional And Control Group N = 200

Lifestyle Contributing Factors	Interventional Group (n-100)		Control Group (n-100)		Chi-Square for Homogeneity
	f	%	f	%	
The number of hours spends on watching TV during school days					$\chi^2=1.472$ P=0.689 N.S
0 hour	17	17.0	16	16.0	
1 hour	38	38.0	44	44.0	
1 – 2 hours	32	32.0	25	25.0	
3 – 4 hours	13	13.0	15	15.0	
The number of hours spends on Playing Video games/ Computer games during school days					$\chi^2=6.792$ P=0.079 N.S
Hour	40	40.0	45	45.0	
<1 hour	30	30.0	17	17.0	
1 – 2 hours	25	25.0	26	26.0	
3 – 4 hours	5	5.0	12	12.0	
The number of hours spends outside on weekend					$\chi^2=1.570$ P=0.666 N.S
<1 hour	29	29.0	27	27.0	
1 – 2 hours	35	35.0	37	37.0	
3 – 4 hours	19	19.0	24	24.0	
>4 hours	17	17.0	12	12.0	
The Mode of transportation to school					$\chi^2=19.330$ P=0.001 S***
Walking / Bicycle	36	36.0	50	50.0	
School vehicle	17	17.0	2	2.0	
Own vehicle	32	32.0	42	42.0	
Public transport	15	15.0	6	6.0	
Type of television service					$\chi^2=6.095$ P=0.10 7 S
No television	10	10.0	7	7.0	

Cable	40	40.0	50	50.0	
Satellite dish	41	41.0	41	41.0	
Wi- fi connection	9	9.0	2	2.0	
The number of sleeping hours during day time in weekends					$\chi^2=2.323$
<1 hours	42	42.0	52	52.0	P=0.508 N.S
1 – 2 hours	20	20.0	19	19.0	
2 – 3 hours	23	23.0	17	17.0	
>4 hours	15	15.0	12	12.0	

***p<0.001, S – Significant N.S – Not Significant, p>0.05

The table 2 depicts that most of the adolescents, 38(38%) and 44(44%) had spent 1 hour on watching TV during school days, 40(40%) and 45(45%) had spent zero hour on playing video games/ computer games during school days, 35(35%) and 37(37%) had spent 1 – 2 hours outside on weekend, 36(36%)

and 50(50%) used the transport to school by walking / bicycle, 41(41%) had satellite dish for television service and 50(50%) had cable connection for television service and 42(42%) and 52(52%) had slept for <1 hour during day time in weekends in the interventional and control group.

Table 3 Frequency And Percentage Distribution Of Physical Activity Contributing Factors Associated Regarding Childhood Obesity Among Adolescents In The Interventional And Control Group.

Physical Activity Contributing Factors	Interventional Group (n-100)		Control Group (n-100)		Chi-Square for Homogeneity
	f	%	f	%	
The number of days spend to physical education (PE) classes					$\chi^2=6.240$
0 days	17	17.0	21		P=0.100 N.S
2 – 3 days	69	69.0	75	75.0	
4 – 5 days	10	10.0	3	3.0	
>5 days	4	4.0	1	1.0	
The number of days spend to play football/ cricket/in or around the house					$\chi^2=24.610$
Not done	32	32.0	49	49.0	P=0.001 S***
Daily	34	34.0	11	11.0	
Only weekends	17	17.0	33	33.0	
Once a month	17	17.0	7	7.0	
The type of regular activities					$\chi^2=4.210$
Running	24	24.0	22	22.0	P=0.240 N.S
Jogging	19	19.0	10	10.0	
Cycling	17	17.0	17	17.0	
None	40	40.0	51	51.0	
The frequency of playing outdoor games					$\chi^2=2.025$
Daily	21	21.0	18	18.0	P=0.567 N.S
Only weekends	40	40.0	38	38.0	
Once a month	17	17.0	25	25.0	
Occasionally	22	22.0	19	19.0	
The frequency of playing indoor games					$\chi^2=1.154$
2 hours and above	20	20.0	16	16.0	P=0.764 N.S
One hour	38	38.0	39	39.0	
Less than one hour	24	24.0	22	22.0	
Never	18	18.0	23	23.0	
The sports activities in schools are					$\chi^2=13.678$
Outdoor sports	38	38.0	56	56.0	P=0.003 S**
Indoor sports	12	12.0	1	1.0	
Both (Outdoor sports & Indoor sports)	38	38.0	35	35.0	
No sport activities	12	12.0	8	8.0	
The sleeping hours during night time					$\chi^2=2.799$
Less than 6 hours	16	16.0	11	11.0	P=0.424 N.S
6 – 8 hours	51	51.0	60	60.0	
8 – 10 hours	24	24.0	24	24.0	
More than 10 hours	9	9.0	5	5.0	

N = 200***p<0.001, **p<0.01, S – Significant, N.S – Not Significant

Table 5 : Frequency And Percentage Distribution Of Dietary Pattern Contributing Factors Associated Regarding Childhood Obesity Among Adolescents In The Interventional And Control Group. N = 200

Dietary Pattern Contributing Factors	Interventional Group (n-100)		Control Group (n-100)		Chi-Square for Homogeneity
	f	%	f	%	
The habit of eating non vegetarian per month					$\chi^2=15.685$
Occasionally	15	15.0	10	10.0	P=0.001 S***
Weekly once	49	49.0	75	75.0	
Monthly once	32	32.0	12	12.0	
Not eating	4	4.0	3	3.0	
Frequently used non vegetarian in the Food					$\chi^2=5.790$
Fish	23	23.0	31	31.0	P=0.122 N.S
Chicken	42	42.0	43	43.0	
Mutton	24	24.0	23	23.0	
Others	11	11.0	3	3.0	
The frequency of eating Junk Foods					$\chi^2=2.458$
No consumption	22	22.0	18	18.0	P=0.483 N. S
Occasionally	26	26.0	31	31.0	
Frequently	17	17.0	11	11.0	
Weekly once	35	35.0	40	40.0	

The habit of eating non vegetarian per month					$\chi^2=15.685$
Occasionally	15	15.0	10		P=0.001
Weekly once	49	49.0	75	75.0	S***
Monthly once	32	32.0	12	12.0	
Not eating	4	4.0	3	3.0	
Frequently used non vegetarian in the Food					$\chi^2=5.790$
Fish	23	23.0	31	31.0	P=0.122 N.S
Chicken	42	42.0	43	43.0	
Mutton	24	24.0	23	23.0	
The preference of shops eating fast Food					$\chi^2=20.861$
Fast food shops	19	19.0	4	4.0	P=0.001
Prepacked food	41	41.0	27	27.0	S***
Quick service shops	8	8.0	18	18.0	
Other shops	32	32.0	51	51.0	
The habit of eating regular food per day					$\chi^2=19.459$
3 times	41	41.0	66	66.0	P=0.001
4 times	33	33.0	28	28.0	S***
5 times	11	11.0	4	4.0	
More than 5 times	15	15.0	2	2.0	
The access to buy food or drinks near the school					$\chi^2=22.577$
Cafeteria	17	17.0	13	13.0	P=0.001
School canteen	29	29.0	7	7.0	S***
Fast food shops	18	18.0	15	15.0	
Corner shops	36	36.0	65	65.0	
Never consumed	14	14.0	14	14.0	
The habit of skipping the Breakfast					$\chi^2=4.036$
Never	28	28.0	36	36.0	P=0.25 8 N.S
Always	32	32.0	20	20.0	
Occasionally	28	28.0	32	32.0	
Weekly once	12	12.0	12	12.0	
The snacks taken during the break					$\chi^2=4.036$
Vegetables / Fruit salad	20	20.0	27	27.0	P=0.258 N.S
Biscuits	39	39.0	43	43.0	
Sweets	19	19.0	6	6.0	
None	22	22.0	24	24.0	
The habit of eating non vegetarian per month					$\chi^2=15.685$
Occasionally	15	15.0	10		P=0.001
Weekly once	49	49.0	75	75.0	S***
Monthly once	32	32.0	12	12.0	
Not eating	4	4.0	3	3.0	
Frequently used non vegetarian in the Food					$\chi^2=5.790$
Fish	23	23.0	31	31.0	P=0.122 N.S
Chicken	42	42.0	43	43.0	
Mutton	24	24.0	23	23.0	
The frequency of eating fruits vegetables					$\chi^2=18.082$
Daily	37	37.0	65	65.0	P=0.001
Twice per week	39	39.0	25	25.0	S***
Occasionally	20	20.0	10	10.0	
Never consumed	4	4.0	0	0	
The frequency of eating food from outside hotel					$\chi^2=7.332$
Daily	14	14.0	4	4.0	P=0.062 N.S
Weekly once	30	30.0	39	39.0	
Occasionally	44	44.0	48	48.0	
Never	12	12.0	9	9.0	
The amount of water consumption / Day					$\chi^2=1.331$
1 – 2 liter	17	17.0	16	16.0	P=0.722 N.S
2 – 3 liter	38	38.0	44	44.0	
3 – 4 liter	28	28.0	28	28.0	
More than 4 liters	17	17.0	12	12.0	
Consuming carbonateds weetened drinks					$\chi^2=16.984$
Daily	16	16.0	4	4.0	P=0.001
Twice per week	39	39.0	26	26.0	S***
Occasionally	31	31.0	56	56.0	

***p<0.001, S – Significant N.S – Not Significant, p>0.05

The table 3 indicates that most of the adolescents, 69(69%) and 75(75%) had spent 2 – 3 days for physical education (PE) classes, 34(34%) had played football / cricket / in or around the house daily & 49(49%) had not played, 40(40%) and 51(51%) had no regular activities, 40(40%) and 38(38%) played outdoor games only in the weekends, 38(38%) and 39(39%) in the had played indoor games for one hour, 38(38%) and 56(56%) had involved in outdoor sports and both (outdoor and indoor sports) in schools and 51(51%) and 60(60%)

had slept for 6 – 8 hours during night time in the interventional and control group.

The table 4 showed that most of the adolescents, 49(49%) and 75(75%) had the habit of eating non-vegetarian weekly once, 42(42%) and 43(43%) had included chicken frequency as non- vegetarian food, 35(35%) and 40(40%) consumed junk foods weekly once, 41(41%) preferred eating fast food in fast food shops and 51(51%) in other

shops, 41(41%) and 66(66%) had the habit of eating regular food 3 times per day, 36(36%) and 65(65%) accessed corner shops to buy food or drinks near the school, 44(44%) and 48(48%) had occasionally eat food from outside hotel, 38(38%) and 44(44%) had consumed 2 – 3 litres of water per day, 39(39%) and 56(56%) had consumed carbonated sweetened drinks twice per week and occasionally, 39(39%) and 43(43%) had taken biscuits during the break and 39(39%) and 65(65%) had the habit of eating fruits/vegetables daily in the interventional and control group.

DISCUSSION

The present study aimed to assess the prevalence of obesity among adolescents in selected schools in Coimbatore, as well as to examine the contributing factors regarding childhood obesity. The findings provide valuable insights into the growing concern of childhood obesity in this urban setting, highlighting both the scale of the problem and the need for targeted interventions.

Prevalence of Obesity:

The present study revealed a significant prevalence of obesity among the adolescent population, with 200 participants categorized as overweight or obese. This finding was consistent with other studies conducted in urban Indian settings, where childhood obesity rates have been on the rise due to shifting dietary habits, reduced physical activity, and increased screen time (Mohan et al., 2018). The prevalence rate observed in Coimbatore reflects a national and global trend, emphasizing the urgent need for public health interventions targeting the adolescent age group.

Contributing Factors:

Several contributing factors were identified as significant in the development of obesity among adolescents in Coimbatore. High consumption of junk food, sugary drinks, and processed foods emerged as the most common dietary habits associated with obesity, similar to findings in other urban studies (Pradeepa et al., 2018). Additionally, a lack of physical activity was noted among the majority of students, with increased screen time being a prominent risk factor. The findings align with previous research that links sedentary behavior with increased obesity risk (Hafeez et al., 2019). Furthermore, a family history of obesity and socio-economic factors such as parental education and income level were identified as significant contributors, indicating that family environments play a crucial role in shaping adolescent behaviors.

Implications For Intervention:

The findings of this study underscore the critical need for targeted interventions in schools to raise awareness about childhood obesity, promote healthy eating habits, and encourage physical activity. School-based programs that combine nutrition education with opportunities for physical exercise are essential in curbing the obesity epidemic. Additionally, involving parents in these programs could improve their understanding of childhood obesity and empower them to support healthier behaviors at home.

Moreover, addressing attitudes toward obesity and health may be equally important as providing knowledge. Programs that focus on promoting positive body image and debunking misconceptions about obesity could help reduce stigma and increase adolescents' willingness to adopt healthier lifestyles. Collaborating with healthcare professionals, school authorities, and policymakers will be vital in creating a comprehensive approach to tackling childhood obesity.

Limitations And Recommendations For Future Research:

This study has a few limitations. The cross-sectional nature of the design does not allow for the establishment of causal relationships between obesity and contributing factors. Additionally, the reliance on self-reported data for dietary habits and physical activity may have introduced recall bias, as participants may not accurately report their eating habits or exercise levels.

Future research should consider longitudinal studies to track changes in obesity prevalence over time and explore causal relationships. Larger and more diverse sample sizes, including rural populations, could provide a more comprehensive understanding of the factors influencing childhood obesity across different regions. Furthermore, studies focusing on the effectiveness of specific school-based interventions in reducing obesity rates could offer valuable insights into the best practices for combating this public health issue.

CONCLUSION

This study successfully assessed the prevalence of obesity among adolescents in selected schools in Coimbatore and identified key contributing factors, including poor dietary habits, insufficient physical activity, and increased screen time. The findings revealed a concerning prevalence of obesity among the adolescent population, highlighting the urgent need for interventions aimed at promoting healthier lifestyles. While adolescents exhibited basic knowledge about obesity, there were significant gaps in their understanding of its causes, consequences, and preventive measures. Additionally, their attitudes towards obesity and health behavior changes were influenced by social factors such as peer pressure, family dynamics, and societal norms. These findings suggest that raising awareness about obesity, its risks, and the importance of healthy living should be a priority in schools, with a focus on enhancing both knowledge and positive attitudes towards healthier habits.

The study underscores the need for comprehensive school-based health education programs that integrate nutrition, physical activity, and psychosocial support to address the obesity epidemic. Such programs, when coupled with family involvement, can play a vital role in preventing and managing childhood obesity. Furthermore, addressing the socio-cultural barriers to behavior change is crucial for effective intervention. By implementing multi-faceted strategies, we can empower adolescents to make informed decisions about their health and reduce the long-term burden of obesity-related diseases. In conclusion, this study provides valuable insights into the current state of obesity among adolescents and lays the foundation for future research and interventions aimed at promoting healthy lifestyles among young people.

Conflict Of Interest

The authors declare that there are no conflicts of interest related to this study. The research was conducted independently, and no financial or non-financial interests influenced the design, implementation, or findings of the study. All data collection, analysis, and interpretation of results were done with impartiality, and no external funding or sponsorship was received for the study. The authors also affirm that there was no involvement of any organizations, individuals, or entities with competing interests that could have impacted the objectivity of the research process.

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