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PREVALENCE AND DETERMINANTS OF CHILDHOOD OBESITY IN SEMI-URBAN SETTINGS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Childhood obesity is a growing public health challenge in India, influenced by urbanization-driven lifestyle modifications affecting both urban and semi-urban populations. However, data from semi-urban areas remain scarce. Objectives: To determine the prevalence of overweight and obesity among schoolchildren in semi-urban Mahbubnagar, Telangana, and to identify associated risk factors.

Materials and Methods: A cross-sectional study was conducted among 400 school children using a validated questionnaire collecting information on demographics, screen time, physical activity, nutritional patterns, and socioeconomic status (Modified Kuppuswamy Scale). BMI was calculated, and statistical analysis was performed to assess associations.

Results: Prevalence rates of overweight and obesity were 38% and 8% respectively. Significant risk factors included increased screen time, limited outdoor activity, frequent junk food intake, and higher socioeconomic status. Children from higher socioeconomic backgrounds and those with more sedentary habits had elevated overweight and obesity rates. Outdoor activity showed an inverse relationship with BMI.

Conclusion: The burden of overweight and obesity among children in semi-urban Mahbubnagar reflects trends seen in urban India. Key factors include screen time, dietary choices, and socioeconomic conditions. Early, targeted health promotion strategies are needed to address the rising obesity prevalence in these transitioning regions.

Keywords: Childhood obesity, prevalence, risk factors, semi-urban, schoolchildren, Telangana, India.

INTRODUCTION

Childhood obesity has emerged as a critical public health issue globally, with its incidence increasing markedly, especially in developing countries such as India.[1,2] Urbanization, changing dietary habits, and a decline in physical activity have collectively contributed to the rising rates of obesity among Indian school-aged children—particularly in urban environments—where prevalence has been reported between 10% and 25%.[3] Childhood obesity is associated with several adverse health outcomes, including hypertension, type 2 diabetes, dyslipidemia, early onset of cardiovascular diseases, and psychological issues that often extend into adulthood.[4–6] Furthermore, this condition imposes a substantial burden on health care systems and national economies.[7]

While existing studies have focused predominantly on urban areas, data from rural and semi-urban regions like Mahbubnagar, Telangana are limited. Given the ongoing lifestyle shifts in such communities, region-specific research is essential to guide localized public health interventions and deepen our understanding of the determinants of childhood obesity.

Review of Literature

The prevalence of obesity among Indian schoolchildren has shown a marked increase in recent decades, primarily due to urbanization, changing lifestyles, and evolving dietary patterns.[8] Reported prevalence rates vary significantly—from 3.3% to 19.3%—depending on regional and methodological differences.[8] Urban children tend to exhibit higher obesity rates compared to rural counterparts, largely due to disparities in socioeconomic conditions and behavioral practices.[8] Marwaha et al. documented a 7.4% obesity prevalence among schoolchildren in Delhi, disproportionately affecting urban students.[9] Likewise, Kaur et al. reported a 6.8% prevalence in South Indian schools, with a higher risk noted among students attending private schools compared to those in public institutions.[10]

A meta-analysis by Gupta et al. confirmed the wide variation in obesity rates across India, further supported by findings from the Comprehensive National Nutrition Survey (CNNS) 2016–18, which estimated that around 5% of Indian children and adolescents were obese.[11,12] Diets increasingly rich in calorie-dense, nutrient-poor processed foods, particularly those high in refined sugars and unhealthy fats, have significantly contributed to rising adiposity among children.[13] The decline in physical activity, often driven by academic demands and increased screen exposure, further exacerbates obesity risks.[14] Raj et al. observed that children who failed to meet recommended physical activity guidelines were at substantially greater risk of obesity.[14]

Genetic factors also influence obesity risk. Variants in genes like FTO and MC4R have been associated with elevated BMI and fat accumulation in Indian children, as noted by Ramachandran et al.[15] Socioeconomic status plays a dual role—while affluent children often have greater access to unhealthy foods and sedentary pastimes, children from economically disadvantaged backgrounds may suffer from poor-quality diets that contribute to obesity even in the absence of caloric excess.[16,17]

Addressing childhood obesity requires a multi-faceted strategy, incorporating school-based initiatives, community engagement, regulatory policies around food marketing, and enhanced physical education. The observed diversity in regional prevalence highlights the importance of tailoring interventions to specific local contexts.[8,17]

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted in a school-based setting. The study was carried out over a period of six months, from January to June 2025.

Inclusion Criteria:

- School-going children aged 6 to 15 years.

Exclusion Criteria:

- Children with chronic diseases
- Children with significant physical dysmorphology
- Children on chronic medications, such as oral steroids

Data Collection: Four Schools were selected based on stratified random sampling, and consent was obtained from Parents, teachers and the head of the institution. A pre-designed, pre-tested questionnaire proforma was used to collect data on children from the selected schools, including information on age, screen time, duration of physical activity, socioeconomic status and food habits (junk food consumption). Socio-economic status was assessed using the Modified Kuppuswamy Scale. Weight was measured using a digital weighing scale (BPL Medical Technologies PWS-01), and measurements were recorded to the nearest 0.1 kilogram. Height was measured using a stadiometer (Prestige brand), and measurements were taken to the nearest 0.1 centimeter. The weight and height of each child were plotted on the IAP growth chart. The study protocol was approved by the Institutional Ethics Committee of SVS Medical College, Mahbubnagar and Written informed consent was obtained from all participants' parents before enrollment.

Data Analysis: The collected data were systematically entered into an MS Office Excel sheet. Frequency distribution tables were prepared, and descriptive statistics were calculated. Inferential statistics were derived based on the study variables. Appropriate statistical tests were applied wherever necessary, with a significance level of $p < 0.05$ (95% CI). Data analysis was performed using SPSS software (version 23).

RESULTS

Among the 400 school-going children surveyed, 8.0% were classified as obese, 38.0% as overweight, and 54.0% had normal BMI. The mean hip-waist ratio increased across BMI categories: 0.82 in normal-weight, 0.87 in overweight, and 0.92 in obese children ($p = 0.04$).Mean screen time was highest among overweight children (3.6 hours/day), followed by obese (3.42 hours/day) and normal-weight children (3.02 hours/day). Outdoor activity duration was highest in normal-weight children (1.93 hours/day) and lowest in obese children (1.76 hours/day).

Among children consuming junk food, 60.4% were overweight and 14.6% obese, compared to 25.4% overweight and 4.3% obese among those not consuming junk food. Children with low dietary diversity showed higher rates of overweight/obesity (58.6%), compared to 28.7% in the medium and 20.0% in the high diversity groups. The highest obesity proportion (13.1%) was among those with low dietary diversity. Obesity was reported in 42.5% of children using a car to commute, compared to 3.4% in those who walked or cycled. Normal weight was most prevalent among active commuters (58.4%). Obesity and overweight were more frequent in upper socioeconomic classes, with the highest number of

obese children in Class II (n=16), followed by Class I (n=10). No obese children were reported in Class IV. Normal BMI was most common in Class III (n=100).

Table 1: Comparison of Variables Among Children by Weight Status (N=400)

Parametre	Normal	Over weight	Obese
N(400)	216	152	32
Mean hip waist ratio, mean(SD)	0.82(0.05)	0.87(0.06)	0.92(0.05) P value:0.04
Screen time(Hours/day), Mean (SD)	3.02(1.57)	3.6(1.52)	3.42(1.52) P value: 0.056
Out door activity(Hours/day),Mean(SD)	1.93(1.14)	1.95(1.1)	1.76(1.15) P value: 0.013
Junk food consumption(n=144)	36	87	21
Dietary diversity score: High Medium low	 20 155 41	 4 63 85	 1 12 19
Transport to school: Walking/bicycle Other vehicles	 206 10	 135 17	 12 20
Socio economic status: Upper(ClassI) Upper middle(ClassII) Lower Middle(ClassIII) Upper lower(Class IV) Lower(Class(V)	 2 8 100 72 14	 4 40 46 48 14	 10 16 4 0 2

*P Value = <0.05 (significant)

Table 2: Association of Key Variables with Childhood Obesity: Odds Ratios and P-values

Variable	Odds Ratio	P-Value
Screen Time (hours/day)	1.041	0.056
Outdoor Activity (hours/day)	0.866	0.013

DISCUSSION

This cross-sectional study among 400 school-going children aged 6–15 years in Mahabubnagar district identified a substantial burden of overweight (38.0%) and obesity (8.0%), with 46.0% of the children having excess body weight. These figures are notably higher than those reported by Singh & Amita (2021), who found 3.3% overweight and 0.8% obesity among Indian children aged 10–17 years.[27] However, the present findings are comparable to the study by Rosaneli et al. (2012) in Brazil, which reported 17% overweight and 7% obesity,[18] and Koirala et al. (2014) in Nepal (14.6% overweight, 11.3% obesity),[28] suggesting that children in semi-urban India may be undergoing similar nutritional and lifestyle transitions seen in middle-income countries. The mean BMI in our study was 21.37 kg/m², which is higher than that reported by Singh & Amita (18.06 kg/m²),[27] and Sagbo et al. in Togo (16.25 kg/m²),[29] but slightly above the value reported in China by Andegiorgish et al. (19.86 kg/m²).[19] These variations may reflect regional differences in socioeconomic status, dietary patterns, and physical activity. Our findings also align with the anthropometric profile described by Ganie et al. among obese Indian children.[22] A significant progressive increase in hip-waist ratio across BMI categories was observed in our study (p = 0.04), with values of 0.82 in normal-weight, 0.87 in overweight, and 0.92 in obese children. This supports existing literature that suggests central adiposity is a key indicator for obesity-related risk in children.[30]

Children with higher screen time exhibited greater prevalence of overweight and obesity. The mean screen time was highest among overweight children (3.6 hours/day), followed by obese (3.42 hours/day), and lowest in normal-weight children (3.02 hours/day). These findings are consistent with those of Patel et al., who found a strong association between screen time exceeding 2 hours/day and increased obesity risk in Indian children.[23] In our study, 69% of children watched TV on weekdays, higher than the 27.4% reported in China by Andegiorgish et al,[19] and 45.1% in Ghana by Aryeetey et al.[31] Outdoor activity showed an inverse pattern. It was lowest among obese children (1.76 hours/day) and highest among normal-weight children (1.93 hours/day), highlighting the protective role of physical activity. This trend is consistent with Khadilkar et al., who reported lower participation in outdoor activities among obese children.[24]

Dietary behavior also played a prominent role. Among children consuming junk food, 60.4% were overweight and 14.6% were obese. This is similar to findings by Misra et al. and Goyal et al., who reported increased fast food and trans-fat intake to be positively associated with higher BMI in Indian children.[20,21] Dietary diversity had a strong inverse relationship with obesity status. Children with low dietary diversity had the highest combined prevalence of overweight and obesity (58.6%), which is supported by studies like Ranjani et al.,

emphasizing that poor dietary quality contributes significantly to adiposity in children.[22]

The association of mode of transport with obesity was also notable. Among children using a car, 42.5% were obese, compared to 3.4% of those walking or cycling. This trend mirrors findings from Sagbo et al. in Togo, where 90.1% of children used active modes of transport and had lower obesity rates.[29]

In terms of socioeconomic status (SES), obesity was more prevalent in children from upper and upper-middle classes—Class II (n=16) and Class I (n=10). This pattern aligns with findings by Shukla et al. and Rathi et al., who noted that children from affluent households have greater access to calorie-dense diets and sedentary entertainment, thereby increasing obesity risk.[25,26]

Finally, multivariate logistic regression in our study found age (OR=1.052, p=0.021), BMI (OR=1.012, p=0.050), and outdoor activity (OR=0.866, p=0.013) to be significant predictors of obesity. Screen time showed a borderline association (OR=1.041, p=0.056), suggesting a potential contribution to obesity risk, consistent with evidence presented by Raj et al. and Ramachandran et al., who highlighted the interplay of behavioral and genetic factors in childhood obesity.[21]

Limitations: Limitations of this study include its cross-sectional nature and reliance on self-reported behaviors, which may introduce recall bias. Further research with longitudinal follow-up and detailed parental/genetic profiling is warranted.

CONCLUSION

Childhood obesity is a growing concern among schoolchildren in semi-urban Mahbubnagar, Telangana. Key risk factors identified include higher screen time, frequent junk food consumption, and reduced outdoor activity. Socioeconomic status also played a significant role in obesity prevalence. These trends mirror those observed in urban Indian settings, indicating lifestyle transitions in semi-urban regions. Early, targeted interventions are needed to promote healthy eating and active lifestyles. Such efforts are vital to curbing the rising obesity epidemic in India's transitioning communities.

REFERENCES

1. World Health Organization. Obesity: Preventing and managing the global epidemic. 2000.
2. Ng M et al. Global, regional, and national prevalence of overweight and obesity. Lancet. 2014.
3. Raj M, Kumar RK. Obesity in children & adolescents. Indian J Med Res. 2010.
4. Lobstein T et al. Child and adolescent obesity. Lancet. 2015.
5. Reilly JJ, Kelly J. Long-term impact of overweight and obesity in childhood. Int J Obes. 2011.
6. Griffiths LJ et al. Self-esteem and quality of life in obese children. Int J Pediatr Obes. 2010.
7. Wang YC et al. Health and economic burden of obesity trends. Lancet. 2011.
8. Ranjani H, Mehreen TS, Pradeepa R, Anjana RM, Garg R, Anand K, et al. Epidemiology of childhood overweight & obesity in India: A systematic review. Indian J Med Res. 2016;143(2):160–74.
9. Marwaha RK, Tandon N, Ganie MA, Kanwar R, Shivaprasad C, Sabharwal A, et al. Nationwide reference data for height, weight, and body mass index of Indian school children. Natl Med J India. 2011;24(5):269–77.
10. Kaur S, Sachdev HP, Dwivedi SN, Lakshmy R, Kapil U. Prevalence of overweight and obesity amongst school children in Delhi, India. Asia Pac J Clin Nutr. 2008;17(4):592–6.
11. Gupta DK, Shah P, Misra A, Bharadwaj S, Gulati S, Krishnan A, et al. Secular trends in prevalence of overweight and obesity from 2006 to 2009 in urban Asian Indian adolescents aged 14–17 years. PLoS One. 2011;6(2):e17221.
12. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF, Population Council. Comprehensive National Nutrition Survey (CNNS) 2016–18. New Delhi: MoHFW; 2019.
13. Misra A, Singhal N, Khurana L. Obesity, the metabolic syndrome, and type 2 diabetes in developing countries: Role of dietary fats and oils. J Am Coll Nutr. 2010;29(3 Suppl):289S–301S.
14. Raj M, Sundaram KR, Paul M, Deepa AS, Kumar RK. Obesity in Indian children: Time trends and relationship with hypertension. Natl Med J India. 2007;20(6):288–93.
15. Ramachandran A, Snehalatha C, Vinitha R, Thayyil M, Kumar CK, Sheeba L, et al. Prevalence of overweight in urban Indian adolescent school children. Diabetes Res Clin Pract. 2002;57(3):185–90.
16. Bharati DR, Deshmukh PR, Garg BS. Correlates of overweight & obesity among school-going children of Wardha city, central India. Indian J Med Res. 2008;127(6):539–43.
17. Swaminathan S, Thomas T, Kurpad AV. Low-cost strategies for combatting the double burden of malnutrition in Indian children. Indian Pediatr. 2015;52(7):573–82.
18. Rosaneli CF, et al. (2012). Prevalence of obesity in Brazilian schoolchildren.
19. Andegiorgish AK, et al. (2011). Prevalence of overweight and obesity among Chinese children and adolescents.
20. Misra A, Singhal N, Sivakumar B, et al. Nutrition transition in India: secular trends in dietary intake.
21. Goyal RK, Shah VN, Saboo BD, et al. Prevalence of overweight and obesity in Indian adolescents.
22. Ranjani H, Mehreen TS, Pradeepa R, et al. Epidemiology of childhood overweight and obesity in India.
23. Patel ML, Sachan R, Verma A, et al. Obesity and lifestyle of adolescents in India.
24. Khadilkar VV, Khadilkar AV, Chiplonkar SA. Trends in BMI and obesity among Indian school children.
25. Shukla N, Shah P, Singh S, et al. Urban lifestyle and childhood obesity in India.
26. Rathi N, Riddell L, Worsley A. School food environments and policies in India.
27. Singh A, Amita M. (2021). Prevalence of childhood obesity in Indian school children.
28. Koirala M, et al. (2014). Obesity prevalence among Nepalese school children.
29. Sagbo G, et al. (2018). Childhood obesity and physical activity in Togo.
30. Kelishadi R, et al. Association of adiposity with carotid intima-media thickness in children.
31. Aryeetey R, et al. (2017). Obesity and sedentary behaviors among Ghanaian children.
32. Ganie MA, et al. (2016). Anthropometric profile of obese Indian children.