RESEARCH PAPER

A Study on Prevalence of childhood obesity among middle school children in selected schools in Pondicherry

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ABSTRACT

Background: Childhood obesity is a public health problem associated with the deterioration of physical and psychological health in children. The prevalence and risk factors vary across regions, and the determinants are demographic, socioeconomic, lifestyle, and family dependent variables. These rates are considerably high in India, highlighting the need for immediate attention and planned interventions. This study aimed to determine the prevalence of childhood obesity among school children aged 10–15 years in Puducherry and to analyse the associated sociodemographic variables.

Methods: A cross-sectional study was conducted among 420 students aged 10–15 years in a selected school in Puducherry, India. Children receiving treatment for obesity or chronic illnesses were excluded. Data on sociodemographic variables and BMI (using the IAP growth chart) were collected after obtaining ethical approval. Statistical analysis involved descriptive statistics and chi-square tests to assess the associations between variables and BMI categories.

Results: Among the participants, 11.4% were overweight and 4.3% were obese, totaling 15.7% overweight/obesity prevalence. Overweight and obesity rates were significantly higher in children aged 13–15 years (21.7%–30.4%) and among those with birth orders two and three. There was no significant association between family income, fathers' occupation, and BMI. However, maternal occupation was significantly associated with overweight and obesity.

Conclusion: The study reported higher levels of overweight and obesity among Puducherry school children, particularly in early adolescence and those with higher birth orders. Maternal occupation influences childhood BMI, highlighting the multifactorial nature of obesity in childhood. These findings support targeted and sensitive interventions that address sociodemographic and child behavioural factors.

Keywords: birth order, children 10-15 years, childhood obesity, overweight

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INTRODUCTION

Globally, childhood obesity is an increasing public health issue marked by the accumulation of excessive body fat, which adversely affects both physical and mental well-being. This condition is typically evaluated using BMI cut-offs that are specific to age and sex, such as those provided by the International Obesity Task Force (IOTF) and the World Health Organization (WHO). Children who exceeded +2 standard deviations were categorised as obese.

The prevalence of childhood obesity and its risk factors varies globally by various factors, including socioeconomic and lifestyle factors. In China, obesity among school-aged children was high, with 4.11% in males. High maternal education and longer sleep, family history of diabetes, parental overweight status, and sedentary behaviours were found to increase the risk. (1) . In Beijing, the prevalence of obesity/overweight was 18.7% to 21.7%, linked to inactivity, poor diet, and excessive screen time (2).

The prevalence of overweight and obesity in children under five years of age was 2.6% in India. The risk factors were sex of the child, birth-related factors, maternal education, and dietary patterns. (3). In a meta-analysis,

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the estimated prevalence of overweight and obesity was 12.6% and 3.4 %, respectively, among Indian children aged 10-15 years. Another study in New Delhi, India, showed an increase in obesity from 9.8% to 11.7% among children between 2006 and 2009. Male children were found to be more prone to obesity, and a higher socioeconomic status was also responsible for obesity. (4)

The higher prevalence of overweight and obesity is not a single risk factor but multiple risk factors. Many studies have reported that sex, birth weight, maternal obesity, dietary patterns, and exposure to media significantly contribute to obesity, while some social groups offer a protective effect.(5). In a study conducted in Pondicherry, India, socioeconomic status, lifestyle, and parental factors were attributed to obesity risk, especially in urbanising regions.

Birth order was reported to have a weaker association with overweight and obesity, but birth weight and maternal health were closely associated. (6). Working more hours by mothers correlated with an increased childhood overweight risk, moderated by family income.(7). Similarly, either or both parents' occupations are associated with higher overweight and obesity, reflecting broader socioeconomic impacts on child BMI (8).

The body of research highlights the complex causes of childhood obesity in India, stressing the importance of interventions tailored to local cultures that address sociodemographic, behavioural, and environmental elements to mitigate this growing public health concern in the country. Hence, the was conducted with the aim to estimate the prevalence of childhood obesity and the relationship with associated factors.

METHODS

This cross-sectional study was conducted among school students studying in classes V to X in a selected school in Pondicherry, in the age group of 10 to 15 years. Students with known chronic illnesses and those undergoing treatment for obesity and overweight were excluded. Based on the prevalence of childhood obesity from previous research (48.9 %), absolute precision 5%, alpha=0.05, and power=80%, the sample size was calculated to be 420. The data collection tools contained two parts: one containing the selected sociodemographic variables and the other containing the IAP growth chart along with BMI interpretation. The study was conducted after the approval of the IHEC and obtaining permission from the concerned school authorities. Accent from the children and consent from their parents was also obtained as per Helsinki Declaration of 1975, as revised in 2013 guidelines.

Data analysis was performed using SPSS softwar version23-IBM. Quantitative variables were described using mean and standard deviation, and qualitative variables were described using frequency and percentage. The association between variables was tested using the chi-square test.

RESULTS

The number of children at 10 years was 15.5%, at 11 years 13.1%, at 12 years 22.1%, at 13 years 30.7%, at 14 years 7.6%, and at 15 years 11.0%. There were 61.7% male and 38.3% female children. The number of children was 52.1%, in first order, 46.7% in second order, and only 1.2% in birth order three. The type of family showed that 79% of the children belonged to nuclear families, 18.8% to joint families, and 2.1% to extended families. Income data revealed that 3.3% in 35k-50k, 39% in 20k-35k, 45.2% earned 15k-20k and 12.4% in 10k-15k. A majority (84.2%) of the families were in the 15k to 35k income group.

The percentile range was calculated for BMI and categorised as underweight ≤ 4, healthy weight 5–84, overweight 85–94, and obese ≥95. Overall, 6.4% of students were underweight, 77.9% had a healthy weight, 11.4% were overweight, and 4.3% were obese. (Graph 1)

Age-wise analysis showed that overweight and obesity were found to be high in 13, 14 and 15 years children with 21.7%, 25%, and 30.4%, respectively. The percentages of healthy weight students were 76.9% at 10years, 98.2% at 11 years, 84.9% at 12 years, 69% at 13 years, 71.9% at 14 years, and 69.6% at 15 years. The chi-square test showed a significant association between age and BMI. (p=0.001) table 1.

Healthy weight was observed in 80.3% of male and 73.9% of female children. Underweight, overweight, and obesity were slightly higher among female children than among male children, but the difference was not significant(p=0.410).

Table 2 shows that overweight children were high in birth order two (12.8%) but very high (60%) in third-order births. Children with a healthy weight were 80.4% in birth order one, 76% in birth order two, and 40% in birth order three. Chi-square test shows that there was a significant association between birth order and BMI category (p=0.025).

Overweight and obesity were high at 21.4% among the children whose family income was 36–50k, 14.6 among those with 20k with 35k, 18.5% among those with 15k–20k, and 7.6% among those with 10k–15k. However, this difference was not statistically significant. (p=0.203). Father's occupational status did not show significant variation in obesity among children aged 10–15 years. Analysis of the mother's occupation shows that the percentage of overweight children was high (20.7%) among those whose mothers were daily wage workers, followed by those whose mothers were self-employed (17.2%). Obesity was high among government employees. The children of service employees accounted for 22.2%, followed by self-employed individuals (10.3%). The difference in proportion of BMI category of children was significant with occupation of mother(p=0.040) (table 3)

DISCUSSION

In our study, the prevalence of childhood obesity among school children aged 10–15 years was 4.3%, and the prevalence of overweight was 11.4%. The overall overweight and obesity rate was 15.7%. This was aligned with a meta-analysis by Midha et al. among children 10-15 years reporting 12.6% overweight and 3.4% obesity. This suggests that the prevalence of overweight and obesity is very common and highlights the urgent need for health interventions focusing on prevention, early detection, and management. This helps to reduce further complications and associated health burden in school children.(9)

Age-wise analysis of obesity in our study showed that children in 13-15 years had a significantly higher proportion of overweight and obesity. This was consistent with Andrasi et al., who also reported that the growth pattern among children influenced the anthropometric values, leading to a higher prevalence of overweight and obesity among 13-15 years. The higher prevalence of overweight and obesity among children 13-15 years may be attributed to sedentary activities, diet patterns, and reduced physical activities. Monitoring growth continuously, promoting healthy behavour and intervening age-related programms are crucial for curtailing future health issues among children. (10)

Our results showed that female children had a higher prevalence of overweight and obesity than male children, but the difference was not significant. This is contradicted by a research in China that reported a significant higher proportion among female children. The gender difference in overweight and obesity was attributed to the study population settings, sample size and power, socio-cultural variations and how the outcome was measured.(1)

Birth order: the results showed that the prevalence of overweight and obesity was significantly higher among children of birth orders two and three compared to children of the first order. This result aligns with a study that revealed that birth order increases the prevalence of being overweight and obese. This may occur due to differences in parental attention, feeding practices, and lifestyle modifications that may alter attention among different birth orders. Tailor made intervention programme focused on the number of siblings may improve the status there by overall health status of children. (11)

Our results did not find family income as a predictor of overweight or obesity in children. This result is in contrast to a study that demonstrated a significant association between being overweight, obesity, and family income. This contradiction may occur because economic factors alone cannot capture the influence of the overweight and obesity status of the child, but parental education, occupation, cultural habits, and other factors may also have an influence on it. How the income was categorised may also influence the effect on overweight and obesity..(12)

Our study reported a significant association between overweight and obesity and the occupation of the mother but not the father. This result aligns with a study reporting that maternal occupation may influence the BMI status of children. A mother's occupation may influence the time spent on childcare, income, and work-related stress. In contract, fathers may not may be highlighting gender-specific influence on child healthcare and outcoms. (13)

CONCLUSION

The study found a 15.7% prevalence of overweight and obesity among school children aged 10–15 years in Puducherry, with higher rates in early adolescence (13–15 years) and among second- and third-born children. Maternal occupation was significantly associated with childhood BMI. These results highlight the multifactorial nature of childhood obesity and underscore the need for targeted interventions addressing sociodemographic and behavioral factors specific to the region.

Data Availability Statement: The complete data set is available and will be submitted when required

TABLES

Table 1: Association between age and BMI group

Age	BMI_group				Total	p-value
	Underweight	Healthy weight	Overweight	Obese		
10	7(10.8%)	50(76.9%)	7(10.8%)	1(1.5%)	65(100.0%)	0.001
11	1(1.8%)	54(98.2%)	0(0.0%)	0(0.0%)	55(100.0%)	
12	6(6.5%)	79(84.9%)	6(6.5%)	2(2.2%)	93(100.0%)	
13	(9.3%)2	89(69.0%)	16(12.4%)	12(9.3%)	129(100.0%)	
14	1(3.1%)	23(71.9%)	5(15.6%)	3(9.4%)	32(100.0%)	
15	0(0.0%)	32(69.6%)	14(30.4%)	0(0.0%)	46(100.0%)	
Total	27(6.4%)	327(77.9%)	48(11.4%)	18(4.3%)	420(100.0%)	

Table 2: Association between birth order and BMI

Birth Order	**BMI category**				**Total**	**p-value**
	Underweight	**Healthy weight**	**Overweight**	**Obese**		
1	10(4.6%)	176(80.4%)	20(9.1%)	13(5.9%)	219(100.0%)	0.025
2	17(8.7%)	149(76.0%)	25(12.8%)	5(2.6%)	196(100.0%)	
3	0(0.0%)	2(40.0%)	3(60.0%)	0(0.0%)	5(100.0%)	

Total	27(6.4%)	327(77.9%)	48(11.4%)	18(4.3%)	420(100.0%)	

Table 3: Association between occupation of mother and BMI

Occupation of mother	BMI category				Total	p-value
	Underweight	Healthy weight	Overweight	Obese		
Daily wage worker	0(0.0%)	22(75.9%)	6(20.7%)	1(3.4%)	29(100.0%)	P=0.040
Govt. Service	1(11.1%)	6(66.7%)	0(0.0%)	2(22.2%)	9(100.0%)	
Housewife	21(7.2%)	230(79.3%)	32(11.0%)	7(2.4%)	290(100.0%)	
Private job	4(6.3%)	49(77.8%)	5(7.9%)	5(7.9%)	63(100.0%)	
Self employed	1(3.4%)	20(69.9i%)	5(17.2%)	3(10.3%)	29(100.0%)	
Total	27(6.4%)	327(77.9%)	48(11.4%)	18(4.3%)	420(100.0%)	

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