Original Article

Exploring Current Status on Prevalence of Childhood Overweight and Obesity in South India: Survey Findings

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Abstract

Background: Measure the prevalence of overweight and obesity among 5 to 12 year olds in Guntur city's elementary schools. Study Design: A school-focused cross-sectional study. Study Setting: All 5000 children between the ages of 5 and 12 in Guntur were tested over a course of three years. **Subjects and Methods:** The Anthropometric data acquired in Microsoft Excel was examined using SPSS version 13.0. Using new IAP growth charts, BMI is computed and categorized into overweight and obesity. **Results:** Microsoft Excel was used to compile the anthropometric data, which was then analyzed using the SPSS version 13.0. The BMI is determined using updated IAP growth charts, and children are classified as overweight or obese based on their BMI. Overweight and obesity are most common in children aged 6-7 (23.8 percent) and least common in children aged 11-12 (16.8 percent). Government school children were relatively more overweight and obese (20.8percent) than private schools (20percent). In comparison to girls (19.17 percent), the prevalence of obesity in boys is higher (21.7 percent). The prevalence is more in lower age groups (21.6percent) than that in higher (18.78percent) age groups. **Conclusion:** Child obesity is on the rise, emphasizing the need for a comprehensive approach to deal with it both now and in the future, according to research.

Keywords: Obesity, Overweight, Indian Academy of pediatrics, Body mass index.

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Introduction

There are a variety of common nutritional problems, such as obesity and overweight in childhood, that may be traced back to a lack of caloric balance.[1]

Their prevalence has become a threat particularly to school-going children worldwide, both in developed and developing countries.[2,3] In 1980, 6.8 percent of children ages 6 to 12 had the disease, and in 2008, 19.6 percent of youth ages 12 to 19 had it, according to CDC data.[4,5] Worldwide, 43million children are estimated to be overweight in 2010, out of which, 35million are reported to be from developing countries.[6] According to IAP2015,[7] obesity affects 14% of the population, whereas overweight affects 19% of the inhabitants. There were percent of Delhi and Chennai residents overweight or obese and 6.2 percent of students in South Karnataka who were overweight or obese, respectively

and 9.9 percent of students in South Karnataka who were overweight or obese.[8,9,10] The increased prevalence in India is due to the emergence of people that have easy access to foods with a high glycemic index, increase in sedentary lifestyle by television, cellphones, video games, computers, that substitute outdoor activity. A mix of genetic, cultural, and psychological variables may be to blame for childhood obesity and overweight.[11]

WHO (World health organization) recommends both BMI and subscapular and triceps SFT (skinfold thickness) as the best anthropometric methods to assess adiposity. More than a dozen IAP growth criteria have been used to measure obesity and overweight during the last two decades.[12,13,14] IAP2015 growth charts, on the other hand, elucidate overweight and obesity based on the BMI's 23rd and 27th percentiles.

As a result of the detrimental impacts on social and cognitive development, hypercholesterolemia, and cardiovascular

illnesses such heart disease and type 2 diabetes, obesity in childhood is concordant with greater mortality and morbidity in later life. As a result, there is an increasing concern over youth obesity and overweight. Guntur city elementary school students were surveyed using revised IAP2015 growth charts to accomplish the current research.

Subjects and Methods

Study area: The study place was at Guntur, a city in the province of Andhra Pradesh.

Study design: Six private schools and fifteen Government schools in Guntur participated in a cross-sectional research that drew on a variety of data gathering techniques. The information was gathered by a group of three people. The team members stayed the same throughout the research.

The research was carried out at the NRI Academy of Medical Sciences school camps. A schedule of the research team's visits to various schools and class levels was provided to school officials in advance.

Study Population: A total of 5000 school-going children aged 5 to 12years who attended both private and government elementary schools were studied.

Table 1: Distribution of Study Population

Sex	Government Schools	Private Schools	Total
Boys	1250	1242	2492
Girls	1250	1258	2508
Total	2500	2500	5000

Study Period: The study was conducted over three years from October 2018 to October 2021.

Inclusion criteria:

The study comprised students aged 5 to 12 who were in attendance at school on the day of the investigation.

Exclusion criteria:

Children with developmental defects and chronic illness were excluded from the study.

Sampling Technique: Following gender and class stratification, simple sampling was used to choose school children aged 5 to 12 years for the research.

Data Collection: All safety measures were followed while measuring the subject's current height and weight with a stadiometer and a standard weighing scale to the closest 0.5 centimetres each. The child's age is determined through school records.

After collecting data, BMI is computed as follows: Weight (in kgs) / Height (in mtr^2)

The computed BMI is plotted in the revised IAP 2015 growth charts (separate for both boys and girls that is blue and pink respectively).

BMI more than 23rd percentile (orange line) are classified as overweight and those more than on 27th centile (red line) are classified as obese.

Data Analysis: The information gathered was put into a

Microsoft Office Excel spreadsheet.

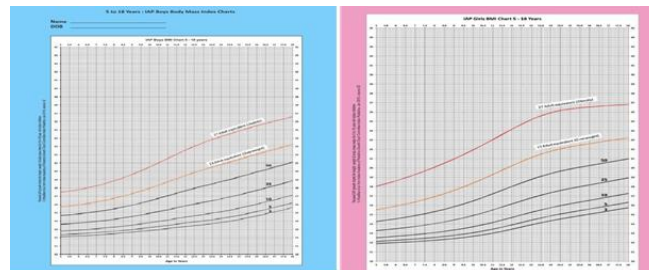In order to assess the study's conclusions, a range of statistical tests were run in Stata version 13.0.

Figure 1: Revised IAP 2015 growth charts for boys (left) and girls (right)

Results

Table 2: Weight, height, and BMI for boys (n=2492)

Age in years	Mean weight with standard deviation	Mean height with standard deviation	Mean BMI with standard deviation
3	16.26±2.40	105.5±1.58	14.65±2.13
6-7	18.74±1.72	109.8±1.99	15.59±1.51
7-8	21.4±2.23	115.7±3.29	16.11±1.70
8-9	24.6±2.74	122.8±2.37	16.39±1.78
9-10	28.09±3.05	128.1±2.15	17.20±1.96
10-11	32.31±2.72	134.22±2.27	22.4±1.66
11-12	35±3.65	140±2.36	17.91±1.86

The mean BMI is highest for 10-11 years age group and least for 5-6years age group boys.

Table 3: Weight, height, and BMI mean and standard deviations for girls (n=2508)

Age in years	Mean weight with standard deviation	Mean height with standard deviation	Mean BMI with standard deviation
5-6	16.2± 2.39	105.5±1.64	14.58±2.11
6-7	18.73±1.67	110.2±2.01	15.46±1.52
7-8	21.2±2.26	115.5±3.44	15.93±1.64
8-9	24.7±2.71	122.9±2.43	16.41±1.76
9-10	27.7±2.81	128.2±2.08	16.9±1.83
10-11	32.27±2.66	134.5±2.26	17.92±1.64
11-12	35±3.66	140±2.30	17.87±1.91

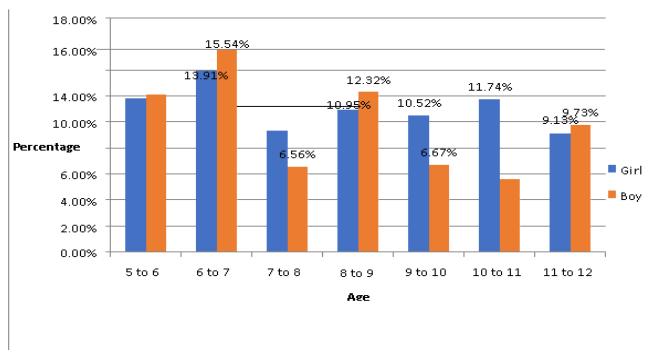The mean BMI is highest for 10-11 years age group and least for 5-6 years age group girls.

Figure 2: Age-wise and sex-wise overweight prevalence in the entire study population
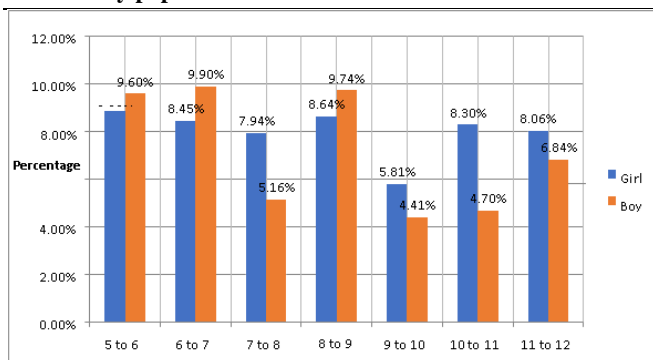

Figure 3: Age-wise and sex-wise prevalence of obesity in the

entire study population

From the entire population, boys of 6 to 7 years age group are overweight and 8-9years are more obese.

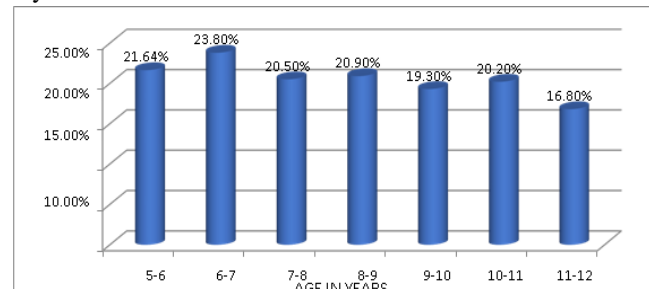Similarly, girls of 6 to 7 years are more overweight and 5 to 6 years are more obese.

Figure 4: Overweight and obesity were shown with age in the total research sample

Children of 6 to 7 years age group are more overweight and obese in the entire study population. The study population is divided into lower age group (5-9years) and higher age group (9 to 12years), and it was found that the lower age group children were more overweight and obese, with a statistically significant difference (p=0.04).

Table 4: Combined overweight and obesity prevalence among boys in the study population

Age in years	Obese boys in government schools	Obese boys in private schools	Total	Overweight boys in government schools	Overweight boys in private schools	Total
5-6	20	15	35	22	21	43
6-7	19	15	34	29	24	53
7-8	18	19	37	21	26	47
8-9	15	19	34	23	20	43
9-10	18	14	32	24	24	48
10-11	17	17	34	19	20	39
11-12	13	13	26	19	18	37
Total	120	112	232	157	153	310

Table 5: Overall prevalence of overweight and obesity among girls in the research population

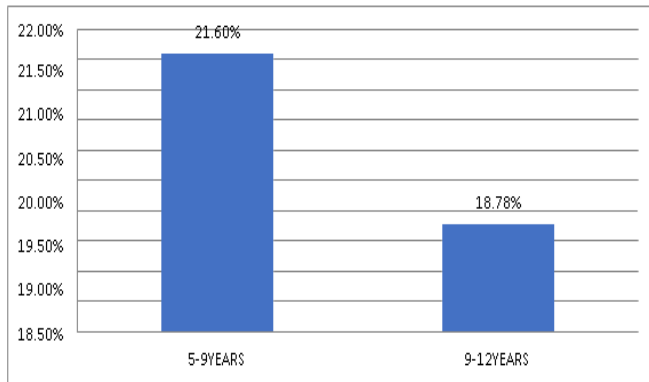| Age in years	Obese girls in government schools	Obese girls in private schools	Total	Overweight girls in government schools	Overweight girls in private schools	Total
5-6	16	17	33	23	21	44
6-7	13	17	30	28	22	50
7-8	12	17	29	18	16	34
8-9	17	13	30	19	20	39
9-10	7	14	21	21	17	38
10-11	15	13	28	21	20	41
11-12	16	14	30	17	17	34
Total	105	96	201	147	133	280

Figure 5: Prevalence of overweight and obesity between lower and higher age groups
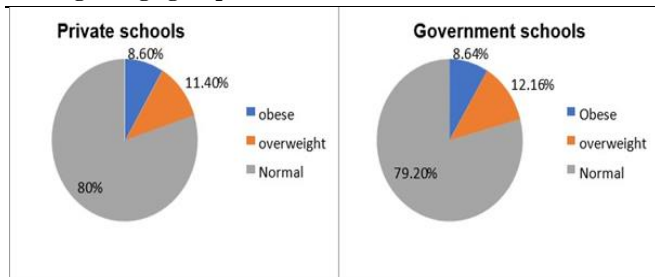

Figure 6: Prevalence of overweight and obesity in private and government schools

There was no statistically significant difference (p=0.269) in overweight and obesity between students in private schools and those in government schools.
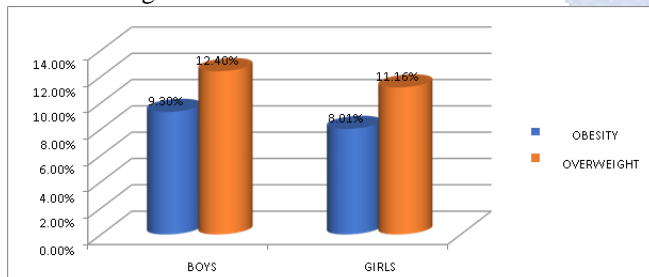

Figure 7: Overall prevalence of obesity and overweight sex-wise in the research population

Though the boys are more overweight and obese (21.7%) than girls (19.17%) there was no statistical significance (p=0.1079).
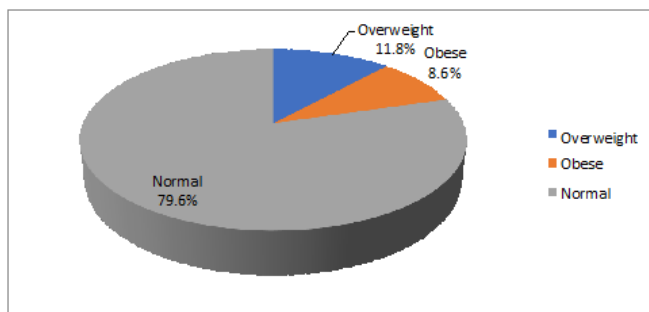

Figure 8: Overweight and obesity prevalence in the entire research population

In congruence with BMI, 20.4 percent (n=1023) of the research participants were overweight and obese.

Discussion

The results in the present study conducted in 5 to 12-year age group elementary school children in the Guntur city showed a prevalence of overweight 11.8% (n= 590) and obesity (433) 8.6% is a combined prevalence of 20.4%. The disclosures of our analysis are on par with a study done by Popkin in Delhi, Chennai, Kolkata, Hyderabad, Mumbai, the combined prevalence was 20%.[15]

Another study done by Cherian et al, Kumaravel et al, Jagadeshan et al, as per IAP2015 standards delineated the prevalence of overweight as 19.1%, obesity as 14%.[16,17,18] However, the current study based on revised IAP2015 standards showed a lower prevalence than them.

It is in line with a recent study of school-aged teenagers done by Gupta et al, although it contradicts findings by Ramachandran and Maiti et al, which revealed that females were more likely to be overweight or obese than boys.[19,20,21] Males are conceivably more obese and overweight than females since they are better cared for and given more nutrients.

The epidemiology of overweight and obesity is said to vary from the population's culture, structure, and ecology of the ambient environment.[22] As a result, there is a disparity in the prevalence of obesity and overweight.[23] This might be the reason for the similarity in results seen in regional studies with that of distant studies.

Our study reported that lower age groups were more overweight and obese (21.6%) than a higher age group (18.78%). Concurrently, global studies showed the combined prevalence among the lower age group reported an increase from 6.5% to 19.6 %, and in higher age groups increased was from 5% to 18.1% in 2008. Children's obesity and overweight are rising at an alarming rate, as seen by this data. New generations exposure to a changing way of life is one of many plausible factors.

Only a few research have examined the prevalence of obesity and overweight in both government and private Indian schools. The majority of the study was done at private schools.

While the prevalence was reported to be superlative in private (21.4 %) than in government institutions (3.6 %) in a 2014 study of 18955 school-aged children in Chennai,[24] our current investigation found a higher prevalence of the disorder in the government sector (20.8%) than the private sector (20 %). This might be due to an increase in calorie accessibility by purchasing cheap foods from vendors, mostly from fat and high sugar.

Table 6: Childhood (1-12 years) overweight and obesity trends as per multiple studies

SNo	Author	Year	Region	Age (yr)	Sample (n)	Methods	Over weight (%)	Obesity (%)
1.	Monga	2004	New Delhi	7-9	1238	WHO	6.2	8.2
2.	Sidhu et al.[25]	2006	Punjab	6-11	1000	IOTF-Cole et al.	10.5%	5.75%
3.	Bose et al.[26]	2007	Kolkata	6-9	431	IOTF-Cole et al.	14.6%	5.1%
4.	Kumar et al.	2008	Mangalore, South India	2-5	425	WHO	-	1.6%
5.	Wang, et al.[27]	2009	NFHS-1 (National family health survey)	<4	25584	WHO	11.2%	1.6%
			NFHS-2	1-5	35892	WHO	-	5%
			NFHS-3	<5	46655	Gomez et al.	16.8%	3.7%
			NFHS-4	1-5	28392	Gomez et al.	15.4%	3%
			NNMB (National nutrition monitoring bureau)	1-5	32642	Must et al.	16.3%	2.6%
6.	Dhingra et al.[28]	2011	Srinagar, North India	7-11	128	WHO	13%	8%
7.	Preetam et al.	2011	Puducherry, South India	6-12	12685	CDC	4.4%	2.1%
8.	Our Study	2018 2021	Guntur, South India	5-12	5000	IAP	11.8%	8.6%

Limitations

We used only BMI criteria, by taking a single reference that is Revised IAP 2015 charts to quantify the prevalence. SFT criteria were not used. Adolescent age groups from 13 to 18 years were not included in our study. The present study did not examine obesity risk factors such as eating behaviours, screening time, physical activity hours, or the use of motorized transportation.

Conclusion

Obesity and overweight were found to be prevalent in 20.4 percent of the population, which is consistent with rising patterns in other studies worldwide. In the near future, there will be major health repercussions that will need immediate action to prevent them.

It is important that children be encouraged to engage in physical exercise that is both easy and fun in order to reach the greatest number possible. The prevalence of obesity might be reduced by comprehending endurance strategies, nourishment and parental enlightenment into the school curriculum at all levels. As a result, health care expenses would be reduced for future generations.

Acknowledgement

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