

Overweight and Obesity among Primary School Going Children in Urban Agra: A Cross-Sectional Study

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Abstract:


Introduction: Childhood obesity is global nutritional concern. It is precursor of various non-communicable diseases and metabolic disorders in adulthood. **Objective:** To determine the prevalence of overweight and obesity among primary school students in urban Agra. **Method:** This cross-sectional study was done among 200 children studying in grades 1st to 5th in government and private school of Agra. List of all schools in Agra city having 1st to 5th classes was obtained from official website of Agra District Authorities. One government and one private school were selected. 100 students were selected from each selected school. A pre-designed and pre-tested administered questionnaire was used to collect information and anthropometric measurement; height and weight of the student measured to calculate Basal Metabolic Index (BMI). Overweight/obesity was defined using age and sex specific body mass index cut off points. **Result:** Prevalence of overweight and obesity was 16.5% and 7% respectively. Prevalence of overweight and obesity was more in boys as compared to girls. Obesity is seen only in private school students. **Conclusion:** In the present study, the magnitude of overweight and obesity is high among boys and children studying in private school. Health education should be given in the schools so as to educate children as well as parents regarding risk factors, preventive measures and the consequences of overweight and obesity.

Key words: Body mass index, Obesity, Overweight, Sampling

Introduction:

For persons with coronavirus disease 2019 (COVID-19), the published studies have shown link between obesity and risks of hospitalization.^[1] Covid pandemic has occurred when majority of countries have prevalence of overweight/obesity greater than 20%.^[2] Obesity is a major public health issue worldwide. Likewise, childhood obesity is a global nutritional concern. Childhood obesity leads to serious chronic diseases and psychosocial complications; which lead to stigmatization, poor socialization and greatly increase the risk of

morbidity and mortality in adults.^[3-6] The prevalence of overweight and obesity among children has increased considerably during the past decades all over the world. Overweight and obesity, which were previously considered problems afflicting mainly the affluent, are now markedly on the increase in low and middle-income developing countries.^[7,8] According to the World Health Organization (WHO), for children aged 5–19 years, overweight is defined as a Body Mass Index (BMI)-for-age greater than one standard deviation, and obese children as a BMI-for-age greater than two standard deviations above the WHO

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growth reference median.^[9] Globally, the prevalence of overweight among children aged 5–17 years is 10%; though, this prevalence varies according to region. With globalization and urbanization, the exposure to the obesogenic environment is increasing in both high-income countries and Low and Middle-Income Countries (LMICs).

In Asia, the prevalence of obesity in 2010 was 4.9% (about 18 million children). If current trends continue, over 70 million infants and young children will be overweight or obese by 2025, and India will have over 17 million obese children.^[10] In recent systematic review (2018) it was found that the overall prevalence of obesity was 5.8% in Asian children.^[11] The combined prevalence of childhood overweight and obesity in India according to Ranjani H et al (2016) in their systematic review study was 19.3 per cent.^[12] Most of the behavioral risk factors for non-communicable diseases (NCDs) start during childhood and often lead to intermediate risk factors such as obesity, hypertension and dyslipidemia early in life, even in childhood and adolescence. Consequently, childhood is the critical time to detect overweight/obesity and intervene for preventive measures for non-communicable diseases. Limited research is done on non-communicable diseases and risk factors in Uttar Pradesh. Our study on childhood obesity will give insight in overweight and obesity and some risk factors. With this background, we conducted a study to determine differences in the prevalence of childhood obesity based on types of schools and gender among primary grade children in urban Agra.

Method:

The present study was designed as cross-sectional and conducted between duration October 2019 to December 2019. Ethical clearance for the study was taken from Institutional Ethical Clearance Committee, Sarojini Naidu Medical College, Agra. We had taken consent from parents of 200 children studying in grades 1st to 5th in government and private schools of Urban Agra. List of all schools in Agra city having 1st to 5th classes was obtained from official website of Agra District Authorities. One

government and one private school were selected. 100 students were selected from each selected school. 1st to 5th class were taken from each school, a single class randomly was chosen wherever sections were present. 20 students from each primary class (1st to 5th) were selected using systematic random sampling as every 2nd student was picked up on the basis on their registered roll numbers.

Prior permission by school principal of both private and government school was taken to conduct this study. A pre-designed and pre-tested questionnaire was used to collect information. A weighing (bathroom) scale and stadiometer were used to measure the weight (nearest 0.5 Kg) and height (nearest 0.1 cm) of each child using standard procedure. BMI was calculated as weight (Kg)/height² (m²). Sex and age specific percentile cut-off points of a reference population (85th percentile for overweight and 95th percentile for obesity) were used. The date of birth of each child was taken from the school records. Children were categorised into three groups : obese (>95th percentile), overweight (≥85th percentile) and normal (<85th percentile, >5th percentile) using age and sex specific percentiles of BMI.^[13] Data was analyzed using MS excel and interpreted accordingly.

Results:

Total of 200 students were studied in present study, of which 57.5% were boys and 42.5% were girls. Mean age of primary school going boys and girls was 9.4 years (±1.72) and 9.5 years (±1.81) respectively . Mean weight and height among boys (32 kg, 1.35 m) was higher than that of girls (30.8 kg, 1.33m). The body mass index (BMI) reported to be higher in boys (17.03 Kg/m²) as compared to girls (16.9 Kg/m²). (Table-1)

Most of the obese children (40%) were found to be in the age group of nine years followed by age group of ten years (32.5%). The prevalence of overweight and obese status found to be 17.5% and 10% among boys and 15.5% and 4% among girls respectively. The prevalence of overweight and obesity found to be 30% and 14% among private

school while only 3% were overweight and none was found to be obese in government school.(Figure -1,2).

The overall prevalence of overweight and obese children was found to be 16.5% and 7% respectively. (Table-2)

Discussion:

Childhood obesity is growing at alarmingly rate and labeled recently as "exploding nightmare" by World Health Organization (WHO).^[14] With a rapid demographic and socioeconomic transition, India is becoming the epicenter of epidemics of both childhood and child obesity, especially in urban populations. Over the years, epidemiological studies have reported a consistent increase in the prevalence of childhood overweight and obesity in the subcontinent.^[14] The prevalence of overweight and obesity among children and adolescents aged 5–19 has risen dramatically from just 4% in 1975 to just over 18% in 2016.^[15]

There has been a phenomenal rise in proportions of children having obesity in the last 4 decades

especially in the developed world.^[14] Studies emerging from different parts of India within last decade are also indicative of similar trend."^[15,16] In present study in Urban Agra the prevalence of overweight and obese status found to be 17.5% and 10% among boys and 15.5% and 4% among girls respectively. Results are similar to previous studies from India^[17-20] but it was not in concordance with some other studies^[21-23] while study from Chennai, West Bengal and Telangana found more prevalence in girls.^[24-27] Socio-economic trends in childhood obesity in India are also emerging. The prevalence of overweight and obesity found to be 30% and 14% among private school while only 3% were overweight and none was found to be obese in government school. A study from northern India reported a childhood obesity prevalence of 5.59% in the higher socio-economic strata when compared to 0.42% in the lower socio-economic strata. But now it is spreading in lower socio-economic groups as well. Similar findings from other studies from country were found.^[21-23,28-30]

Table 1: Anthropometric measurements of study participants (N=200)

Variable	BOYS(N=115)		GIRLS(N=85)		TOTAL(N=200)	
	MEAN	SD	MEAN	SD	MEAN	SD
Age(years)	9.4	1.72	9.6	1.93	9.5	1.81
Weight(Kg)	32	9.88	30.8	9.21	31.48	9.60
Height(metre)	1.35	0.12	1.33	0.13	1.34	127
BMI(Kg/m2)	17.03	2.96	16.82	2.35	16.9	2.71

Table 2: Gender wise and School wise distribution of prevalence of overweight and obesity

Determinant	Overweight (n=33)	Obesity (n=14)	P value
Gender wise			
Boys	20 (17.5%)	11 (10%)	0.23
Girls	13 (15.5%)	3 (4%)	
School wise			
Private	30 (30%)	14 (14%)	0.24
Government	3 (3%)	0 (0%)	

Table 3: Comparison of previous studies on obesity and overweight prevalence in the Children age group

Author	Year	Region	Age group	Sample size (n)	Criteria used	Overweight Prevalence (%)	Obesity prevalence (%)
Gupta & Ahmad ^[32]	1990	New Delhi	5-15	3861	Ponderal Index (Kg/m ³)	-	Boys= 8 Girls=7
Chatterjee ^[33]	2002	New Delhi	4-18	5000	IOTF-Cole et al	Overall =29	Overall =6
Marwaha et al ^[34]	2006	New Delhi	5-18	21485	IOTF-Cole et al	Boys= 16.8 Girls=19	Boys=5.6 Girls=5.0
Sharma et al ^[35]	2007	New Delhi	4-17	4000	IOTF-Cole et al	Overall =22	Overall =6
Raj et al ^[36]	2007	Kerala	5-16	20263	CDC Growth Charts*	Overall =6.6 (Boys= 7.3 Girls= 5.9)	Overall=1.3 (Boys= 1.7 Girls=0.9)
Kaur et al ^[37]	2008	New Delhi	5-18	16955	IOTF-Cole et al	Overall 2.7[Lower Income(LI)] 6.5[Middle Income(MI)] 15.3[High Income(HI)]	Overall 0.1(LI) 0.6(MI) 6.8(HI)
Premanath et al ^[38]	2010	Mysore	5-16	43152	Agarwal Charts	Overall =8.5 (Boys= 8.8 Girls= 8.2)	Overall =3.4 (Boys= 3.7, Girls=3.0)
Khadilkar et al ^[31]	2011	Delhi & Chandigarh Kolkata, Chennai, Bangalore, Hyderabad, Mumbai, Pune, Baroda, Raipur	2-17	20243	IOTF-Cole et al	Overall=14.9 (Boys= 15.2 , Girls= 8.2)	Overall=4.7 (Boys= 5.4 , Girls= 3.9)
					WHO	Overall=11.1 (Boys= 10.8 , Girls= 11.4)	Overall=15.9 (Boys= 18.4, Girls= 12.8)
Misra et al ^[39]	2011	Delhi, Jaipur, Agra Allahabad, Mumbai	8-18	38296	IOTF-Cole et al** CDC WHO#	14.4 14.5 18.5	2.8 4.8 5.3
Patnaik et al ^[40]	2011	Bhubaneswar	5-15	468	CDC	Overall = 14.1	Overall = 14.5
Ghosh ^[41]	2011	Kolkatta	8-12	753	IOTF-Cole et al	Overall = 9.4	Overall =6.1
Chakraborty et al ^[42]	2011	Kolkatta	5-8	271	CDC	Overall = 14.4	Overall =5.2
Preetam M ^[43]	2011	Puducherry	6-12	2980	CDC BMI Charts	4.41	2.12

Siddiqui & Bose ^[44]	2012	Indore	7-14	2158	IOTF-Cole et al	-	Overall=15.0 (Boys= 6.8, Girls= 8.2)
Singh & Devi ^[45]	2013	Manipur	6-12	192	IOTF-Cole et al	-	Boys = 1.6 Girls = 5.2
Longkumar ^[46]	2013	Nagaland	8-15	571	IOTF-Cole et al	Overall =2.3 (Boys= 2.1, Girls = 2.5)	-
Sonya et al ^[28]	2014	Chennai	6-11	8025	IOTF-Cole et al	Private (Boys=16.2, Girls=13.7) Government (Boys=1.6, Girls= 2.6)	Private (Boys=4.2, Girls=3.9) Government Boys=0.3, Girls= 0.4)
Ranjani H et al ^[12]	2016	16 states	1-12 & 10-17	52 studies	Systematic review	Overall overweight and obesity: 19.8	-
Pathak S et al ^[47]	2018	Vadodara	10-18	188	IAP Charts	Urban= 32.3 Rural= 6.7	Urban= 31.3 Rural= 2.2
Kumar R ^[48]	2018	North- East	6-10	793	BMI-for-age chart of WHO	Overall = 10.5 (Boys= 10.97, Girls=9.76)	Overall =2.4 (Boys=3.21, Girls=1.21)
Chandra et al ^[49]	2019	Hyderabad	9-15	544	IAP 2016	Overall = 35.8 (Boys=28.1, Girls=44.5)	Overall = 24.6 (Boys=17.3 &Girls =32.8
Aqeel KI et al (Present study)	2020	Agra	5-13	200	CDC BMI Charts	Overall = 16.5 (Boys=17.5, Girls=15.5)	Overall = 7 (Boys=10, Girls=4)

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The overall prevalence of overweight and obese children was found to be 16.5% and 7% respectively. Comparison of prevalence of overweight and obese from various parts of country is highlighted in Table - 3. It shows that prevalence of overweight and obesity is comparatively lower in northeast states, Puduchery than other states. Many definitions used in various studies depend on cutoffs of IOTF-Cole et al, WHO and CDC.^[12] India specific cut-points were Agarwal charts and Indian Academy of Pediatrics (IAP).^[12] Many studies show evidence that

overweight and obesity is more in higher socioeconomic strata.^[28] But as now non communicable are now penetrating in rural areas, strategies have to rolled out to prevent and control childhood obesity. Comparison of prevalence of overweight and obese from various parts of country is highlighted in Table-3. Study has limitations of covering two schools only, small sample size and including only few risk factors.

Conclusion:

In the present study, the magnitude of overweight and obesity is high among boys and children studying in private school. It is recommended that more health

education campaigns, physical education, healthy eating habits, and behavior activities of children are to be taught at the school level, especially in private schools.

Recommendations:

Health education should be given in the schools so as to educate children as well as parents regarding risk factors, preventive measures and the consequences of overweight and obesity. As childhood obesity is largely preventable, prevention strategies at individual and population level should be incorporated to tackle non-communicable disease burden in country. The Government of India's National Program on Prevention and Control of Diabetes, Cardiovascular Disease, and Stroke has a school component, which needs to be strengthened

Declaration:

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