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A Study Of Prevalence And Determinants Of Obesity Among School Children

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Introduction: *Overweight and Obesity represent a rapidly growing threat to populations' health in an increasing number of countries. Indeed they are now so common that they replace more traditional problems such as undernutrition and infectious diseases as the most significant causes of ill health. Childhood obesity is associated with a higher chance of obesity, premature death, and disability in adulthood. Hence, this study assessed the prevalence and determinants of Obesityamong adolescent school children*
Methods: *1484 school children from private school In Nellore city participated in the study. A simple random sampling technique was used for sampling the study. Data was collected using a pre-designed and pre-tested questionnaire. Anthropometric measurements of height and weight were recorded. Data thus collected were analyzed using SPS statistical software, and the chi-square test was used as a test of significance.*
Results: *The overall prevalence of overweight and obesity was 8.3%. Among the study participants, 52.2% were boys obese, and 47.8% were girls were obese. The significant risk factors include eating outside the home, eating while watching T.V., increased frequency of snacking outside, lack of outdoor sports, going to school on vehicles, prolonged school timings, long periods of watching/using the computer, no daily exercise, both parents working, fewer hours of physical training at school, and absence of playground in the school.*
Conclusion This study has identified some modifiable potential risk factors for overweight and obesity among school-age children. Understanding the risk factors for overweight and Obesity could help design effective preventive and control strategies targeted at some of these risk factors among this age group.
Keywords: *Adolescent school children, Obesity, Overweight, body mass index*

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I. Introduction:

Obesity has emerged as one of the global health problems, with 200 million school-aged children worldwide categorized as being overweight/obese, of which 40-50 million are obese.[1] High prevalence of childhood and adolescent obesity/ overweight are reported in both developed and developing countries.2 In 1998, World Health Organization recognized obesity as a significant health problem.[1] According to WHO, [four] the prevalence of Obesity is 4.8% in developing countries,17.1% in transitional countries, and 20.4% in developed countries. Adolescence is a period of increased autonomy associated with changing lifestyles (food habits, physical activity, sedentary behavior) combined with physiological changes promoting increased fat deposition.[3.4] In most children with obesity, environmental and hereditary factors play a significant role. Underlying etiology is identified in very few cases (less than 1%) causes ofchildhood obesity are classified into environmental and pathological. Environmental causes (constitute over 95%) like excess calorie intake, sedentary lifestyle, television viewing, and playing computer games. Pathological causes are endocrine abnormalities, genetic syndromes, monogenetic disorders, and drug intake[5.] Obesity during the childhood and adolescent period leads to health consequences currently and increases the risk of obesity and its related complications later in life. Obesity may be associated with increased prevalence and early occurrence of diabetes mellitus, hypertension, coronary artery disease, orthopedic problems, mental disorders, and poor life quality. For establishing effective intervention, it is essential to identify significant determinants in an early stage of life. Hence this study was planned to assess the prevalence and determinants of Obesity among adolescent school children.

II. Materials and methods

It was a cross-sectional observational study. Institutional ethical committee clearance was obtained before the start of the study. Prior permission was obtained for conducting the study at Nellore in the private school from the concerned authorities. The study was conducted between February 2020 and November 2020. Study subjects included of both gender from age 6-11 yrs The Data was collected using a pre-designed and pre-

tested questionnaire afterobtaining permission from the respective School Authorities. Height was measured in centimeters (cm) using a stadiometer. Weight was measured in kilograms (Kg) using a standardized weighing machine. Body mass index (BMI) was calculated using the formula weight (Kg) divided by height in square meters (m2). Waist circumference was measured in centimeters using a non-stretchable fiber measuring tape.

Inclusion criteria: Adolescent School children in the age group of 6-11 years.

Exclusion criteria: Children with any history of endocrine abnormality, epilepsy, or any medication like anticonvulsants, steroids, etc.Children below the age group of 6 yrs and above 11years.

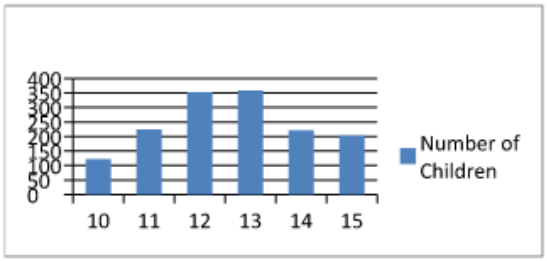
***Statistical analysis*:** Comparison of continuous variables was by One-way ANOVA and proportions by the Chi-squared test. Logistic regression analysis was carried out to examine the relationship between socioeconomic status, gender, and age with overweight/obesity. Analyses were done using Windows-based SPSS StatisticalPackage.

III. Results:

Table: 1-Distribution of the Study Population According To the Age

Age in Years	Number of Children
6	123
7	225
8	353
9	359
10	221
11	203
Total	1484

Graph 1: Distribution of the Study Population According To the Age



In our study population, adolescent children were 1484, out of which 123 (8.28%) children were six years old; 225 (15.6%) were seven years; 353 (23.7%) were 8 yearsold, which constituted the significant study population; followed by 221 (14.8.%) of 9 years old children; 203 (13.6%) were 11 years old children;

Table: 2-Distribution of the Study Population According To the Sex

Sex	Number ofChildren	Percentage(%)
Male	774	52.2
Female	710	47.8
Total	1484	100

In our study population, Male children were 774 (52.2%), and femaleswere 710 (47.8%), respectively.

3.Distribution of the Study Population According To the BMI

BMI	Number of Children	Percentage (%)
<18.5	883	59.55
18.5-24.9	476	32.07
25-29.9	94	6.3
≥30	31	2.08
TOTAL	1484	100

In our study population, out of 1484 adolescent children, 883 (59.55%) were underweight; 475(32.07%) were average weight; 94(6.3%) were overweight, and 31(2.08%) were obese. Therefore, the overall prevalence of overweight and obesity was 8.38%.

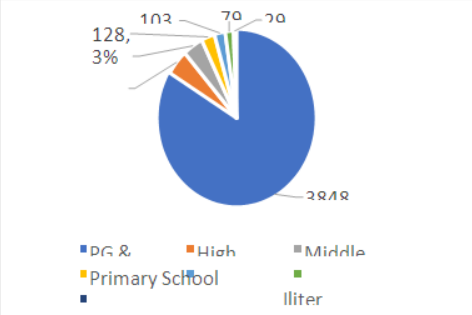
4.Distribution of study participants according to SES

SES	Frequency	Percentage
Upper Class	310	20.91%
Upper Middle	300	20.28%
Lower Middle	665	44.80%

Upper Lower	174	11.77%
Lower	33	2.24%
	Total	**1484**

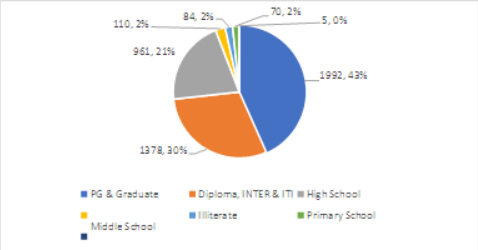
Among the total study participants, 44.80% belonged to lower-middle socioeconomic status as per Modified Kuppuswamy's Socioeconomic Scale, followed by upper and upper-middle-class.

5.Distribution of Study Participants by Father's Education



The primary educational qualification among fathers was Postgraduates & Graduates.

Distribution of Study Participants by Mother's Education (n=1484)



The maternal Educational qualification majority of the study participants was graduation followed by Diploma, Inter & ITI .The Highest qualification was a PhD constituting less than 1%.

IV. Discussion :

In the present study, the total number of participants was 1484 primary schoolstudents from age 6 to 11 years attending primary schools in Kurnool city. The mean age of the study participants was 8.5 years. The majority of the children belongedto 8 years, followed by 9, age group. The majority of the study participantswere males compared to females. Similar to the current study, a study by Ashmita Karki et al. in urban primary schools of Lalitpur, Nepal, the mean age of study participants was nine years majority of the children belonging to 6 to 9 years. And a majority of study participantswere males. [6] In another study similar to the present study by Mushtaq M.U et al.

Among primary school children in Lahore city of Pakistan, the mean age of study participants was 8.49yrs, and the majority were males.The majority of the study participants belonged to the lower middle class according to modified Kuppuswamy's socioeconomic status, followed by upper andupper-middle class.Similar to the present study, the majority of study participants belonged to urbanHigh Socioeconomic status in the study by Mushtaq M.U et al. [7] The study participants' primary maternal educational qualification was graduation, followed by high school and Intermediate. Like the present study, most study participants had mothers with education qualifications at the university level. [7]In contrast to the present study, the maternal educational status in a study by Muhihi A.J. et al. in Dar es Salaam, Tanzania, was primary school followed by the secondary school. [8] In the present study, the prevalence of overweight was 10.80%, and Obesity was 6.78 %. The prevalence of overweight was10.2%, and Obesity was 8.2% in males and 11.4% and 5.1% respectively in females. Males showed a higher prevalence of Obesity, and females showed a higher prevalence of overweight.

Similarly, a study by A Karki et al. observed 18.6 % overweight 7.1 % obesity in the study population. Males showed a 19% prevalence of overweight and 10.6% prevalence of Obesity. Females showed 18.2% of overweight and 2.4% obesity. [6] The study done by Mushtaq M.U et al. observed a prevalence of 17% overweight and 7.5% obesity. Prevalence in males was 17% and 9%, and females were 16.5% and 6% for overweight and obesity, respectively.[7] The mean BMI increased from 14.3 to 16.3, with increasing age in the total study population. In males, it increased from 14.35 to 16.49, and In females, it increased from14.25 to 16.13 with increasing age. In the study by Mushtaq M.U et al., there was a similar increase in BMI with increasing grades in males and females.[7] A higher prevalence was observed in the upper socioeconomic class compared to other classes in the present study. Similarly, in a study by Mushtaq M.U et al., the prevalence of overweight and obesity was higher in the upper Socioeconomic class. [7]

A meta-analysis in the Indian subcontinent has observed a similar higher prevalence among boys than girls with childhood obesity and an increased prevalence in urban areas. Among the study participants, there is a

significant relationship between age, gender, socioeconomic status, religion, maternal educational qualification with Nutritional Status ($p<0.001$). There was an increased risk of being overweight/obese (aOR 1.3) at 95% CI (1.2, 1.3). Higher socioeconomic status of the upper class and upper-middle showed an increased risk of being Overweight/Obese (aOR8.3) at 95% CI (21.1, 37.9).

A study by Mushtaq M.U et al. found a similar increase in prevalence with increasing

grades of the child and higher prevalence in urban high socioeconomic classes compared to lower classes but found no gender disparity.[7] A study by Koirala M et al. observed increased risk with upper socioeconomic state advantage ethnic groups similar to the present study. [9] Muhihi A J et al. observed an increased risk of Obesity in higher grades compared to lower grades, but higher risk among females compared to males. A study by Karki A et al. observed an increase in the risk of developing Overweight/Obesity with higher maternal education and a higher risk of the same males.

A study by Taleb S and Agli A reported a higher prevalence of Obesity in highersocioeconomic classes and parental education. [10] In the present study, a significant relationship with the presence of Gestational diabetes in the mother during the antenatal period, the birth weight of the child, type of feed received in the first six months of life was found with the nutritional status of the study participant ($p<0.001$)

The presence of gestational diabetes showed a higher risk ofoverweight/obesity in the offspring (aOR 3.1) at 95% CI (2.3, 4.3). The presence ofhigher birth weight of more than 4 kgs showed an increased risk of being overweight/obese in childhood (aOR 22.0) at 95% CI (5.7, 84.0). Use of commercially available Infant milk Substitutes in the first six months of life showedan increased risk of overweight/obesity (aOR 3.6) at 95% CI (2.8, 4.5), usage of commercial infant foods as complementary feed after the first 6months of life (aOR 2.3) at 95% CI (1.6, 3.3) Like the present study, an increased BMI in children with higher birth weight was observed by Knerr I et al. in Bavaria among primary school children. [11] A significant risk of Obesity with a higher birth weight of more than 4kgs at OR of 3.67 was observed by Meriem et al. among 6-8-year-old children. [12]

N Koirala et al. observed an increased risk of overweight/obesity with a higher birth weight of more than 4 kgs. [9] Sharma et al. in Delhi observed a higher prevalence of obesity/overweight in childhood with a higher birth weight of more than 3 kgs.[13] Karki A et al. observed an increased risk of being overweight/obese with largerbirthweight of >4kgs. Von Kries *et al.* showed that the prevalence of obesity in children who were never breastfed was 4.5%, compared to 2.8% in breastfed children. Breastfeedingremained a protective factor against obesity at odds ratio (0.75, 95% CI 0.57, 0.98)and being overweight (0.79, 0.68, 0.93). (43) [15]

Monasta et al. also identified prenatal exposure to maternal smoking, No or short breastfeeding in infancy, and short sleep duration at 3–4 yrs. of age as some of the early-life determinants of overweight and Obesity.[14] In the present study, a significant relation was found between the type of diet consumed in the family, leisure time activity of the participant like a computer or videogaming (aOR 3.4) at 95% CI (2.2, 5.2), type of games played by the child, and noof the hour of play with the nutritional status of the child lesser time involved in active play (aOR 2.2) at 95% CI (1.8, 2.8). Consumption of 3 meals per day significant protective effect in contrast to 2 meals per day (aOR 0.45) at 95% CI (0.28, 0.73) Like this study, Karki A et al. observed n increased risk of being overweightor obese with sedentary behavior.[6] A study by Atul Watharkar et al. observed a significant association between, low level of physical activity and watching television for more than 2 hours per dayor playing computer games for more than two hours per day [17]

In the present study, there was no relationship between the type of food consumed (traditional/high fat/high carbohydrate) and the prevalence of overweight or obesity [17] Contrary to this study, Sivakumar C P et al. observed a higher prevalence of obesity and overweight children with frequent high-energy foods. Contrary to this, Taleb S and Agli A's study observed Obesity in children whoare more likely to consume high fat and carbohydrate foods. [10]

A study by Atul Watharkar et al. observed a significant association betweenconsuming fast foods contrary to the present study [16] upper-middle showed an increased risk of being Overweight/Obese (aOR 28.3) at 95% CI (21.1, 37.9) A study by Mustaq M.U et al. found a similar increase in prevalence with increasing grades of the child and higher prevalence in urban high socioeconomicclasses than lower classes but found no gender disparity. [7]

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Von Kries *et al.* showed that the prevalence of obesity in children who were never breastfed was 4.5%, compared to 2.8% in breastfed children. Breastfeeding Remained a protective factor against obesity at odds ratio (0.75, 95% CI 0.57, 0.98)and being overweight (0.79, 0.68, 0.93). (43) [15] Monasta et al. also identified prenatal exposure to maternal smoking, No or short breastfeeding in infancy, and short sleep duration at 3–4 yrs. of age as someof the early-life determinants of overweight and Obesity. [14] In the present study, a significant relation was found between the type of diet consumed in the family, leisure time activity of the participant like a computer or videogaming (aOR 3.4) at 95% CI (2.2, 5.2), type of games played by the child, and noof the hour of play with the nutritional status of the child lesser time involved in active play (aOR 2.2) at 95% CI (1.8, 2.8). Consumption of 3 meals per day significant protective effect in contrast to 2 meals per day (aOR 0.45) at 95% CI (0.28, 0.73) Like this study, Karki A et al. observed n increased risk of being overweightor obese with sedentary behavior. [6] A study by Atul Watharkar et al. observed a significant association between, low level of physical activity and watching television for more than 2 hours per dayor playing computer games for more than two hours per day [17]

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V. Conclusion :

Obesity is emerging as an important public health problem. The parents need to be more cautious about their child's dietary habits. The pediatrician should counsel them about the effects parenting can have on the child's BMI and also on his/her future. Every school should have a playground. Children should be provided with physical training for at least two h per week. The cutoffs regarding the working hours of the school should be followed strictly. Children should be encouraged to play outdoor games instead of computer games. Incentives should be provided to children to maintain a healthy lifestyle. It can be concluded that dietary habits like more junk food frequency, more sweet consumption, and socioeconomic status significantly impact children's body mass index. These risk factors may be considered as potential determinants of obesity

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