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Prevalence of Obesity and Hypertension among Apparently Healthy School Children Aged 5-15 Years of Affluent Societies of Nandyal

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Abstract: ***Childhood obesity increases the risk for the development of various non-communicable diseases later in life. Studies have shown that obese children have an increased systolic and diastolic blood pressure levels. This study was taken up to evaluate the prevalence of obesity and hypertension among apparently healthy school-aged children. Aims and objectives: To estimate the a) Prevalence of obesity and hypertension b) Correlation between obesity and hypertension among apparently healthy school children aged 5-15 years. Materials and methods: Data collected through questionnaire from 1500 apparently healthy school children is analyzed. Results: The prevalence of obesity is 3.8% and overweight 6.93%. The prevalence of hypertension is 2.2%, and prehypertension is 2.6%. The prevalence of obesity and hypertension in boys was 2.36% and 2.05% respectively, whereas in girls it was 6.45% and 2.46%. Conclusion: The prevalence of obesity and hypertension was higher in girls compared to boys. Hypertension was found to be significantly higher in the obese group.***

Keywords: Obesity, Hypertension, school children

1. Introduction

Malnutrition includes both undernutrition and obesity, and the burden of the latter is increasing.[1] According to WHO, obesity is a "global epidemic" because of an increase in the prevalence of obesity and its complications.[2]

According to the International Obesity Task Force (IOTF), the World Health Organization (WHO) global prevalence of overweight (including obesity) among children aged 5-17 years is 10%.On one hand, undernutrition is an epidemic in developing and underdeveloped countries. On the other hand, overnutrition evident as overweight and obesity has been recently on the rise.[3]

Obesity in children and adolescents is gradually becoming a significant public Health problem in India.[4] Childhood obesity increases the risk for the development of various non-communicable diseases later in life. The seed of obesity is usually laid in childhood, and the morbidity and mortality associated with obesity can be intervened by primary prevention.

The comorbidities of obesity include dyslipidemia, osteoarthritis, gout, hypertension, coronary heart disease, stroke, and certain types of cancers, gallbladder disease, and pulmonary diseases, including sleep apnoea. Obesity is due to an imbalance between energy intake and energy output. Factors affecting Energy Imbalance - Overeating, psychosocial factors, physical inactivity, and genetic predisposition.[5] WHO has emphasized the need for understanding the prevalence trends and influencing factors of childhood obesity.[6]

Children with an upper percentile of blood pressure levels are more likely to become adult hypertensive, which is described as tracking. By tracking it may be possible to alter lifestyle and prevent systemic hypertension as well as related complications.[7]

The prevalence of hypertension in children is 1-3%[8.] Elevated blood pressure in children and adolescents may be an early marker of essential hypertension in adulthood.[9] Studies have shown that obese children have an increased systolic and diastolic blood pressure levels.[10,11]

This study is taken up to evaluate the prevalence of obesity and hypertension among apparently healthy school-aged children of Nandyal so that preventive measures, early detection, and modifying the risk factors can protect these children from developing complications and thereby reducing the morbidity and mortality.

This study also forms a basis to design a suitable school-based programme to promote physical activity and nutritional education in reducing obesity and hypertension.

1.1 Aims and Objectives of the Study

To estimate the:
a) Prevalence of obesity
b) Prevalence of hypertension
c) Correlation between obesity and hypertension among apparently
Healthy school children aged 5-15 years of Nandyal

2. Materials and Methods

A Cross-Sectional study conducted from December 2016 to November 2017 among the 1500 school going children of affluent class families in the urban area of Nandyal. For the present study, the sample size was estimated using the prevalence rate of 4% acceptable (allowable) Error 1.

Inclusion criteria
Apparently healthy school children aged 5-15 years of Nandyal

Exclusion criteria

1) Children below 5 years and above 15 years.
2) Children with chronic illness.
3) Children on long term medications.
4) Children with congenital anomalies.
5) Children diagnosed to be obese and hypertensive secondary to other causes.

2.1 Study methods

A list of schools with the fee structure of around 30,000 Indian rupees (INR) per annum in the urban area of Nandyal was obtained and the permission to undertake the study obtained from the school principals. From the list of schools, four schools were selected using the lottery method of simple random sampling. Initially, questionnaires were given to the students. After the questionnaire was filled up, their weight and height were measured, and BP was recorded one by one and noted in their respective questionnaires with the help of teachers. After the collection of data from all the four schools, the questionnaires were used for analysis.

2.2 Method of anthropometric measurements

2.2.1 Instructions followed in measuring weight:

1) It was checked that the reading in the digital weighing machine was zero before each measurement.
2) Removed bulky clothing and shoes from students.
3) Students were made to stand still in the center of the platform with head straight to look forward.
4) Recorded to the nearest 0.1 kg.

2.2.2 Instructions followed in measuring height:

1) Located the crown of the head of the student.
2) Students were made to stand erect.
3) 4 contact points – head, upper back, buttocks, and heels were checked.
4) Frankfurt plane parallel to the headpiece of the stadiometer. (Frankfurt plane is the imaginary line from the lower margin of the eye socket to the notch above the tragus of the ear).
5) The subject was instructed to breathe in.
6) Recorded to the nearest 0.5 cm.

2.3 Blood pressure Measurement

Blood pressure was recorded as per recommendations of the fourth report by a Taskforce on diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. Sphygmomanometer was used, and cuff (having a bladder width approximately 40% of arm circumference and length 80% of arm circumference) tied midway between the olecranon and acromion process. Blood pressure recorded in sitting position in the right arm with arm resting on the table with the cubital fossa at the level of the heart. The lower edge of the cuff placed half to one inch above the inner side of the elbow joint. Efforts were made to eliminate factors that affect BP like anxiety, crying, exercise, etc. and BP recorded when the child was calm. Initially, the palpatory method used to determine the systolic BP, followed by the auscultatory method. Three consecutive readings taken at the 2-minute interval were recorded. Average of the value was taken. Hypertension was diagnosed based on BP percentile charts of "Fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents" published by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents.

Hypertension was diagnosed if either of average systolic or diastolic blood pressure is > or = to 95th percentile for age, sex, and height. Prehypertension was diagnosed if either of average systolic or diastolic BP is > or = 90th and < 95th percentile for age, sex, and height. Children with BP levels more than or equal to120 mmHg systolic and or 80 mmHg diastolic were also considered pre-hypertensive.

3. Results

The present study was carried out among 1500, apparently healthy school children aged 5-15 years. Out of 1500 (100%) children included in the survey, 64.8 % (973) children are males, and 35.2% (527) children are females. Most of the study subjects were aged 12 years, followed by 15 and 13 years, and the least number was in 10, 8, and 7 years age group in the ascending order.

Body Mass Index (BMI) estimation of the study group showed 89.27% of children are in the normal range of BMI, 6.93% are overweight, and 3.8% are obese. The body mass index has a range of 10.5 kg/m2 to 24.50 Kg/m2. The mean body mass index was 17.5 +/- 2.3 kg/m2, 5.96% of males are overweight, and 2.36% of males are obese, whereas 8.72% of females are overweight, and 6.45% are obese. (Table No.1)

Blood Pressure measurements showed 95.2 %of children are in the normal range While 2.6% are pre-hypertensive, and 2.2% are hypertensive. (Table No.2) In males, 2.05% are pre-hypertensive, and 2.05% are hypertensive; among females, 3.6% are pre-hypertensive, and 2.46% are hypertensive. Children in the obese group, 45.62%, are hypertensive, whereas only 6.73% of overweight children are hypertensive. (P-value <0.001)

It was observed that 64.7 % of obese children of 11-15 years of age group are hypertensive, and 17.4% of obese children of 5-10 year age group are hypertensive. (P<0.001). (Table no.3) Gender wise distribution of obesity showed more female preponderance, with 6.45% of females are obese, whereas only 2.36% of males are obese. The prevalence of obesity is more in girls than in boys, and the observation is statistically significant. High blood pressure recordings were noted in the female population of 3.79% vs. 1.33% in males. (P<0.001)

4. Discussion

The study is undertaken in a semi-urban area, Nandyal, in the state of Andhra Pradesh. Most of the study subjects were aged 12 years, followed by 15 and 13 years. Least number included from10 years, 8 years, and 7 years in the ascending order.

The prevalence of obesity in the present study (3.8%) correlates with the Shimoga based study done by Raghotam Reddy et al[12]. (4%) (2017). Studies conducted in different parts of India on school children have come out with prevalence ranging from 6% (Raghotam Reddy et al[12] (2017) to 20.2% (Sunil Pathak et al.[13] – 2018). The prevalence of overweight in the present study is 6.93% comparable to Raghotam's study. The wide range of the reported prevalence could be due to regional differences, different genetic makeup, variability in the criteria used among the studies, and different age range of the children studied. In this study, 2.36% of boys and 6.45% of girls were found to be obese with a statistically significant difference. Similar results were reported by Mudur[14] et al. and Sonya Jagadesan[15] et al. This could be due to the fact that during puberty, females have a tendency to accumulate more fat, and male adolescents have a more substantial amount of lean mass compared to females.

Out of 1500 study population, 33(2.2%) apparently healthy school children are hypertensive. Studies have come out with a prevalence of hypertension ranging from 0.41% (Gupta A.K and Ahmad A.J[10]) to 11.4% (Gopalakrishnan et al.)[16]. 2.05% of boys and 2.46% of girls were found to be hypertensive with a statistically insignificant difference. Manoj Kumar Das[17] et al. have reported a higher prevalence of hypertension of 12.3% in boys and 13.5% in girls and an overall prevalence of 13%.

Out of 57 (100%) obese children, 59.6% (34) belonged to 11-15 years age group whereas only 40.4% (23) belonged to 5-10 years age group. Out of 34 (100%) obese children of 11-15 years of age group, 64.7% are hypertensive. Out of 23 (100%) obese children of 5-10 years of age group, 17.4% are hypertensive. Similar results obtained in a study conducted by Chada SL[18] showed 34% obese are hypertensives in 11-15 years age group in comparison with 5-10 years, where 13.1% of the obese are hypertensive. Hypertension in obese children may occur due to increased cardiac output, increased blood volume, excessive sodium intake, increased steroid production, alteration in receptors for various vasopressor substances.

5. Conclusions

In the present study, the prevalence of obesity is 3.8%, and hypertension is2.2% among apparently healthy school children. The prevalence of obesity is more in girls than in boys, and the observation is statistically significant. The prevalence of hypertension is slightly higher in females, but the observation is statistically significant.

6. Recommendations

Parents and teachers should be motivated to educate the school children about the hazards of overweight and hypertension and encourage them to involve in more physical based activities. A multi-sectoral approach involving the education department, government, food industry, media, and people, implementation of policies to halt the problem of childhood obesity. The FOAD (fetal origins of adult-onset disease) epidemic is preventable with lifestyle changes in childhood and adolescence.

Table 1: Weight distribution

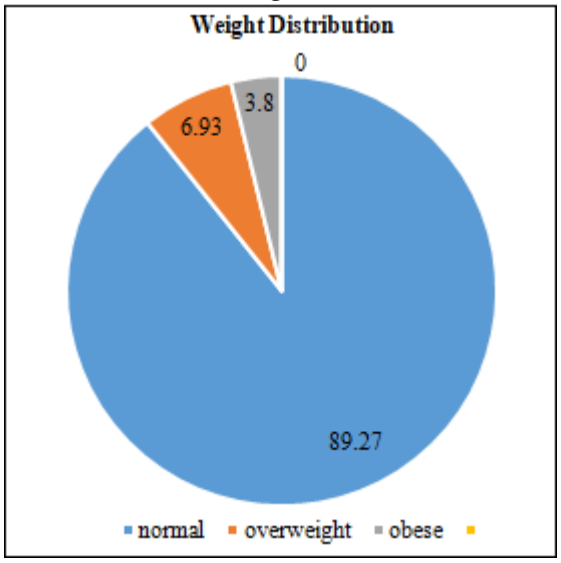


Table 2: Distribution of Blood pressures

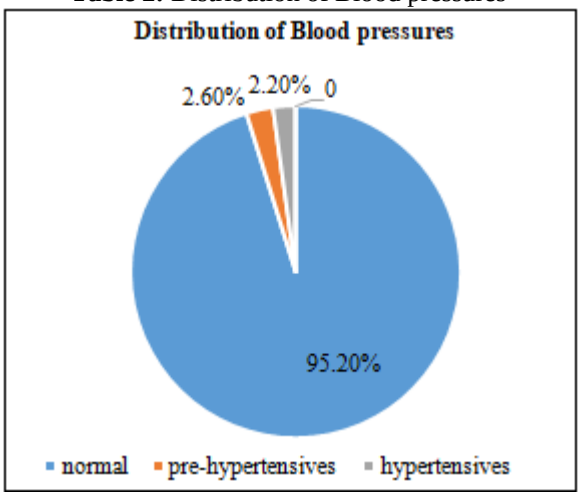
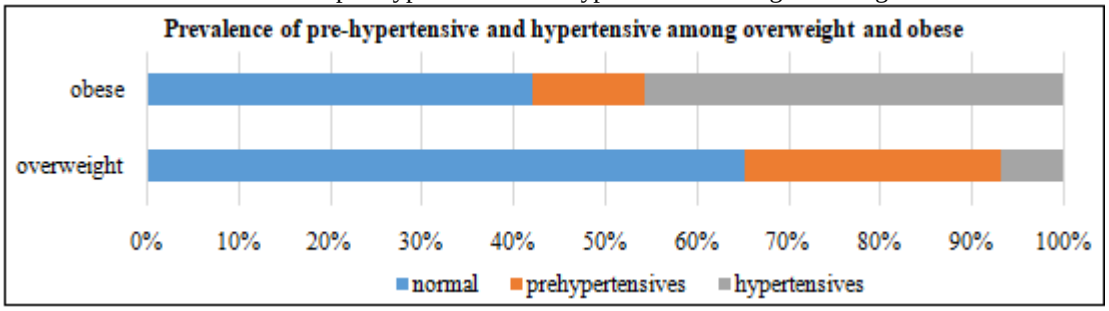


Table 3: Prevalence of pre-hypertensive and hypertensive among overweight and obese



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