

## A Study on Physical Activity and Obesity amongst Secondary School Children.

Sudeepa Dhanpal<sup>1\*</sup>, Pavithra MB<sup>1</sup>, and Pruthvish S<sup>2</sup>.

<sup>1</sup>Department of Community Medicine, MVJ Medical college, Bangalore, Karnataka, India.

<sup>2</sup>Department of Community Medicine, M S Ramaiah Medical college, Bangalore, Karnataka, India.

### Research Article

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#### \*For Correspondence

Department of Community  
Medicine, MVJ Medical college &  
RH, Dandupalya, Kolathur Post,  
Hosakote ,Bangalore Rural  
562114.

Mobile: +91 9886940299,

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#### ABSTRACT

The combination of inactivity and surplus calories contributes to abnormal blood lipids, elevated Blood pressure, Obesity and Diabetes. To find out the proportion of obesity and overweight among school children and to find the level of physical activity. This study was conducted among the selected schools of Bangalore city, 1203 high school students were interviewed of which 600 students were from government schools another 603 were from private schools. Levels of physical activity and Body mass index was measured Adequate physical activity was seen among 445(37%) of the study subjects. Adequate level of physical activity found among 8, 9 and 10 standards are 165(41.4%), 160(41%) and 120(29%) respectively. The difference of physical activity observed was found to be statistically highly significant ( $P < 0.001$ ). The proportion of overweight and obesity among the study subjects was 55(4.6%) and 25(2.1%) respectively. Among the overweight subjects 30(54.5%) were females and 25(45.5%) were males. Obesity was seen among 19(76%) of males and 6(24%) of females. The observed difference is statistically significant ( $P = 0.03$ ). Implementing State educational policies that seek to promote the physical well-being of children is the need of the hour.

#### INTRODUCTION

The combination of inactivity and surplus calories (particularly from animal products) contributes to abnormal blood lipids and elevated blood pressure (BP) and results in widespread obesity, diabetes, and excessive risk of CVD <sup>[1]</sup>.

Overweight and obesity is defined based on BMI (Body mass index). Children are considered to be overweight if they had a BMI 25 kg/m<sup>2</sup> and to be obese if their BMI was 30 kg/m<sup>2</sup> <sup>[2]</sup>. BMI has extremely high specificity (98 to 99%), but lower sensitivity compared to other standard tests for estimating fat content of the body <sup>[3]</sup>. Obesity is a global nutritional concern, the increasing prevalence of overweight, obesity and its consequences prompted the World Health Organization to designate obesity as a global epidemic <sup>[4]</sup>.

A pattern of inactivity, also known as sedentism, begins early in life, making the promotion of physical activity among children imperative. Physical education offers many benefits: development of motor skills needed for enjoyable participation in physical activities; promotion of physical fitness; increased energy expenditure; and promotion of positive attitudes toward an active lifestyle. Evidence also exists that physical education may enhance academic performance, self-concept, and mental health <sup>[5]</sup>.

With cars on most driveways and the decline in the number of physically active jobs, 70% of the adult population is sufficiently inactive to be classed as "sedentary". For thousands of years, physical activity has been associated with health. Today science has confirmed the link with overwhelming evidence that people who lead active lifestyles are less likely to die early or to experience major illnesses <sup>[6]</sup>.

Current recommendations state that children and adults should strive for at least 30 minutes daily of moderate intensity physical activity, Such as a two-mile brisk walk, that should make you feel warm and mildly out of breath. During moderate intensity activity, you should still be able to talk without panting in between your words.

For an adult, regular, moderate intensity physical activity means using up about an extra 200 calories per day, most days of the week. An alternate approach that may be equally beneficial would be to engage in 5 to 10 minute bouts of moderate intensity activity throughout the day, for a total accumulation of at least 30 minutes for adolescents and adults and 60 minutes for children [5].

The current epidemic of the cardiovascular disease can be controlled only through primordial prevention. This may be the only viable strategy if ultimately we are to eliminate these diseases [4]. For primordial prevention, schools and youth education programs are an important focus for the preventive activities, the reason being schools are one of the powerful social institutes with which a large proportion of the population has a relationship, they are thus ideal centers for community health promotion and can influence community health in a number of ways [7].

### **Aim and Objectives**

- To find out the proportion of obesity and overweight among school children
- To find the level of physical activity among the study subjects

## **MATERIAL AND METHODS**

### **Study Area**

This study was conducted among the selected schools of Bangalore city, located at Karnataka in South India. Only the schools from which permission could be obtained to conduct the study were included for the study purpose.

### **Study Design**

Cross sectional study

### **Method of Collection of Data**

### **Source of data**

The study population consisted of 8 standards, 9 standard and 10 standard students of the selected schools. This study was done for a period of 6 months, 1203 students were interviewed of which 600 students were from government schools another 603 were from private schools. There were 5 governments and 5 private schools which participated in the study 120 students were taken from each of the government schools and in each school 40 students were selected from 8, 9 & 10 standards respectively, the students were chosen randomly with the help of attendance registers. The same technique was followed in private schools also, as the total students were 603, these 3 extra students as compared to government schools was chosen from the 10 standard of the last school which was interviewed for the study.

The instrument used for the purpose of the study is a predesigned and pretested structured questionnaire which was administered using the interview method by going to each school. The Questionnaire contains the general information of the person along with details of physical activity; height and weight of the students were recorded to calculate the BMI

In order to build Aerobic Capacity (or cardio respiratory endurance) it is necessary to exercise at a moderate level of intensity for more than 20 minutes. Because the individual is developing the systems for supplying oxygenated blood to working muscle, aerobic exercise involves as many large muscles as possible. It is recommended that aerobic exercises should be done for more than 3 times a week [8].

List of aerobic exercises: Some of the best forms of aerobic exercises traditional sports such as Running, Basketball, Swimming, Cycling, Tennis, Brisk walking, Jogging, Karate, Hockey, Racquet ball, Football, Volley ball, Skipping, Badminton [9]. Based on the above explanation, Adequate physical activity is defined as performing aerobic exercises for more than 20 minutes and more than 3 times a week. This is the definition which is adopted in this study.

Body mass index will be calculated based on physical measurements such as height and weight. Weight was measured using a bath room weighing scale, every time before measurement it was ensured that it was calibrated to zero, this scale was checked frequently using known weights. This scale was kept on a horizontal surface a person was made to stand in the centre of the scale in erect position, foot wear and heavy clothing was removed before weighing.

Height was measured with a measuring tape, using a measuring tape markings were done on a wall. A person was made to stand erect, without foot wear with feet together and head touching the wall. Sufficient pressure was given to compress the hair with a help of a note book. Students were made to look straight and the reading was taken.

Measurement of Obesity and overweight is based on the standard CDC (center for disease control) charts for children; CDC defines as Overweight if the BMI is higher than the 85<sup>th</sup> percentile and Obese if the BMI is higher than 95<sup>th</sup> percentile [10].

### Source

Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion

### Standard CDC Charts for children

AGE	OVERWEIGHT		OBESE	
	GIRLS	BOYS	GIRLS	BOYS
11	20.8	20.2	24	23.2
12	21.8	21	25.2	24.2
13	22.6	21.8	26.2	25.2
14	23.4	22.6	27.2	26
15	24	23.4	28	26.8
16	24.6	24.2	29	27.6
17	25.2	25	29.6	28.2
18	25.6	25.6	30.4	29

### Data Entry and Analysis

Using Micro soft excel and Statistical package for social Sciences

### Statistical Tests Used

- Descriptive statistics, Chi-Square test

### OBSERVATION AND RESULTS

A total of 1203 students were interviewed of which 600 were from Government schools, 603 were from private schools. Males were 648(53.9%) and females 555(46.1%). The age of the study subjects ranged from 11 to 18 years, maximum numbers of students were in the age group of 14 years 390 (32.3%), details are shown in table below.

Adequate physical activity was seen among 445(37%) of the study subjects. 210(37.8%) among females and 235(36.3%) among males. Adequate level of physical activity found among 8, 9 and 10 standards are 165(41.4%), 160(41%) and 120(29%) respectively. The difference of physical activity observed was found to be statistically highly significant (P < 0.001). Adequate physical activity was noticed among 399(42%) students of Private schools and 46(18. 3%) among Government schools, the observed difference is statistically highly significant (P < 0.001).

The proportion of overweight and obesity among the study subjects was 55(4.6%) and 25(2.1%) respectively. Among the overweight subjects 30(54.5%) were females and 25(45.5%) were males. Obesity was seen among 19(76%) of males and 6(24%) of females. The observed differences between the two sexes is said to be statistically significant (P = 0.03). Overweight and obesity was found among 74(7.7%) students of private schools and 6(2.3 %) among government schools. The observed difference is statistically significant (P = 0.01).

**Table 1: Distribution of Physical activity according to Standard in which students were studying**

Standard	Not adequate	Adequate	Total
8 Std	234(58.6)	165(41.4)	399
9 Std	231(59)	160(41)	391
10 Std	293(71)	120(29)	413
Total	758	445	1203

Figures in parenthesis includes percentage  
Chi square value = 17, df = 2, P < 0.001

**Table 2: Distribution of Overweight and Obesity according to Sex**

Overweight and Obesity	SEX		Total
	Female	Male	
Overweight	30 (54.5)	25 (45.5)	55
Obese	6 (24)	19 (76)	25
Others	519	604	1123
Total	555	648	1203

Note (Figures in parenthesis includes percentages)  
Chi square value = 6.4, df = 2, P = 0.03

**Table 3: Relationship of physical activity and overweight, obesity**

Physical activity	Overweight	Obesity	Others	Total
Not adequate	30 (3.9)	14 (1.9)	714 (94.2)	758
Adequate	25 (5.6)	11 (2.5)	409 (91.9)	445
Total	55	25	1123	1203

Note (Figures in parenthesis includes percentages)  
Chi square value = 2.3, df = 2, P = 0.3

## DISCUSSION

A total of 1203 students were interviewed of which 600 were from Government schools, 603 were from private schools. Males were 648(53.9%) and females 555(46.1%). The age of the study subjects ranged from 11 to 18 years, maximum numbers of students were in the age group of 14 years 390 (32.3%), details are shown in the table.

Adequate physical activity was seen among 445(37%) of the study subjects. 758 (63.0) of them were found to have "Not adequate" physical activity. Adequate physical activity is defined as performing aerobic exercises for more than 20 minutes and more than 3 times a week. This is the definition which is adopted in this study, details explained in methodology.

There were studies related to obesity in India but not much data was available on physical activity for comparison. In a study conducted in Brazil by Maria Alayde Mendonça da Silva; Ivan Romero Rivera; Maria Roseane Mendonça Tenório Ferraz; Aluísio José Tavares Pinheiro; Sheyla Waleska dos Santos Alves; Adriana Ávila Moura; et- al, inadequate physical activity was seen in 93.5% as compared to 63.0% in the present study [11].

Further it was noticed that adequate physical activity were seen among 210 (37.8%) in females (N=555) and 235 (36.3%) in males (N=648). Chi square test showed p value = 0.5 which says that the difference in physical activity between the two sexes is not statistically significant. Where as in a study conducted in Brazil by Maria Alayde Mendonça da Silva; Ivan Romero Rivera; Maria Roseane Mendonça Tenório Ferraz; Aluísio José Tavares Pinheiro; Sheyla Waleska dos Santos Alves; Adriana Ávila Moura; et-al. significant association of sedentary lifestyle and the female sex was observed (P < 0.0001) [11].

We tried to see the difference in level of physical activity among 8, 9 and 10 standards, the results revealed that adequate level of physical activity were reported by 165(41.4%) students who were studying in 8 standard, 160(41%) students of 9 standard and 120(29%) of 10 standard reported adequate physical activity. The difference of physical activity observed was found to be statistically highly significant (P < 0.001). The possible explanation is students belonging to standard (class) 10 having less physical activity could be because of their serious involvement in studies as they have to face public exams. According to Omar HA, Rager K. Kentucky adolescents in USA, 45% of 9th graders reported complete lack of physical activity in contrast to 59% in the present study. Studies to compare 8 and 10 standards were not available [12].

Adequate physical activity was noticed among 399(42%) students of Private schools and 46(18. 3%) among Government schools, the observed difference is statistically highly significant (P < 0.001). Difference observed may be because government schools are not focusing much on physical activity; it has to be incorporated as part of their curriculum which may increase the level of physical activity among students of Government schools.

The proportion of overweight and obesity among the study subjects was 55(4.6%) and 25(2.1%) respectively. Center for Chronic Disease Prevention defines as Overweight if the BMI is higher than the 85<sup>th</sup> percentile and Obese if the BMI is higher than 95<sup>th</sup> percentile. (Refer methodology for details). In this study the above mentioned criteria is used to define overweight and obesity. Ramachandran A, Snehalatha C, Vinitha R, Thayyil M, Kumar CK, Sheeba L et al. conducted a study on Prevalence of overweight in urban Indian adolescent

school children at Madras. School students in the age group of 13-18 years (n = 4700, M: F 2382:2318) were studied. Body mass index (BMI) was measured. Age-adjusted prevalence of overweight was 17.8% for boys and 15.8% for girls. The study highlighted the high prevalence of overweight in adolescent children in urban India. Life style factors influenced BMI in adolescent age. <sup>13</sup> where as current study reveals lesser percentage (4.6%). Another study done on 1228 boys at Pune in the age group of 10-15 years showed that the prevalence of obesity to be 5.7% in contrast to our findings which is 2.1%, the prevalence of overweight was 19.9% which is higher as compared to our findings which is 4.6% <sup>[14]</sup>. A cross-sectional study carried out on 2008 school children of age 9-15 years in Punjab, revealed the overall prevalence of obesity and overweight was 11.1% and 14.2% respectively, which is again reporting higher percentage than the present findings <sup>[15]</sup>. Janssen I, Katzmarzyk P T, Boyce WF, King MA, Pickett W in their study revealed 15% of 11-16 year-old Canadian youth were overweight (preobese) and 4.6% were obese <sup>[16]</sup>. The findings of the current study show lesser prevalence of overweight and obesity compared to Canadian youth.

Observations of the present study revealed that percentage of overweight among females as 30 (54.5%) which is greater when compared to males 25 (45.5%), whereas the reverse is seen with respect to obesity percentage of obese males are greater 19 (76%) compared to 6 (24%) in females. The observed differences between the two sexes is said to be statistically significant (P = 0.03) Janssen I, Katzmarzyk P T, Boyce WF, King MA, Pickett W in their study revealed that the prevalence rates of both overweight and obesity were greater in boys than girls (p < .001) <sup>[16]</sup>.

Overweight and obesity was found among 74(7.7%) students of private schools and 6(2.3 %) among government schools. The observed difference is statistically significant (P = 0.01).

There is no statistically significant relation between physical activity and overweight/obesity (P=0.3) in the present study. The reason may be though physical activity reduces overweight & obesity, nutrition is another important factor contributing to weight changes. The percentage of Overweight and Obesity are higher in private schools in spite of adequate physical activity levels due to the dietary habits of children of present generation who eat and relish a lot of junk and high fatty foods. In contrast to our findings a study conducted by Janssen I, Katzmarzyk P.T, Boyce W.F, King M.A, Pickett W. In his study "Overweight and obesity in Canadian adolescents and their associations with dietary habits and physical activity patterns" showed that physical activity levels were lower (p < or = .05) and television viewing times were higher (p < .01) in overweight and obese boys and girls than normal-weight youth <sup>[16]</sup>.

## CONCLUSION

In Indian adolescent school children there is a high prevalence of obesity, hypertension, hypercholesterolemia and high fat diet. Promotion of dietary restriction, physically active lifestyle and avoidance of tobacco use beginning from childhood is important for primordial prevention. Importance of implementing State educational policies that seek to promote the physical well-being of children is the need of the hour.

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