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Original Research Article

Association of screen time with physical activity and BMI in middle school children at Tamil Nadu, India

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ABSTRACT

Background: The objective of this study was to find the association of screen time with physical activity and BMI in middle school children in the age group of 11 to 13 years in Tamil Nadu, India.
Methods: This cross-sectional observational study was conducted among 139 middle school children aged 11 to 13 years at the state of Tamil Nadu, India from June 2019 to August 2019. Data regarding screen time and physical activity were collected from the children using a predesigned questionnaire and anthropometric measurements done. The data collected were analyzed with suitable statistical methods using SPSS 25 software.
Results: Of the 139 children, 46(33.1%) were 11 years, 48(34.5%) were 12 years and 45(32.4%) were 13 years old. 74(53.2%) were male and 65(46.8%) were female. Majority of the study subjects (52.5%) had an average daily screen time of >120 minutes followed by 61 to 120 minutes (28.8%) and ≤60 minutes (18.7%). Of the 139 children studied, only 31.7% (44 children) followed the WHO recommendations of moderate to vigorous physical activity of at least 60 minutes per day, 57.5% of the children had normal BMI, 10.8 % had thinness, 25.2% were overweight and 6.5% were obese. Physical activity was found to decrease with increasing screen time, and this was found to be statistically significant. No statistically significant correlation between screen time and BMI was found. There was statistically significant correlation between physical activity and BMI.
Conclusions: There is a significant correlation of screen time with physical activity in this study. Urgent measures need to be taken to decrease screen time and promote a healthy lifestyle.

Keywords: Obesity overweight children, Physical activity children, Screen time children, Screen time and body mass

INTRODUCTION

Sedentary lifestyle has been linked to several health hazards such as obesity, metabolic syndrome, cardiovascular diseases, diabetes and hypertension. There has been a tenfold increase in the prevalence of obesity among children and adolescents over the past 40 years.[1] One of the major contributors of sedentary time in children and adolescents in recent times is increasing screen time. Increasing screen time and sedentary time are both major lifestyle factors in children contributing to the rise of several non-communicable diseases in this population. The objective of this study was to find the association of screen time with physical activity and BMI in middle school children in the age group of 11 to 13 years in the state of Tamil Nadu, India.

METHODS

This was a cross sectional observational study conducted at the state of Tamil Nadu, India among 139 middle school children. The study was conducted over 3 months

from June 2019 to August 2019. The inclusion criteria included middle school children in the age group of 11 to 13 years who were willing to participate in the study. Children with physical disability, developmental delay, intellectual disability, behavioral problems, visual impairment, hearing impairment, chronic illness and acute illness were excluded from the study. After obtaining informed consent, data was collected from the children using a predesigned questionnaire. The demographic details of the children were collected. Modified Kuppusamy's socioeconomic status scale was used to find the socioeconomic status.

The children were asked to self-report the details regarding screen time use and daily physical activity. The duration of screen time on a typical school day and typical holiday were collected and the average screen time over one week was calculated as average screen time per day. The amount of time, the child performs moderate to vigorous physical activity per day on a typical day was taken as the daily physical activity.

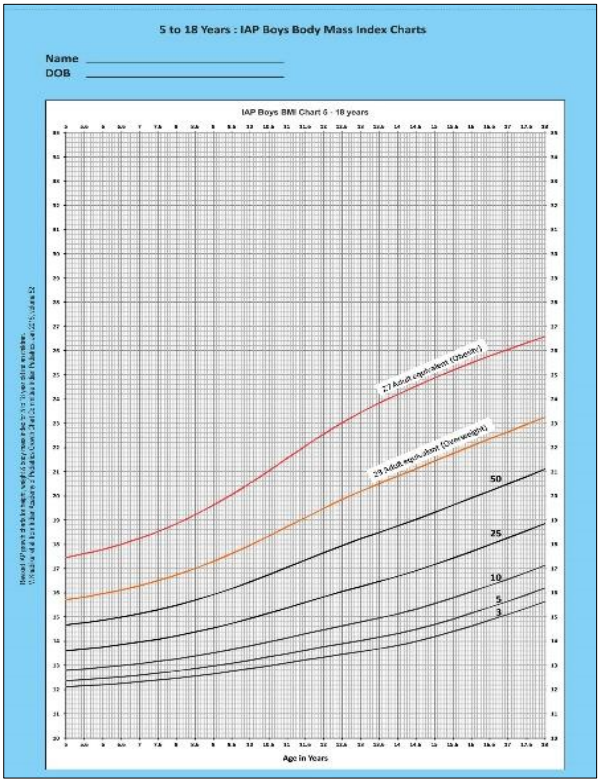

Figure 1: IAP BMI Chart 5 to 18 years (Boys).

The height of the children was measured by a stadiometer and the weight by digital weighing scale. The BMI was calculated using the formula [Weight(kg)/Height(m2)] and plotted in sex specific IAP BMI charts 2015 for boys (Figure 1) or girls (Figure 2).

Based on BMI, children were classified as thinness (less than 3rd percentile), normal BMI, Overweight and Obese. The data collected were analyzed with suitable statistical methods using SPSS 25 software. Statistical significance was assessed at 5% level of significance (p value <0.05).

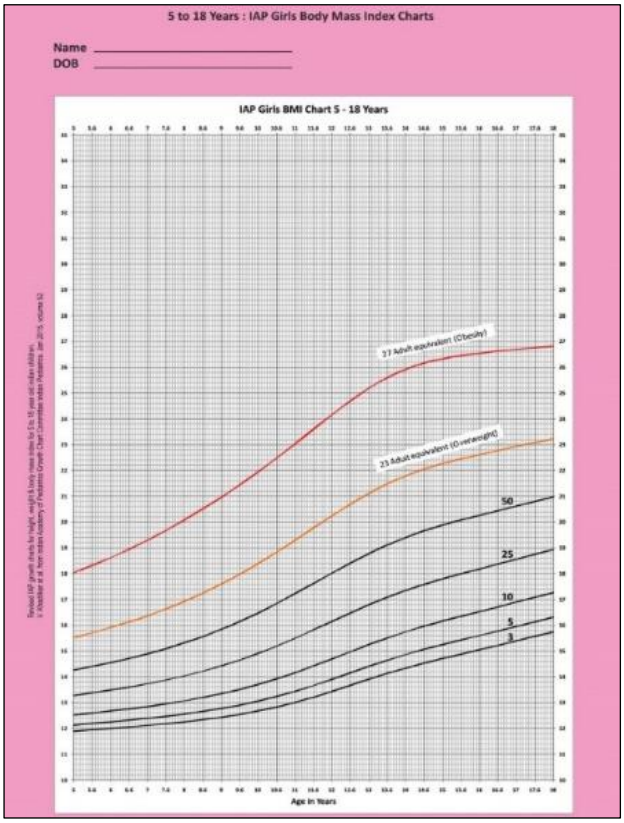

Figure 2: IAP BMI Chart 5 to 18 years (Girls).

RESULTS

Of the 139 children, 46(33.1%) were 11 years old, 48(34.5%) were 12 years old and 45(32.4%) were 13 years old, 74 (53.2%) were male children and 65(46.8%) were female children. Demographic distribution as per Modified Kuppusamy Socio economic status scale and family type is shown in (Table 1).

Table 1: Demographic profile of the study population (Based on age, gender, socioeconomic status and family type).

	11 Years	46(33.1%)
Age group	12 Years	48(34.5%)
	13 Years	45(32.4%)
Gender	Male	74(53.2%)
	Female	65(46.8%)
Socioeconomic Status	Class I (Upper)	6(4.3%)
	Class II (Upper Middle)	40(28.8%)
	Class III (Middle)	32(23.0%)
	Class IV (Upper Lower)	42(30.2%)
	Class V (Lower)	19(13.7%)
Family Type	Joint Family	81(58.3%)
	Nuclear Family	58(41.7%)

The demographic profile of the studied population as per parent's education and occupation is shown in (Table 2). Majority of the study subjects (52.5%) had an average daily screen time of >120 minutes followed by 61 to 120 minutes (28.8%) and ≤60 minutes (18.7%) (Figure 3). The distribution of average daily screen time in various age groups is shown in (Table 3).

Of the 139 children studied, only 31.7% (44 children) followed the WHO recommendations of moderate to vigorous physical activity of at least 60 minutes per day. The distribution of duration of daily physical activities in various age groups is shown in (Figure 4). There was no statistically significant correlation between age and duration of daily physical activity. (Chi Square - 1.4426, p value - 0.48612) (p value >0.05).

Physical activity was found to decrease with increasing screen time, and this was found to be statistically significant.

Statistically significant association of screen time with BMI, age, gender and socioeconomic status was not found. Children with physical activity less than one hour per day were more likely to be overweight and obese compared to children with physical activity of one hour or more per day. This difference was statistically significant (p value <0.5) (Table 4). In present study 57.5% of the children studied had normal BMI. 10.8 % had thinness, 25.2% were overweight and 6.5% were obese. BMI wise distribution of the children in the age groups is shown in (Figure 5).

Table 2: Demographic profile of the study population (Based on parent's occupation and education).

Parent's occupation	Father	Mother
Housewife/House Husband	0 (0%)	61(43.9%)
Unskilled/ Semiskilled	25 (18.0%)	11(7.9%)
Skilled	35 (25.2%)	10(7.2%)
Clerical/Shop Owner/Farm	11(7.9%)	8(5.8%)
Semi professional	33(23.7%)	22(15.8%)
Professional	35(25.2%)	27(19.4%)
Parent's education		
Illiterate	0(0%)	2(1.4%)
Primary	15(10.8%)	22(15.8%)
Middle/High school	30(21.6%)	25(18.1%)
Higher secondary	27(19.4%)	33(23.7%)
Graduate	32(23.0%)	30(21.6%)
Professional	35(25.2%)	27(19.4%)

Table 3: Average screen time and age.

Age	Average screen time per day			
	≤60 minutes	61-120 minutes	>120 minutes	Total
11 Years	8(17.4%)	14(30.4%)	24(52.2%)	46
12 Years	9(18.7%)	13(27.1%)	26(54.2%)	48
13 Years	9(20%)	13(28.9%)	23(51.1%)	45
Total	26(18.7%)	40(28.8%)	73 (52.5%)	139
Chi Square	0.2177	p value	0.994491	Not significant

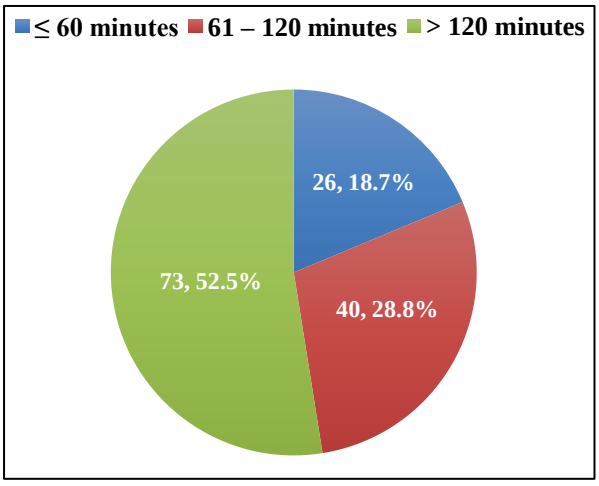

Figure 3: Distribution based on average daily screen time.

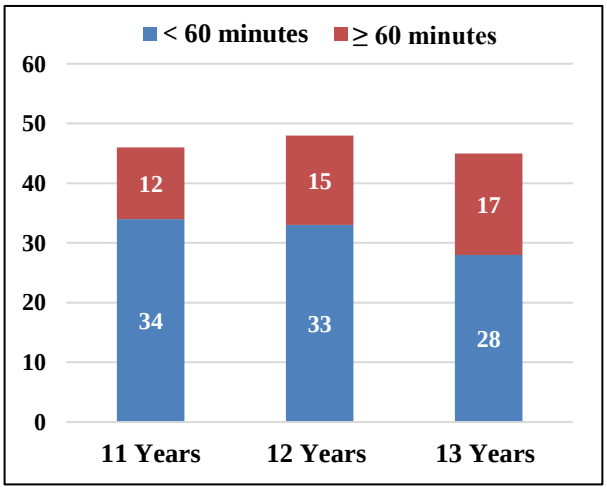

Figure 4: Average duration of daily physical activities in various age groups.

Table 4: Statistical correlation (Chi square test).

Parameter 1	Parameter 2	Chi square	p value	Statistical significance(p value <0.05)
Screen Time	Physical Activity	13.4138	0.001222	Significant
Screen Time	BMI	2.0856	0.911663	Not significant
Screen Time	Age	0.2177	0.994491	Not significant
Screen Time	Gender	0.5291	0.767562	Not significant
Physical Activity	BMI	9.9503	0.018993	Significant
Physical Activity	Age	1.4426	0.48612	Not significant
BMI	Age	2.0856	0.911663	Not significant

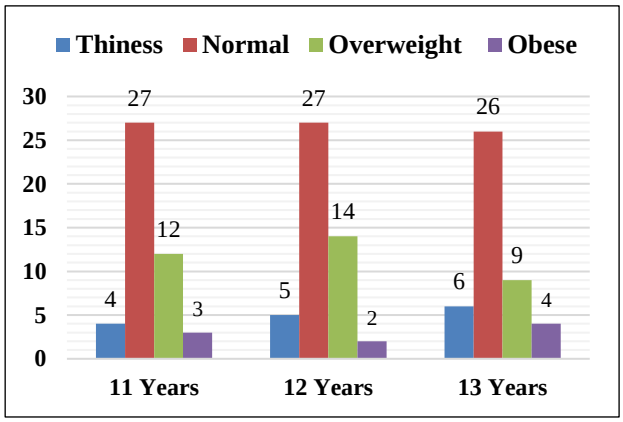

Figure 5: Distribution based on BMI in various age groups.

DISCUSSION

The study by NCD Risk Factor Collaboration (2017) analyzed weight and height in nearly 130 million people, including 31.5 million children aged 5-19 years of age. There was a tenfold increase in the number of obese children and adolescents from 11 million in 1975 to 124 million in 2016. An additional 216 million children were found to be overweight.[1]

Several organizations have recommended guidelines on measures to control this booming public health problem. Sedentary lifestyle has been recognized as one of the major contributing factors to obesity and obesity related morbidities. Sedentary screen time and decreased physical activity are major contributing factors for the increasing prevalence of obesity in all populations.

Commission on Ending Childhood Obesity: implementation plan (2017) recommends several measures to tackle childhood obesity at a global level.[2]

As per WHO recommendation children and youth aged 5-17 should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily. WHO also recommends that most of the daily physical activity should be aerobic and that vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least 3 times per week.[3]

AAP guidelines (2016) recommends that in children aged 6 and older, consistent limits must be placed on the time spent using media, and the types of media, and to make sure media does not take the place of adequate sleep, physical activity and other behaviors essential to health.[4]

In this study, 52.5% of the children had an average daily screen time of >120 minutes. Similarly, several other studies have demonstrated increased screen time among children and adolescents. About 68% of adolescents were reported to have screen time of more than 2 hours in a study on screen time assessment among adolescents in Delhi.[5] Prolonged screen time of ≥ 2hours was observed in 14.7% of boys and 8.9% of girls in a study among 1063 Chinese students aged 8-19 years.[6] 79% of the adolescents were found to have screen time more than 2 hours per day in a study of screen based behaviors of adolescents in Bangladesh.[7]

Only 31.7% of the children followed the WHO recommendations of moderate to vigorous physical activity of at least 60 minutes per day. In a study among urban adolescents in Kolkata, India, only 29% of the adolescents were engaged in regular moderate-to-vigorous exercise.[8] Only 27.7% were involved in daily exercise and 37.1% in daily games in a study among school students in kerala (2010).[9] Statistically 43.8% of the children were physically active for at least 1 hour per day on all 7 days of the previous week in a study among 485 school children in New Delhi by George GM et al.[10]

The prevalence of thinness, overweight and obesity among children in the age group of 11 to 13 years were 10.8 %, 25.2% and 6.5%. The overall prevalence of overweight was 9.9% and obesity was 4.8% in a study at Karnataka by Kotian MS et al, in 2010 among 900 adolescents in the age group of 12 to 15 years.[11] Prevalence of overweight and obesity was noted to be 9.8% and 4.8%, respectively in a study by Nawab T et al, among 660 adolescents at Aligarh.[12] The prevalence of obesity and overweight among urban school children in the age group of 13-17 years in a study at Chennai by Sundar JS et al, was 14.3% and 4.7% respectively.[13] The prevalence of overweight and obesity was found to be 18.7% and 5.8% among adolescents aged 10-19 years in a study in South India.[14]

Physical activity was found to decrease with increasing screen time, and this was found to be statistically significant. No statistical significance was found between screen time and BMI. But there was a significant association between physical activity and BMI.

Increased levels of moderate and vigorous physical activity was associated with a lower BMI and less TV watching, and increased TV was associated with an increased BMI in the Youth Risk Behavior Survey among US youth.[15] In a study among 1216 turkish high school students (2019), obesity was found to be associated with physical activity and screen time.[16]

A positive relation between screen time and overweight and obesity was found in the study conducted among 18,784 adolescents at Mexico.[17] Low physical activity level and watching television for more than 2 h/day were found to be important determinants of overweight and obesity among adolescents in a study by Nawab T et al (2014).[12] Carlson SA et al in a study among American youth noted that odds that children would exceed recommended screen time limits (≤120 minutes per day) decreased as physical activity in the previous week increased.[18]

The magnitude of the problems of overweight, obesity, increasing screen time and decreasing physical activity among children and adolescents and the correlation of screen time with decreased physical activity and raising BMI has been well established by several studies. Several measures need be to take at the level of policy makers, health bodies, educational bodies and individuals to deal with these emerging public health issues.

CONCLUSION

Obesity along with obesity related diseases has been increasing among children and adolescents in the recent years in a dramatic rate. While there are several contributing factors to this rapid rise in obesity, increasing screen time and consequently decreasing physical activity leading to a sedentary lifestyle is a major contributing factor. Awareness of this new age problem and steps to reduce screen time and promote a physically active lifestyle is the need of the hour to curb obesity among children and adolescents.

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