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Research Article

CORRELATION BETWEEN PHYSICAL ACTIVITY AND BODY MASS INDEX AMONG CHILDREN

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ABSTRACT

Background: The prevalence of childhood obesity increasing steadily in India. Obesity may results from a complex interaction of endogenous and exogenous causes. Most of them having exogenous causes and physical inactivity is one of them. Increased hours of inactivity due to increasing academic pressure, use of electronics gazettes have all replaced outdoor games and activities which promotes sedentary life. There are very few studies describing the pattern of physical activity of children in India**.**

Aim: The present study aimed to find out correlation between physical activity, BMI and time spend in front of screen among children.

Methodology: Study was approved by review board of ethics committee. 312 school going children of various income groups with the age 6-12 years were recruited by purposive sampling method. Informed consent was provided by teachers or parents. Height and weight of children was taken to calculate BMI. Physical Activity Questionnaire for children (PAQ-C) was filled up to assess the physical activity by children. Self-reported hours of time spent in front of the screen was noted.

Results: Distribution of obesity and overweight in the sample was 9% and 16%, respectively. There were statistically significant negative correlation between physical activity and BMI (r = -0.619); and Time Spend in front of Screen and physical activity (r = -0.554). There was positive correlation between BMI and Time Spend in front of Screen (r= 0.556).

Conclusion: Increasing prevalence of overweight and obesity in school going children relate to decreasing physical activity level and increasing time spend if front of TV, video games and computers.

KEYWORDS: Pediatric obesity, Physical activity, Body Mass Index, Television viewing.

INTRODUCTION

A significant increasing trend in the prevalence of overweight and obesity in children and adolescents has been documented over last few decades in many countries[1]. In India, where there is high prevalence of under nutrition, a significant proportion of overweight and obese children now coexist[2]. Prevalence of childhood overweight or obesity in India is 29% in year 2006 which was 16% in year 2004[3].The cause of childhood obesity is certainly debated. Obesity may result from a complex interaction of genetic, environment, metabolic, physiological, behavioral, social, and racial influences[4]. The notable interaction in genetic and environmental makes it difficult to qualify the role of each in obesity development. The changing life style of families in India with increased purchasing power, easy availability, more comfortable and luxurious living, improved technology have all attributed to the problem of childhood obesity. Increased hours of inactivity due to increasing academic pressure, television, video games and computer have all replaced outdoor games and other social activities[5]. The lack of appropriate play area and limited open space around home makes it difficult for children to stay physically active. Children spend more time in front of television and computers at the expense of sports and physical activity[6]since obesity does not result from any one single factor, researchers have tested combined interventions, with several messages, as well as single interventions with a single message [7]. Although very few data available for Indian population. Therefore the aim of the present study is to find relationship of physical activity and also time spent in front of the screen with body weight among children.

MATERIALS AND METHODS

Ethics approval was obtained from institutional review board, V.S. Hospital, Ellis Bridge, Ahmedabad. 312 school going children of various income groups with the age of 6 to 12 years old participated in this observation study. They all were selected from the various strata of Ahmedabad by purposive sampling method and categorized in low, middle and high income group. Informed consent was provided by teachers or parents. Height and weight of children was taken to calculate BMI. Physical Activity Questionnaire for children (PAQ-C) was filled up to assess the physical activity by children. Self-reported hours of time spent in front of the screen was noted.

RESULTS AND DISCUSSION

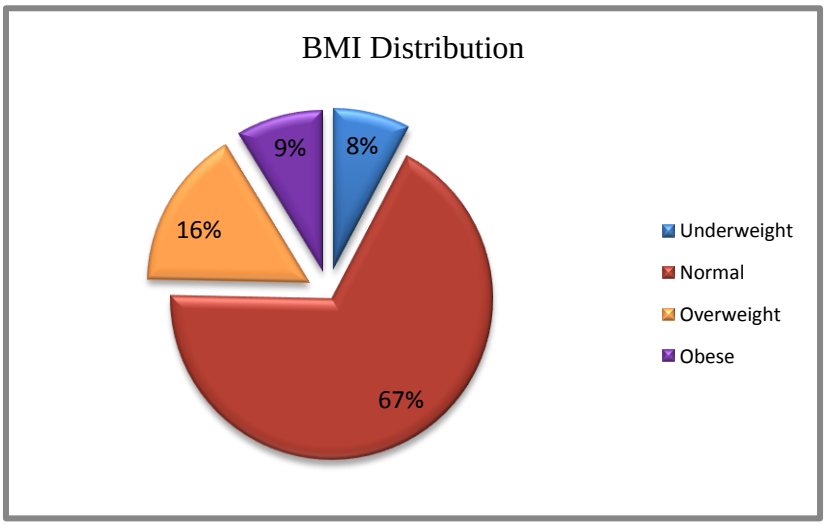
161 boys and 151 girls between 6 to 12 years old from different school of the city participated in the study. The data have been analyzed by using SPSS 16.0 Software and Microsoft Excel 2007.

Table 1: Demographic data

	Total N=312	Income groups		
		LIG* N=104	MIG** N=104	HIG** N=104
Age (year)	8.96 ± 1.96	8.96 ± 1.98	8.97 ± 1.99	8.97 ± 1.99
Height (meter)	1.28 ± 0.12	1.25 ± 0.14	1.28 ± 0.13	1.30 ± 0.10
Weight (kg)	26.98 ± 7.67	24.25 ± 7.16	25.81 ± 7.58	30.87 ± 6.69
BMI (kg/m^2)	16.18 ± 2.86	15.13 ± 2.25	15.43 ± 2.71	17.98 ± 2.70
PAQ-C Score	2.50 ± 0.59	2.81 ± 0.55	2.44 ± 0.54	2.25 ± 0.55
TSIFS (min/day)	127.00 ± 70.6	83.46 ± 57.85	119.23 ± 61.93	180.96 ± 54.40

Table 2: BMI distribution in the sample

Income Groups / BMI Category	No. of children in LIG	No. of children in MIG	No. of children in HIG	Total No. of children
Underweight	15	9	0	24
Normal	78	80	53	211
Overweight	10	10	30	50
Obese	1	5	21	27
Total	104	104	104	312



Pearson's correlation test was applied to find out correlation.

Table 3: Pearson's correlation values for correlation between BMI, PAQ-C and TSIFS

	Pearson's correlation Coefficient (r)				Level of Significant ('p' value)
	Whole sample	LIG	MIG	HIG	
Between BMI and PAQ-C Score	-0.619	-0.404	-0.546	-0.763	0.01
Between BMI and TSIFS	0.556	0.327	0.346	0.601	
Between PAQ-C Score and TSIFS	-0.554	-0.407	-0.425	-0.541	

***LIG - Low income group, **MIG - middle income group, ***HIG – High income group**

When all the subjects in the LIG, MIG and HIG were evaluated by ANOVA for their difference, there were significant different between the group and within the group for all 3 outcome variables BMI, PAQ-C Score and TSIFS ($p < 0.001$). Multiple comparisons done by Post hoc Bonferroni shows there were no significant different between LIG and MIG for BMI ($p = 1.00$), and MIG and HIG for PAQ-C score ($p = 0.05$).

Distribution of obesity and overweight in the present sample was 9% and 16%, respectively. Distribution of obesity and overweight in Low Income Group was 1% and 10%, in Middle Income Group was 5% and 9% and in High Income Group was 20% and 29% respectively. Similar distribution was reported by earlier studies [8, 9, 10]. Some of the studies [11,12] reported a very low prevalence; it may be due to use of different cut off criteria of obesity and different in their sample size.

The present study sample had mean BMI of 16.18 ± 2.86 kg/m^2, PAQ-C score 2.50 ± 0.59 and Time Spend in Front of Screen 127.00 ± 70.61 minutes/day. When Pearson's correlation test was applied to find about correlation between all these three outcomes, there were statistically significant negative correlations between BMI and Physical Activity ($r = -0.619$); and Time Spend in Front

of Screen and Physical Activity (r = -0.554). There was statistically significant positive correlation between BMI and Time spend in Front of Screen (r =0.556). When Pearson's correlation test was applied to individual income group, there were statistically significant negative correlation between BMI and Physical Activity; and Time Spend in Front of Screen and Physical Activity for LIG, MIG and HIG. There was statistically significant positive correlation between BMI and Time Spend in Front of Screen for LIG, MIG and HIG. So the results of present study suggest low physical activity is associated for increasing weight in school going children of present sample. Increasing the time spends more in front of television, video game and computer might be the cause for decreasing level of physical activity in school going children.

When all the subjects in the LIG, MIG and HIG were evaluated by ANOVA for their difference, there were significant different between the group and within the group for all 3 outcome variables BMI, PAQ-C Score and TSIFS ($p < 0.001$). Multiple comparisons done by Post hoc Bonferroni shows there were no significant different between LIG and MIG for BMI ($p = 1.00$), and MIG and HIG for PAQ-C score ($p = 0.05$). All other comparison shows significant difference ($p < 0.001$).

Senbanjo et al.[13] found weak correlation between BMI with physical activity. Marshall SJ et[14], also found association TV viewing, physical activity and obesity. But again it was weak correlation. The present study showed strong correlation and very low physical activity than the available data. Accelerometer and various determents of physical activity were used to assess the level of physical activity in most of the past study. The present study used physical activity questionnaire which is reliable and valid[15,16] tool but it might not include all the aspect of the physical activity. So accelerometer can judge mild to moderate level of activity but questionnaire not, because vigorous activities were easy to recall than mild to moderate activities. It is unlikely that errors in self-reportage would have contributed to a systematic error in between those who reported Physical activity and Time Spend in Front of Screen less or more.

Kuriyan R [17], they found Decreased duration of sleep and increased television viewing was significantly associated with overweight. At an individual level, sleep ≤ 8.5 hrs/day is associated with increased odds of overweight of 6.8, while TV viewing > 45 min had a threefold increase in risk of overweight. TV watching, video games and internet gazing, now important activities of children at home, leaves hardly any time to get involved in leisure time physical activity. Due to intense academic competition to perform better at school, children are hardly seen at the playground.

Vandewater EA et [18] found three hypothesis for connecting obesity and physical activity level with television and video game. First, ''couch-potato'' hypothesis is by far the most popular hypothesis regarding the connection between electronic media use and obesity in children, and it applies equally well to both television watching and video game use. Both activities are assumed to displace more active activities (e.g. playing outside) and facilitate sedentary lifestyles in children and adolescents. The second major hypothesis links television viewing, in particular, to increased caloric intake either from eating during viewing or as a result of food advertising on television, which tends to emphasize high-calorie, high-fat foods with poor nutritional content. It has also been suggested that such advertising not only increases children's desire for high-calorie foods, but fosters belief that the consumption of such foods is unrelated to being overweight, as actors portrayed in such advertisements are generally thin to normal weight. There is also experimental evidence that there are direct effects of exposure to advertising for high-calorie foods on children's snack choices and consumption. While this hypothesized mechanism is clearly appropriate for linking television to children's obesity, it is less relevant to video game and computer users. The third major hypothesis is that television viewing actually decreases metabolic rates, more so than simply resting or sleeping. However, this hypothesis had less evidence because very few studies conducted to examining the relationships between video games and metabolic resting rates, making it difficult to speculate what the relationship might be. But it is generally accepted that video games involve more mental, and perhaps physical, effort and thus this mechanism might also be less relevant for linking video game use and obesity.

Increasing pattern of obesity is apparent from the current study as we move from lower income group to towards high income group. The observed higher distribution of obese children in upper class may be because of sedentary lifestyles, altered eating patterns and increased sugar and fat content of their diet[11]. Among the eating behaviors, increased consumption of fried foods was significantly associated with overweight. However, in the present study eating habits of the children was not assessed.

In present study there was no significant different in Physical Activity level between MSE and HSE class. MSE and HSE class school having almost similar environment lacking physical education and more emphasize on study. This together with the fact that school enrollment rates are variable across India suggests that physical activity needs to be assessed across multiple domains.

CONCLUSION

There were statistically significant negative correlation between physical activity and BMI; and physical activity and time spend in front of screen. There was statistically significant positive correlation between BMI and time spend in front of screen.

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