

## SHORT ARTICLE

**Association of obesity with physical activity, television viewing, video /computer gaming among school children in Mangalore**Sanjay Kini<sup>1</sup>, Pavithra Ramasamy<sup>2</sup>, Merin Jaison<sup>2</sup>, Reshma Raj<sup>2</sup>, Ranjitha RK<sup>2</sup>, Rashmi Kundapur<sup>3</sup>, Nalam Udaya Kiran<sup>4</sup><sup>1</sup>Assistant Professor, <sup>2</sup>Undergraduate Student, <sup>3</sup>Associate Professor, <sup>4</sup>Professor and Head, Department of Community Medicine, KS Hegde Medical Academy, Deralakatte, Mangalore- 575 018, India

<a href="#">Abstract</a>	<a href="#">Introduction</a>	<a href="#">Methodology</a>	<a href="#">Results</a>	<a href="#">Conclusion</a>	<a href="#">References</a>	<a href="#">Citation</a>	<a href="#">Tables / Figures</a>
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**Corresponding Author**

Address for Correspondence: Sanjay Kini, Assistant Professor, Department of Community Medicine, KS Hegde Medical Academy, Deralakatte, Mangalore- 575 018, India  
E Mail ID: sanjaykini2010@gmail.com

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**Abstract**

**Introduction:** There is an increasing prevalence of obesity worldwide in children which can be attributed to changes in lifestyle such as sedentary habits, television (TV) viewing, playing computer games, and consumption of snacks while watching television. The present study was done to find the association between obesity and TV viewing, computer game playing, sedentary lifestyle in children and also with a secondary objective to assess the association between blood pressure and TV/computer game viewing, sedentary lifestyle in children. **Materials and methods:** A cross sectional study was conducted at 4 high schools and Pre University Colleges (PUC'S) in and around Mangalore during the study period of 4 days from 6 -12 august 2014. 509 students were enrolled. Information was gathered by asking the subjects to fill up a structured questionnaire. Nutritional status was assessed based on Body mass index (BMI) and waist-hip ratio, waist-height ratio for all subjects. Blood pressure was measured for all the subjects. **Results:** It was found that among males 2.7% of students were obese and in females it was 2.3%. There was a significant association between blood pressure and consumption of snacks while watching TV and also between blood pressure and their habit of consumption / buying of snacks/ fast-food advertised in TV. A significant association was found between central obesity (Waist-hip ratio and Waist-height ratio) and the number of hours of physical activity per week in schools. **Conclusion:** There is a need to develop preventive intervention like reducing snack consumption while watching TV and increasing the time dedicated to physical activity.

**Key Words**

Obesity; Physical Activity; Video/Computer Games

**Introduction**

The prevalence of obesity worldwide is on the raise and so also its health implications (1, 2, 3) which is a great cause of concern. There is a marked increase in the prevalence of childhood obesity (4, 5, 6) and concerns about the future health implications of obesity in childhood (7,8,9) is well documented. Both in low and middle income countries as well as affluent countries (3,6,10,11) this problem has been identified. Increasing television viewing in children

has been implicated as a cause of childhood obesity though potential contributors to the problem of childhood obesity are multiple and complex. Displacement of physical activity, exposure to advertising and consequent use of foods commonly advertised on television, and increased calorie intake while watching television (12,13) has been proposed to be possible mechanisms. A small but significant positive associations have been demonstrated by a number of studies between television viewing and

body mass index (BMI) or body fatness of children and adolescents, especially in adolescent females (13,14,15,16). Such an association in similar age groups was not demonstrated by other similar studies (17,18). A similar variation of findings has been highlighted by meta-analysis. But it has been concluded that there is a relationship between television viewing and BMI. In India Childhood obesity is emerging as a major health problem, particularly in children from urban affluent areas; for example, in an affluent Delhi school about 30% of children were overweight. Indian studies are presently lacking with regard to the determinants of overweight/obesity among children more so in this part of coastal Karnataka. Hence the present study was done to find the association between obesity and TV/computer game viewing, sedentary lifestyle in children.

### Aims & Objectives

The study was also designed with a secondary objective to assess the association between blood pressure and TV/computer game viewing, sedentary lifestyle in children.

### Material and Methods

This cross sectional study was conducted at 4 high schools and Pre-University Colleges in and around Mangalore during the study period of 4 days from 6-12 August 2014. 509 students present at the time of visit between the age group of 13 to 18 years were studied using a convenient sampling technique. Consent was obtained from principal of school and college and each subject concerned was approached and informed about the study and written consent was taken. Information was gathered by asking the subjects to fill up a structured questionnaire. Students were explained in detail how to fill the questionnaire and the meaning of each question and their options. The questionnaire comprised of questions on their TV viewing and computer/ video gaming habits both during weekdays and weekends, physical activity and habit of consumption of snacks while watching TV and video gaming and buying snacks/ fast-food advertised in TV. The frequency was categorised as never if they never consumed snacks while watching TV, playing computer/ video games, occasional if they did so once or twice a week, frequently if they did more than twice a week and always if they did so every time they watched TV or played video/computer games. The same pattern

was applied to their habits of buying/ consumption of snacks/ fast-foods advertised on TV. Nutritional status was assessed based on BMI and waist-hip ratio, waist-height ratio for all subjects. Weight was measured to the nearest 100gms, without wearing footwear, using a standard weighing machine after correcting the zero error. Height was measured to the nearest 1 cm with the person standing upright against the wall with heels together and touching the wall, and the head held upright position, with a non-stretchable measuring tape. Children were considered obese if their BMI  $\geq$  85th percentile for age and sex specific according to NHANES survey<sup>19</sup>. Waist circumference was measured at the mid-point between the lower margin of the lowest rib and the top of the iliac crest, in mid expiration, in standing position, using a stretch resistant tape. Hip circumference was measured at the inter-trochanteric level in standing position, with the tape parallel to the floor. Abdominal obesity was defined as waist-hip ratio above 1.0 for males and 0.85 for females<sup>20</sup>. Waist height ratio of more than 0.5 was considered as obese<sup>20</sup>. Blood pressure was recorded using a calibrated mercury sphygmomanometer. Blood pressure was taken in sitting position and in the right arm with the sphygmomanometer placed at the level of chest of the subject. Appearance of first sound (phase 1) of korotkoff was taken as systolic and total disappearance (phase 5) of korotkoff sound was taken as diastolic BP. Blood pressure was taken once the person was relaxed. Blood pressure was categorized according to JNC-7 classification (21). Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS) version 16. Continuous data was summarized as mean  $\pm$  Standard deviation. Categorical data was expressed as percentages and proportions. Chi-square test was used to find significant association between parameters of obesity, hypertension and TV watching / video game playing habits. Ethical clearance for the study was obtained from the institutional ethical committee of KS Hegde Medical Academy, Mangalore.

### Results

There were 294 boys and 215 girls in the study ranging from 12 to 18 years. The anthropometric details of children are as shown in [Table 1](#). The mean time dedicated to TV viewing in children per day was  $2.96 \pm 1.02$  hours on weekdays and  $3.34$

$\pm 1.05$  hours on weekends. Mean time dedicated to playing video/ computer games per day was  $1.80 \pm 0.93$  hours on weekdays and  $2.06 \pm 1.16$  hours on weekends. Mean time spent on physical activity in school was  $2.35 \pm 1.00$  hours per week and at home it was  $2.14 \pm 1.14$  minutes.

It was found that among males 2.7% of students were obese (BMI  $\geq$  85th percentile for age and sex specific according to NHANES survey)<sup>19</sup>. About 0.3% had a waist hip ratio  $> 1$  and 5.1% of male students had waist-height ratio  $> 0.5$ . Similarly among females 2.3% were obese, 34% had a waist hip ratio  $> 1$  and 20.5% had waist-height ratio  $> 0.5$ .

No significant association was found between television viewing, video/ computer gaming habits either on weekdays or weekends and obesity (BMI, waist-hip ratio and waist-height ratio). Similarly we did not find any significant association between television viewing, video/ computer gaming habits either on weekdays or weekends and blood pressure.

It was found that 15.9 % of children never consumed snacks while watching TV, 75.1% consumed occasionally, 3.7% consumed frequently and 1.8% always consumed snacks while watching TV. It was also found that 62.9% of children never consumed snacks while playing computer/ video games, 34.7% consumed occasionally, 1.6% consumed frequently and 0.8% always consumed snacks while playing video/ computer games. About 33.0 % of students never bought/ consumed snacks/ fast-food advertised on TV, 59.8% did that occasionally, 5.5% did that frequently and 1.8% always bought/ consumed snacks/ fast-food advertised on TV.

In the present study no significant association was found between consumption of snacks while watching TV or playing computer/ Videogames and measures of obesity like BMI, waist-hip ratio and waist-height ratio. Similarly we did not find any significant association between consumption/ buying snacks/ fast-foods advertised on TV and measures of obesity like BMI, waist-hip ratio and waist-height ratio.

It was found that 8.3% of children were hypertensive, 42.6% were pre-hypertensives and 49.1% were normotensives. There was a significant association between blood pressure and consumption of snacks while watching TV ( $p = 0.01$ ). The results are depicted in [Table 2](#)

We also found a significant association between consumption / buying of snacks/ fast-food advertised in TV and blood pressure ( $p = 0.03$ ). The results are depicted in [Table 3](#)

There was no significant association between BMI and the number of hours of physical activity per week in schools. But we found a significant association between central obesity (Waist-hip ratio and Waist-height ratio) and the number of hours of physical activity per week in schools. It was found that the percentage of people having higher waist-hip ratio were less among those who exercised at least for some time per week compared to those who did not exercise. But no such association was found between waist-height ratio and exercise. Results are shown in [Figure 1](#).

No significant association was found between blood pressure and the number of hours of physical activity per week in schools. The attitude of students towards physical activity was assessed by asking whether the students enjoy physical activity. It was found that 25.0% strongly agreed that they enjoy physical activity, 63.7% just agreed, 4.3% neither agreed nor disagreed, 4.9% disagreed and 2.2% strongly disagreed. It was also found that 39.9% of the students strongly agreed that when they are physically active their body feels good, 55.2% of students just agreed with the statement, 2.9% of students neither agreed nor disagreed, 1.2% disagreed and 0.8% strongly disagreed.

It was found that 41.8 % of students said they did not walk/ rode bicycle to schools. 16.5% said that they did so 1-2 days per week, 9.8% said that they did so 2-3 days per week, 7.1% said that they did so 3-4 days per week, 17.7% said that they did so 4-5 days per week and 7.1% of students said that they did so  $> 5$  days per week. But we did not find any significant association between number of days of walking / cycling to schools and parameters of obesity (BMI, Waist-hip ratio & waist-height ratio) or hypertension.

## Discussion

Out of the 2.5 % obese children (according to BMI), maximum children belonged to the category where they do not do any exercise. According to our study, all the children who do physical activity in school  $> 4$ hrs per week, were found to be non-obese. Similar results were obtained when compared physical activity with central obesity based on waist-hip ratio

and waist-height ratio. About 97% did not have central obesity among those who did physical exercise > 4 hours per week. A similar study conducted in Mexico city by Hernandez *et al* (22) (N=461) among children aged 9-16 year old children found 10% lower chance of obesity for each hour of moderate and vigorous exercise and concluded that lack of physical activity was significantly associated with obesity. Another study conducted by Ekelund U *et al* (23) (N=1921) among 15-16 year old boys and girls found that lack of physical activity was significantly associated with obesity.

According to our study, no positive co-relation was found between obesity and excessive TV viewing; may be because of inadequate samples. But, according to a study by William *et al* (15) (N=2153) among 12 -17 year old adolescents, prevalence of obesity increased by 2% for TV viewing and it was concluded that the consistency, strength and specificity of association suggest that TV viewing may cause obesity in at least some children and adolescents. Hernandez *et al* (22) in Mexico city (N=461) found that obesity was 12% higher for each hour of TV viewing per day. Similar result was obtained when Ekelund U *et al* (23) conducted study on 1921 children of 15-16 years old.

In our study we did not find any significant association between playing video / computer games and obesity. Jorge *et al* (24) in their study on Portuguese adolescent (N=450) found that non obese people spent less time using computers on weekends and weekdays compared to obese people. Those who use computer > 4 hours /day were likely to be more obese or overweight. We did not find any significant association between consumption of snacks while watching TV or playing computer/ Videogames and measures of obesity like BMI, waist-hip ratio and waist-height ratio in our study. A study done by Theresa Nicklas *et al* (25) on the association of overweight status and eating pattern of 1562 children aged 10 years revealed that the total amount of snack consumed was positively associated with overweight and the prevalence was 24%.

We found a significant association between blood pressure and consumption of snacks while watching TV ( $p = 0.01$ ). More than half of the group of students who consumed snacks frequently while watching TV had blood pressure higher than the normal range. An Article published by council on communications and media (26) said that screen time may displace more

active pursuits, advertising of junk food and fast food increases children's requests for those particular foods and products, snacking increases while watching TV or movies, and late-night screen time may interfere with getting adequate amounts of sleep, which is a known risk factor for obesity.

## Conclusion

It is very clear that media plays an important role in the current epidemic of childhood and adolescent obesity. One of the major reasons is the sheer number of advertisements that children and adolescents see for junk food and fast food. The shift away from good nutritional practices that increased media screen time seems to create is also an important attributable risk factor.

## Recommendation

A major change in society's recognition of media exposure as a major risk factor for childhood obesity is required for successful implementation of preventive measures.

## Limitation of the study

We did not study stress factor in children which might have a bearing on obesity.

## Relevance of the study

In the current scenario of changing pattern of disease in the developing countries like India showing a paradigm shift from communicable disease to non-communicable disease (NCDs), the present study emphasizes the importance of lifestyle modifications right from a tender age

## Authors Contribution

Study Design: SK, PR, RK, NUK. Data collection: PR, MJ, RR, RRR. Data analysis: SK, PR, MJ, RR RRR. Manuscript Preparation: SK, PR. Proof reading and editing: RK, NUK.

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## Tables

**TABLE 1 ANTHROPOMETRIC MEASUREMENTS AND BLOOD PRESSURE READINGS AMONG CHILDREN**

Mean ± Standard deviation	Male	Female
<b>Height (cm)</b>	159.82 ± 10.88	153.37 ± 8.90
<b>Weight (kg)</b>	47.32 ± 12.40	44.64 ± 8.89
<b>BMI (kg/m<sup>2</sup>)</b>	18.37 ± 3.83	18.96 ± 3.28
<b>Waist/Hip</b>	0.832 ± 0.063	0.813 ± 0.077
<b>Waist/Height</b>	0.431 ± 0.053	0.441 ± 0.058
<b>SBP (mm/Hg)</b>	115.05 ± 12.34	112.97 ± 9.99
<b>DBP (mm/Hg)</b>	73.46 ± 8.63	72.33 ± 8.57

**TABLE 2 ASSOCIATION BETWEEN BLOOD PRESSURE & CONSUMPTION OF SNACKS WHILE WATCHING TV**

Frequency	Normotension n (%)	Prehypertension n (%)	Hypertension n (%)	Total n (%)
Never	48 (59.3)	21 (25.9)	12 (14.8)	81 (100.0)
Occasional	179 (46.9)	176 (46.1)	27 (7.1)	382 (100.0)
Frequently	7 (36.8)	11 (57.9)	1 (5.3)	19 (100.0)
Always	16 (59.3)	9 (33.3)	2 (7.4)	27 (100.0)

**TABLE 3 ASSOCIATION BETWEEN CONSUMPTION / BUYING OF SNACKS/ FAST-FOOD ADVERTISED IN TV & BLOOD PRESSURE**

Frequency	Normotension n (%)	Prehypertension n (%)	Hypertension n (%)	Total n (%)
Never	95 (56.5)	59 (35.1)	14 (8.3)	168 (100.0)
Occasional	136 (44.7)	142 (46.7)	26 (8.6)	304 (100.0)
Frequently	11 (39.3)	15 (53.6)	2 (7.1)	28 (100.0)
Always	8 (88.9)	1 (11.1)	0 (0.0)	9 (100.0)

**Figures**

**FIGURE 1 ASSOCIATION BETWEEN WAIST-HIP RATIO AND THE NUMBER OF HOURS OF PHYSICAL ACTIVITY PER WEEK IN SCHOOLS**

