

Media Exposure as Predictor of Childhood Obesity in Children Aged 7-12 Years in Gurgaon

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ABSTRACT

Childhood obesity is a serious health condition, where kids weigh above the normal weight for their age. This sets an early stage for diseases like diabetes, high blood pressure, cholesterol and various other ailments that are actually related to adulthood. While the problem is global, it is relatively newer in Indian population but unfortunately; it is growing at a rapid rate. Increased consumption of fast food, sugar laden fizzy drinks, lack of physical activity and largely sedentary lifestyle comprising of watching television, playing video or computer games, playing on mobile phones and tablets due to the changing urban lifestyle are the major causes of childhood obesity. 200 children aged 7-12 years attending a Public School in Gurgaon, participated in the study. Weight and height were measured and the BMI was calculated. Media exposure was assessed by a questionnaire designed especially for the study. Among all participants, a large number of children were found to be obese and overweight. Prevalence of obesity and overweight was higher in boys than girls. A large number of children had a screen time of more than five hours per day and several watched Television while eating, many children had TV in their bed rooms, most had Internet access and nearly everyone played video games daily. Easy accessibility of TV, smart phones and Internet has a strong relationship with childhood obesity and overweight.

Keywords: *Childhood obesity, media exposure*

Overweight and obesity is one of the most important public health problems in the world which is being escalated as a global epidemic. As per WHO, Childhood obesity is one of the most serious public health challenges of the 21st century. This is becoming global in nature and is slowly but steadily affecting many developed and developing countries. Worldwide, the prevalence of obesity and overweight has increased at an alarming rate. In the year 2013 the

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number of overweight children under the age of five is estimated to be over 42 million. Of these, around 73% are living in developing countries. The diseases, which are largely consequent of obesity and overweight, are preventable and so are obesity and overweight themselves. However children who become overweight or obese are more likely to continue in the same manner into adulthood. Although overweight and obesity, as well as their associated diseases, are largely preventable but the likelihood of children who become overweight or obese to develop noncommunicable diseases (NCDs) like diabetes and cardiovascular diseases at a younger age is high. The age at which obesity and overweight are onset and the duration for which it exists are two major contributing factors for most NCDs. It is these NCDs, which in turn increase their chances of premature death and disability in adulthood. Prevention of childhood obesity therefore needs high priority. Childhood obesity is associated with a higher chance of premature death and disability in adulthood and have both short-term and long-term health consequences.

Diseases such as cardiovascular diseases, stroke, diabetes, certain types of cancer and musculoskeletal disorders such as osteoarthritis are some of the most significant health consequences of childhood overweight and obesity. These disorders often do not become apparent until adulthood.

In several parts of the developing world people are battling with dual burden of under nutrition and obesity. As per WHO, at least 2.6 million people each year die as a result of being overweight or obese. Globally obesity and overweight have taken the shape of an epidemic "globesity" - is rapidly becoming a major public health problem in many parts of the world.

In developed and developing countries, overweight and obesity are a major challenge caused by several social and environmental factors that influence people's eating habit and physical activity. Due to the unrestricted access to energy-dense foods at various platforms like school cafeteria and school neighborhood combined with low knowledge about dietary components in school children, there is often increased caloric intake. The practice of overfeeding and largely expression of love through food or overfeeding coupled with lack of physical activity and overindulgence in indoor leisure activities such as watching television, surfing internet, and playing computer games is largely responsible for childhood obesity. Several other factors like unsafe neighborhoods for walking and other outdoor activities lack of open spaces and playgrounds in schools and communities along with increasing pressure on children to perform in academics and reduced emphasis on sports leads to decreased physical activities, which contribute to childhood obesity. Several lifestyle related factors such as increased disposable income, daily allowance (pocket money) to children, commuting to school by bus or car instead of walking or bicycling, easy availability of fast food and sugary drinks and targeted advertising and attractive deals by fast-food and cola companies are some of the practices which predispose children to obesity.

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Childhood obesity is a very serious global issue that needs to be addressed urgently. This is because childhood obesity leads to several medical and psychosocial health problems in children. Reported high prevalence of overweight and obesity in children and adolescents in several developing countries, and their tendency to increase further in coming years makes it very important to gauge the prevalence of childhood obesity and overweight and find out if there is a relationship with media exposure so that corrective and preventive actions may be planned accordingly.

Obesity has become a worldwide public health problem. Since obesity is caused by an imbalance between energy intake and energy expenditure, screen time may contribute in several different ways. Considerable research has shown that the media contribute to the development of child and adolescent obesity, although the exact mechanism remains unclear.

There are a number of ways that media exposure could be contributing to obesity. Displacement of physical activity, the effects of advertising while watching TV, increased calorie consumption while watching TV or playing video games or working at computer may be the major contributing factors. Screen time may displace more active pursuits; advertising of junk food and fast food attracts children 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. The effects of TV advertising on food preferences and consumption have been repeatedly demonstrated. Further there is growing evidence that TV and other screen media use can result in distracted eating.

REVIEW OF LITERATURE

Bickham, Blood, Walls, Shrier and Rich (2013) conducted a study to investigate how characteristics of young adolescents' screen media use are associated with their BMI. They measured heights and weights of 91 13- to 15-year-olds and calculated their BMIs. Participants completed a weekday and a Saturday 24-hour time-use diary in which they reported the amount of time they spent using TV, computers, and video games. It was found that the more that participants paid primary attention to television, the higher was their BMI.

Kuriyan, Thomas, Sumithra, Lokesh, Sheth, Joy, Bhat and Kurpad (2012) conducted a study in urban South Indian children aged 3 to 16 years to identify important factors (linked to lifestyle, eating and sedentary behaviors) relating to waist circumference. They collected data on 8444 children; 4707 children aged 3-10 years and 3737 children aged 10-16 years regarding the frequency of consumption of certain foods, patterns of physical activity, sedentary habits at home, duration of sleep and behaviors such as habits of snacking, skipping breakfast, eating in front of television and eating out frequency. Simple linear regression analysis of waist circumference on various factors was done and it was found that besides other factors, television viewing and eating while watching television was related to waist circumference.

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Harris, Bargh & Brownell (2009) researched the priming effects of television food advertising on eating behavior. They tested the hypothesis that exposure to food advertising during TV viewing may also contribute to obesity by triggering automatic snacking of available food. It was found that children consumed 45% more when exposed to food advertising. It was even seen that food advertising increased consumption of products not in the presented advertisements, and these effects were not related to reported hunger or other conscious influences. These experiments demonstrate the power of food advertising to prime automatic eating behaviors

Kuriyan, Bhat, Thomas, Vaz and Kurpad (2007) evaluated whether television viewing and sleep are associated with overweight among urban and semi-urban South Indian children. Five hundred and ninety eight children aged 6-16 years were studied for their physical activity patterns, sleep duration, sedentary habits and eating behaviors. It was found that increased television viewing was significantly associated with overweight.

Carvalho, Padez, Moreira and Rosado (2006) studied the association between physical activity, TV, videogames, and obesity. The study included a Portuguese random nationally representative sample of 3365 children (1610 girls and 1755 boys) 7-9 year of age. The results from the logistic regression were significant for electronic games both for boys and girls ($P < 0.000$; $P < 0.000$). It was hence suggested that the time spent playing electronic games is associated with obesity.

Viner and Cole (2005) conducted remarkable 30-year study in the United Kingdom and found that a higher mean of daily hours of TV viewed on weekends predicted a higher BMI at the age of 30. For each additional hour of TV watched on weekends at age 5, the risk of adult obesity increased by 7%. They examined the effects of duration, timing and type of television (TV) viewing at age 5 years on body mass index (BMI) in adult life. They found out that the mean daily hours of TV viewed at weekends predicted higher BMI z-score at 30 years (coefficient = 0.03, 95% CI: 0.01, 0.05, $P = .01$) when adjusted for TV viewing and activity level at 10 years, sex, socioeconomic status, parental BMIs, and birth weight. Each additional hour of TV watched on weekends at 5 years increased risk of adult obesity ($BMI \geq 30 \text{ kg/m}^2$) by 7% (OR = 1.07, 95% CI 1.01, 1.13, $P = .02$). Hence, weekend TV viewing in early childhood was found to influence BMI in adulthood.

Vandewater (2004) examined the links between childhood obesity, activity participation and television and video game use in a sample of 2831 children. Results indicated that while television use was not related to children's weight status, the use of video game was found to be related. Children with higher weight status played moderate amounts of electronic games, while children with lower weight status played either very little or a lot of electronic games.

Matheson, Killen, Wang, Varady and Robinson (2004) studied Children's food consumption during television viewing. They described the amounts and types of foods that children

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consumed while watching television, compared those types with the types consumed at other times of the day, and examined the associations between children's body mass index (BMI) and the amounts and types of foods consumed during television viewing. Data were collected from 2 samples. The first sample consisted of ethnically diverse third-grade children, and the second consisted predominantly of Latino fifth-grade children. Three nonconsecutive 24-h dietary recalls were collected from each child. For each eating episode reported, children were asked whether they had been watching television. Height and weight were measured by using standard methods and were used to calculate BMI. It was found that on weekdays and weekend days, 17-18% and approximately 26% of total daily energy, respectively, were consumed during television viewing in the 2 samples. Although the fat content of the foods consumed during television viewing did not differ significantly from that of the foods consumed with the television off, less soda, fast food, fruit, and vegetables were consumed with the television on. The amount of food consumed during television viewing was not associated with children's BMI, but in the third-grade sample, the fat content of foods consumed during television viewing was associated with BMI. It was concluded that A significant proportion of children's daily energy intake is consumed during television viewing.

Stettler et al. (2004) conducted a study aimed at identifying environmental and behavioral factors, in particular type and duration of sedentary activities, associated with obesity in children living in Switzerland. In their study tested the hypothesis that various types of sedentary activities are associated with obesity in children living in Switzerland. They found out that the use of electronic games was significantly associated with obesity, independently of confounding factors. Their study provided a strong evidence for an independent association between time spent playing electronic games and childhood obesity.

Wake, Hesketh and Waters (2003) investigated the relationships between children's body mass index (BMI) and parent reports of children's television and video game/computer habits, controlling for other potential risk factors for pediatric obesity. Child BMI was calculated for a total of 2862 children aged 5-13 years in Victoria, Australia. Parents reported the amount of time children watched television and used video games/computers, children's eating and activity habits, parental BMI and socio demographic details. Child mean BMI z-score was significantly related to television ($F = 10.23$, $P < 0.001$) but not video game/computer time ($F = 2.23$, $P = 0.09$), but accounted for only 1 and 0.2% of total BMI variance, respectively. When parental BMI, parental education, number of siblings, food intake, organized exercise and general activity level were included, television ceased to be independently significantly related to child BMI. Using adjusted logistic regression, the odds of being overweight and obese generally increased with increasing television viewing. However, no relationship was found for video game/computer use.

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Robinson (2001) found strong evidence of a causal link between TV viewing and children being overweight.

McMurray, Harrell, Deng, Bradley, Chyrise, Cox, Bangdiwala (2000) conducted a study to examine the effects of physical activity, television viewing, video game play, socioeconomic status (SES), and ethnicity on body mass index (BMI) on a sample of 2389 adolescents, 10 to 16 years of age. It was found that watching television on non-school days was related to being overweight ($p < 0.005$). It was also found that increased hours of video game play enhanced the risk of being overweight.

Dietz and Gortmaker (1985) reported that each additional hour of TV viewing per week increased the risk of obesity by 2%.

Objectives of the Study

1. To determine the prevalence of childhood obesity/overweight in children aged 7 to 12 years attending a public school.
2. To find out the media exposure of these children.

METHODOLOGY

Sample

This was a cross-sectional study. The data for nutritional status assessment was collected on a sample of 200 children aged 7 to 12 years, attending a public school in Gurgaon ($n=200$) and the data regarding media exposure of children was collected on a sample of 200 parents ($n=200$). The reference population was children residing in Gurgaon. Amongst these, children and parents of these children attending C.R. Model Public School comprised the population for study. From the study population, 200 children between age of 7-12 years (studying in class 2nd to 7th), after applying inclusion and exclusion criteria were selected as the subjects in the study. Children aged 7-12 years even though studying in class lower than 2nd were included. The children who had not been attending school for more than a week or aged above 12 years or below 7 years were excluded.

Tools & Techniques

The subjects were assessed on the basis of BMI for age. BMI-for-age is an indicator that is especially useful for screening for overweight and obesity. WHO simplified field charts (annexed) were used to interpret BMI. The following cutoff of BMI classification provided by WHO were used.

BMI	Status
> +1 SD	Overweight
> +2 SD	Obesity
< -2 SD	Thinness
< -3 SD	Severe Thinness

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Media exposure of children was assessed by means of interview technique. The questions comprised of various dimensions such as which media children are using, the types and number of media available in their homes and how much time do they spend with each medium in atypical day. The media activities covered in the study included watching television and movies, playing video games and using computers. Time spent talking on the phone or text messaging was not counted as “media exposure.” Time spent using a cell phone to listen to music, play games or watch TV was counted as media exposure. Time spent using a computer included both online and offline activities. The time spent playing video games included time spent playing on either a console or handheld gaming device (including a cell phone). However, time spent playing computer games was counted in the computer section. TV content included total time spent watching the television.

Procedure

The data for weight and height of children was calculated by means of a weighing scale and using a height board mounted at a right angle between a level floor and against a straight, vertical surface such as a wall or pillar. BMI was calculated by using the below formula: $BMI = \text{Weight in Kg} / (\text{Height in Meter})^2$.

Children were classified on the basis of their BMI into Overweight, obese, Normal and Underweight categories. The media exposure of children was assessed by means of a questionnaire designed specifically for the study.

Statistical Analysis

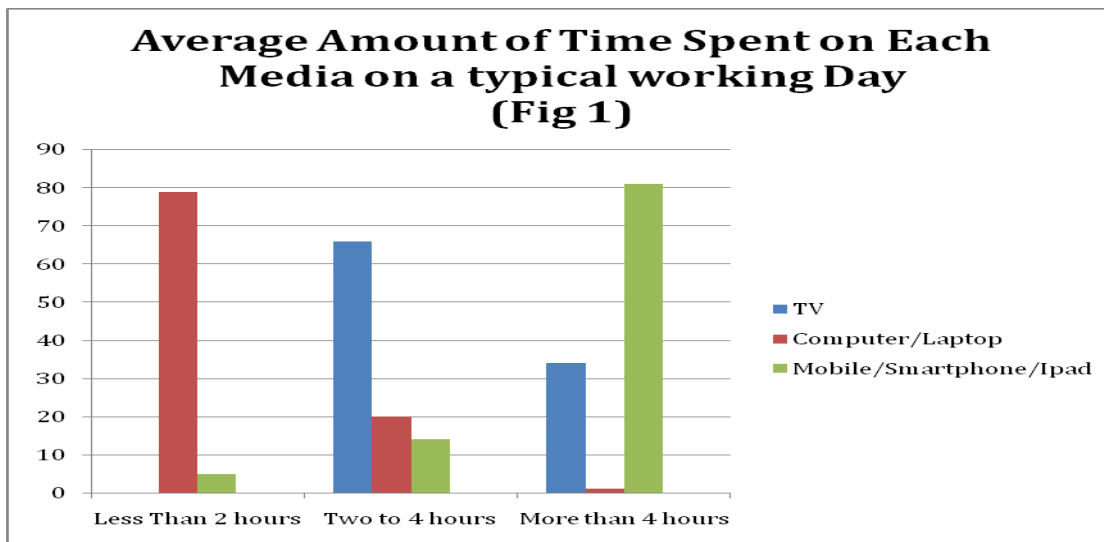
The collected data was analyzed by mean and percent method.

RESULTS AND DISCUSSION

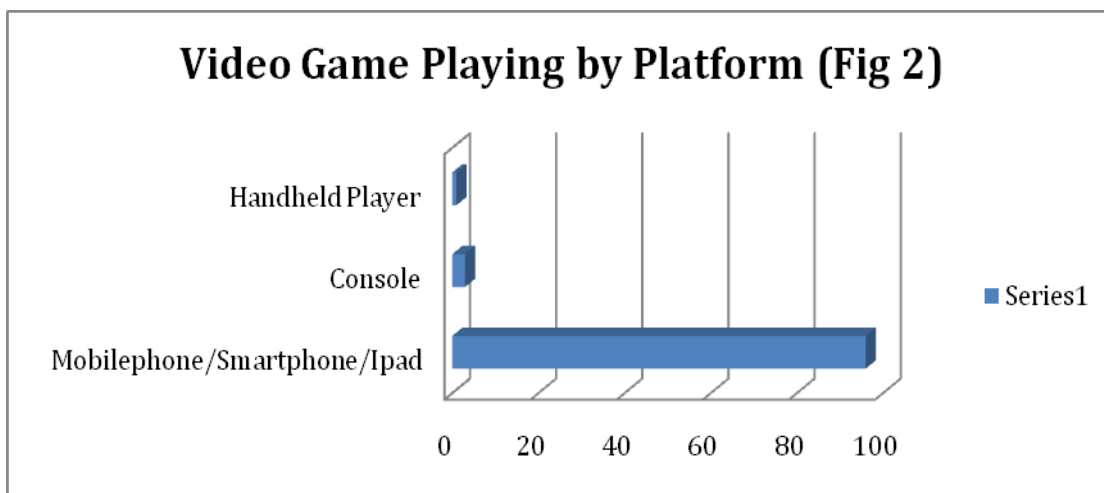
Among all participants, 30% children were obese and 11% were overweight. Out of the obese children, 40% were girls while 60% were boys. Similarly, out of the overweight, 59% were boys and 41% were girls. Ranjani et al (2016) systematically reviewed the epidemiology of childhood overweight and obesity in India and estimated a combined prevalence of 19.3 per cent of childhood overweight and obesity after 2010. Gupta et al (2012) analyzed data from cross-sectional sampling of children, in 2006 and 2009 and reported that based on age, gender, and Asian Indian-specific cutoffs of BMI, the prevalence of obesity increased significantly from 9.8% in 2006 to 11.7% in 2009. They also found that males and children studying in private schools had significantly higher increase in prevalence and risk of being overweight and obese over these 3 yr.

The figure 1 demonstrates the average amount of time spent by children on various media on each working day.

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It was seen that 66% children spent two to four hours watching TV. Striking 81% children spent more than four hours per day on mobiles/ smart phones/ iPads. There were 15% children who spent more than 4 hours watching TV and on mobiles/ smartphones/ iPads. This corresponds to a total time spent on media of more than 8 hours a day by 15% children. The platform which children used to play video games, has been represented in Fig.2



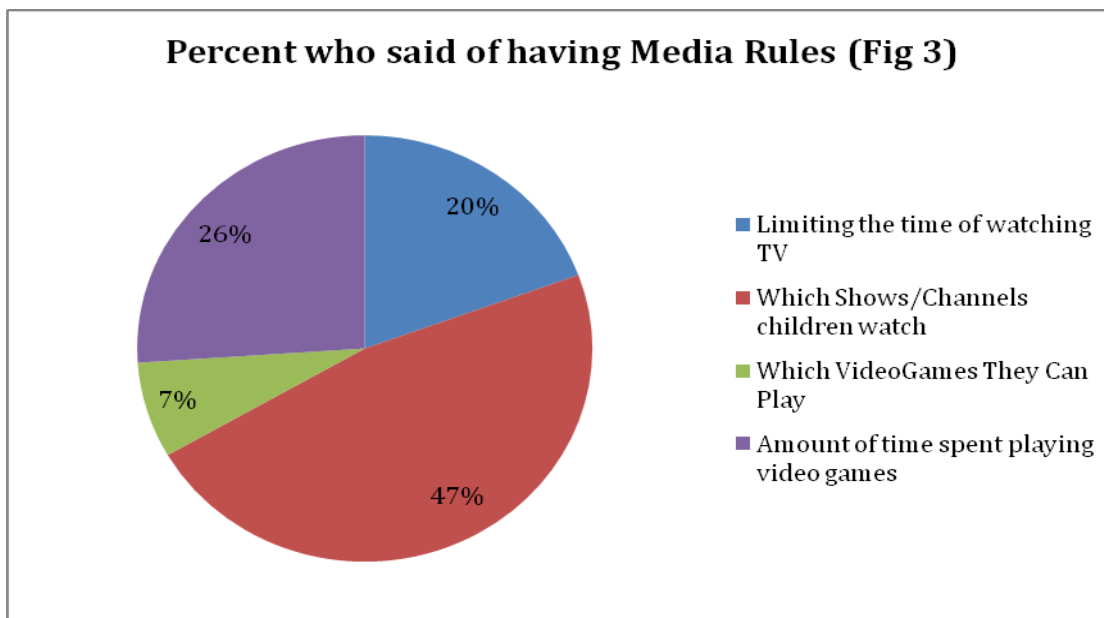
It was also found that 96% children played video games on Mobiles/smart phones or iPads while only 3% and 1% played on gaming console and handheld device respectively.

Our findings were inline with other studies being conducted globally. Popkin et al (2001) attributed the rapid increase in childhood obesity to change in activity patterns of children. They suggested that more children prefer indoor entertainment activities such as watching television, surfing Internet and playing computer games. Kuriyan et al (2007) conducted a study in India over children aged 6–16 yr and suggested that the adjusted odds of being overweight for children

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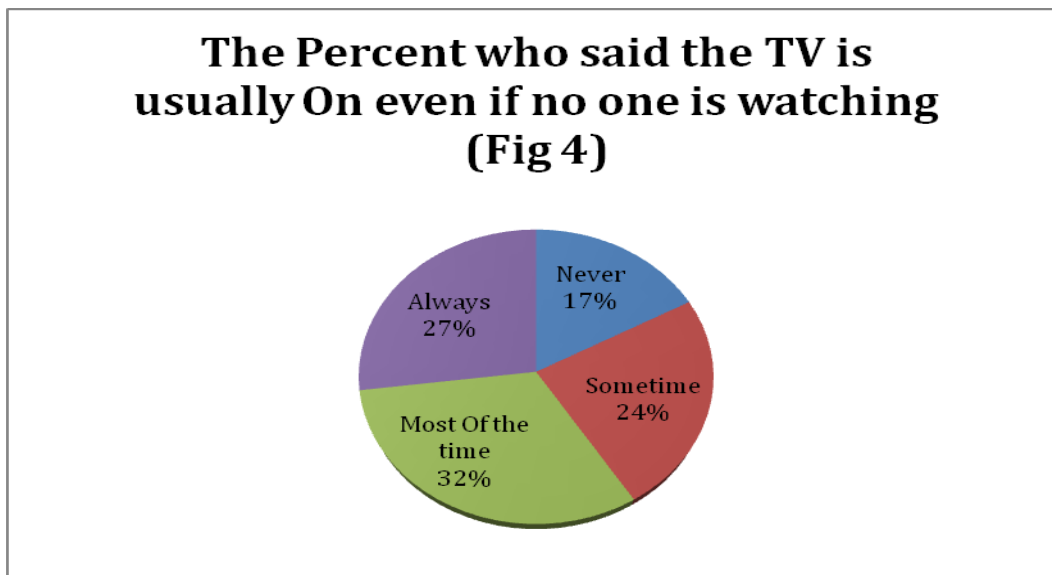
who viewed television for at least 90 min/d was 19.6 when compared with children who viewed television for no more than 45 min/d. We similarly found in our study population that both time spent watching TV and prevalence of obesity and overweight was high.

Data regarding presence of media rules has been represented in Fig.3.



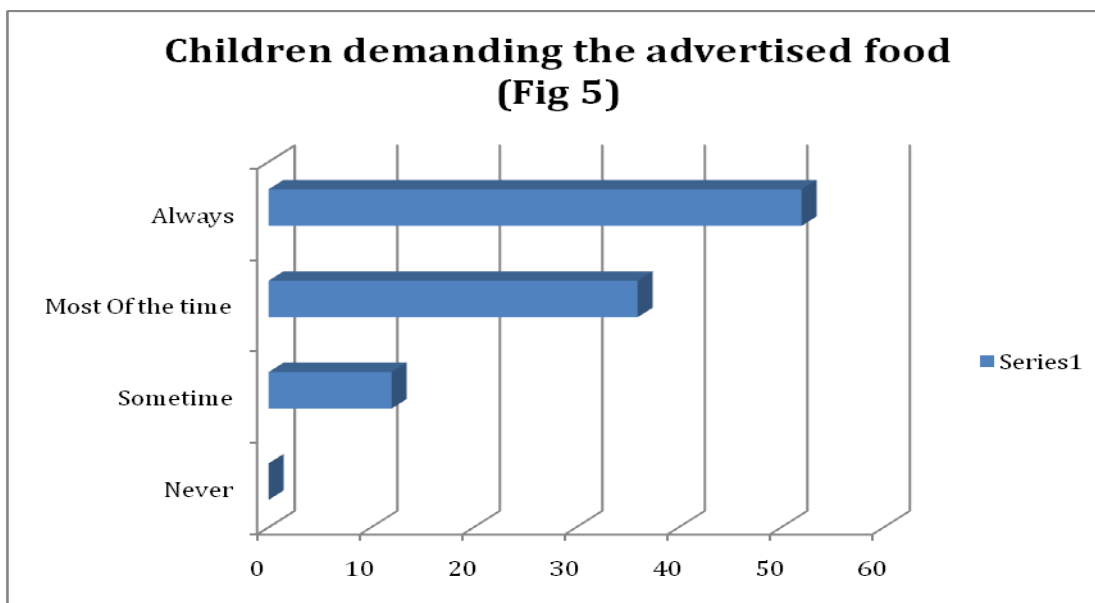
When parents were enquired about rules they had regarding various media for children, only 7% of the respondents had rules regarding which video games can children play. Only 20% and 26% parents had rules regarding limiting the time of watching TV and playing video games respectively. A large number of parents (47%) had rules regarding which shows or channels children watch but only 7% had rules regarding which video games children can play. In spite of the fact that 26% parents had rules regarding limiting the time of playing video games, 81% children played videogames for more than 4 hours per day.

To study the mindfulness in regards to TV watching, question was asked that whether the TV used to be switched on, even if no one is watching. The results have been summarized in Fig.4



In 32% and 27% households the TV was on even if nobody was watching most of the time and always respectively (Fig 4).78% children always watched Television or played video games while eating at home.

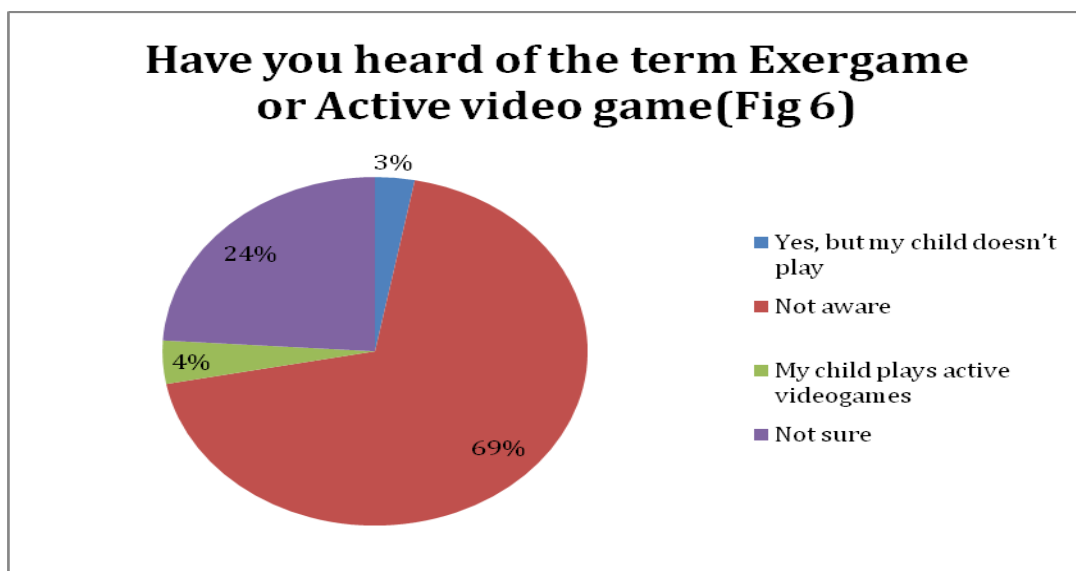
The data regarding children’s demand for advertised food has been summarized in Fig.5



As seen in the figure 5, 52% parents said that their children always wanted advertised food while 36% said that they demanded the advertised food most of the time.

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Although, improper use of electronic media is considered a major contributing factor to childhood obesity. However, exergames, a new generation of active games, have made it possible to combine electronic entertainment with physical exercise. Based on review of the literature, exergaming was found to lead to a more active lifestyle by increasing the level of physical activity by reducing sedentary behaviors. In this light, technology may be viewed as an effective strategy for the encouragement of active and healthy behaviors and as an aid in the fight against childhood obesity. However, when parents were asked about active gaming or exergaming, 69% were not aware of the same. Only 3% parents were aware of exergaming but their children did not play the same. The data has been summarized in Fig. 6.



The survey conducted showed the prevalence of obesity and overweight at a high rate (30% and 11% respectively) and also a large percentage of children who participated in the study had considerable amount of media exposure including time spent watching television, playing video games and using a computer. Further it was seen that most of the children (81%) spent more than 4 hours/ day on mobiles/smartphones/iPads.

A major portion of children's time is being spent playing video games and watching television rendering less time being physically active. Further, there is considerable advertising and promotion of calorie rich, nutrient poor food products. Food manufacturing companies promote high-sugar, high-fat foods during children's programmes. Children are exposed to numerous verbal and non-verbal messages about food from the media, with television and advertising in particular being the largest single media source of these messages. Children being innocent and having limited nutritional knowledge are soft targets of food manufacturing companies. The consumption of advertised foods is merely driven by taste, peer pressure and the unsaid pressure created by these companies to appear 'cool'. The majority of commercials during programs aimed at children are for unhealthy high-fat, high-sugar or high-salt foods with little nutritional

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value. The consumption of the advertised foods is higher than healthier foods, like fruits and vegetables, which are rarely advertised. This exposure of children to TV ads for unhealthy food products is a significant risk factor for obesity. In the absence of regulations restricting food advertising aimed at children, reduction in television viewing is a promising approach to reducing excess energy intake. A health videogame which is an interactive digital program or application designed for promoting health and wellbeing as part of its goal may encourage children to be physically active. In order to deal with the epidemic of childhood obesity and overweight, the first stepping-stone is to accept and recognize the major causes and risk factors associated. Young people's media habits and the advertisements to which they are exposed are one of the vital factors of the same.

Recommendations

Due to limited sample size and time constraint, a correlational study could not be conducted. Further studies may be conducted to study the correlation between media exposure and childhood obesity by means of standardized questionnaires. In addition, potential effectiveness of alternative media interventions to counteract the unhealthy influence of media exposure on diet, including nutrition education, parental communication and media literacy to teach children to defend against unwanted influence and reduced exposure to unhealthy messages. The role of active gaming on tackling childhood obesity is an area, which has not been explored so far. Intervention in the form of exergaming may be evaluated as a strategy to combat the epidemic of childhood obesity and encouraging positive behaviors.

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