Original Research Article

The Association Between Duration of Playing Electronic Games (E-Games) and Body Weight Among Primary School Age Children (6-12 Years Old) in Saudi Arabia

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Abstract

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To assess the possible association between duration of playing electronic games (e-games) and body weight among primary school age children (6-12 years old) in Riyadh, Saudi Arabia 2015. A cross sectional study was conducted on primary school students between the ages of 6-12 years. Multistage sampling technique was used to select the sample as follows. Riyadh is divided into five administrative regions (North, South, middle, East and East). A list of schools in each region was collected and numbered randomly by the Random Number Generator (RNG). After choosing random schools, the next step was choosing a random class by the RNG and asking all students in that chosen class to fill out the developed questionnaire. Well trained investigators then measured the weight and height of each student. The study included 718 students. Higher Body Mass Index (BMI) was associated with more hours of playing e-games (P =0.008), cooking types of e-games and duration (P =0.023, P =0.018), duration of playing adventure e-games (P =0.008), history of obesity in family (P =0.000), child's age (P =0.018), and child's height (P =0.012). The study demonstrates that duration of playing electronic games has an impact on child BMI.

Key words: Children, Electronic games, Obesity, Overweight

INTRODUCTION

In recent decades the prevalence of child obesity has dramatically increased in industrialized countries such as: US (Ogden et al., 2002), Switzerland (Zimmermann et al., 2000; Wietlisbach et al., 2003), UK (Bundred et al., 2001). Also, in the developing countries, specifically in Gulf Cooperation Council countries (GCC) (Abdul-Rasoul, 2012). Several factors have been associated with being overweight, including watching television (Fuller-Tyszkiewicz et al., 2012; Al-Ghamdi, 2013), and low physical activity (Gutin et al., 1999). Moreover, there are additional factors that are related to overweight in GCC, for

instance: the traditional Saudi diet is replaced by a western diet in addition to an increase in socio-economic status (Blass et al., 2006).

The Increase in overweight and obesity rates among children is leading to many complications, for example: impaired glucose intolerance, type 2 diabetes mellitus (Sinha et al., 2002; Goran et al., 2003), and cardiovascular disease (Berenson, 2005). In addition, it has a psychological impact such as depression (Needham and Crosnoe, 2005) and poor self-esteem (French et al., 1995).

Currently, the newest phenomenon is the use of electronic games, which has become popular and widely distributed. These are played on computers, hand-held devices, cell phones and game consoles[15]. Furthermore, these games are highly available and easy to access. In 2008, a national representative sample of U.S teens found that 99% of boys and 94% of girls played video games (Gentile et al., 2004).

The American Academic of Pediatrics advised that children should not exceed more than 2 hours per day using electronic media for entertainment (Education. AAoPCoP. Children, Adolescents, and Television. Pediatrics, 2001). And there are a few studies that have shown some association between television views and obesity. Ross E. Anderson et al (2009) found in a study including 4063 U.S American children that 26% watching television 4 hours or more are higher in BMI (Andersen et al., 1998).

Carol Maher et al (2012) suggested that the larger screen time the more likely to be obese (Maher et al., 2012). However, Beckham et al (2013) deny the relation between screen time and BMI (Dennison and Edmunds, 2008).

A study done in Switzerland by Nicolas Settler et al (2004) revealed that there is a significant association between using electronic games and obesity. Few studies have explored the association between watching television and overweight or obesity in SA. Sameer H. Al-Ghamdi (2013), in a study of school age children in Saudi Arabia, found an association between number of hours watching television and high BMI (Al-Ghamdi, 2013), however; the study does not spotlight on electronic games which might be related to obesity.

RESEARCH METHODOLOGY

A cross-sectional study was preformed between primary school age children (6-12) years in Riyadh city, Saudi Arabia. The data is primarily collected by investigators in January and February 2015. Students who are older than 12 year or younger than 6-year-old or have any chronic diseases were excluded.

The estimated sample size assumed to be 50% at P <0.05 and degree of precision of 5%. The estimated sample size was 384 participants. And to compensate for non-response rate or exclusion the sample size increased to 500.

A Multistage sampling technique was used to select the sample where Riyadh is divided into five administrative regions (North, South, middle, East and West). A list of schools in each region was collected and numbered randomly by Random Number Generator (RNG). One hundred will be recruited from each region. One male primary school and one female primary school were selected from each region, with fifty children chosen from each school. After choosing random schools the next step was choosing a random class by (RNG) and applying the questionnaire to all students in that chosen class, regardless for who were absent.

For data collection, a Self-administered Arabic questionnaire was used with five sections.1-Socio-demographic. 2- Family history of obesity. 3-Anthropometric measures. 4-Nutritional and physical activity. 5-practice of electronic games. The questionnaire was filled by the child's parent.

Well‑trained Medical students collected the anthropometric measurements of weight and height. Height was measured without shoes in centimeters and the weight was measured in kilograms by using an electronic scale.

Body mass index (BMI), which is weight divided by height square (kg/m²), was calculated for each participant to determine body weight status.

Body mass index (BMI) cut of points of over-weight and obesity were obtained from WHO (Child growth standards, 2014). The parameter of playing electronic games in hours was classified as the American Academic of Pediatrics advices (Education. AAoPCoP. Children, Adolescents, and Television. Pediatrics, 2001). The relation between each variable and child body weight was tested by X^2 test for categorical variables and ANOVA test for quantitative variables.

For data entering and analysis, Statistical Package for Social Science (SPSS) software v21 (Statistical Package for Social Sciences, 2012) was used to analyze the data. A significant P-value was set at 0.05.

Permission was procured from the college of medicine Research Center in King Saud University in Riyadh-Saudi Arabia. The consent form was obtained from parents of the participating children. Moreover; the consent form indicated the aim of the study. However, the participant had the right to withdrawal any time.

RESULT

Out of 800 distributed questionnaires, 718 (90%) were completed. Less than two-third of the participants were females 449(62.5%) and 269 (37.5%) of them were males.

The mean scores of children's age, height and family history of obesity were higher in obese children compared to those who were normal or under-weight and were statistical significance (p=0.018, p=0.012, p=0.00 respectively) (Table 1).

Of obese participants 45.2% were playing e-games for less than 2 hours while 23.2% were playing more than 4 hours compare to 49.3% of normal weight/ underweight were playing less than 2 hours. Both gender and duration of playing e-games were statically significant associated to child body weight (P=0.008) (Table 2)

Concerning all types of games included in the study (adventure, racing, sports, cooking, girls, others), All the game types were not statistically significant associated

Table 1. Demographic and familial characteristics in primary school children (6-12 years) in Riyadh 2015.

Weight	Normal or under-weight		Over- weight		Obese		Total	P-value
	Mean	Std. deviation	Mean	Std. deviation	Mean	Std. deviation		
Child age	9.7	1.7	10	1.69	10	1.59	718	0.018*
Child height	133.7	12.27	136.9	12.26	136	13.9	718	0.012*
No. of family member	6.8	2.7	6.9	2.3	6.8	2.44	686	0.78
Hx of obesity in family	0.35	o.77	0.66	1.1	1.06	1.26	710	0.00*

* Significant

Table 2. Gender and duration of playing games and body weight in primary school children (6-12 years) in Riyadh 2015

Gender	Hours	Weight Class			P-Value
		Normal/ Under-weight N = 400	Over-Wight N = 163	Obese N = 155	
Male	< 2	69(49.6%)	24(42.1%)	31(42.5%)	0.221
	2 – 4	50(36.0%)	17(29.8%)	25(34.2%)	
	> 4	20(14.4%)	16(28.1%)	17(23.3%)	
Female	< 2	128(49.0%)	52(49.1%)	39(47.6%)	0.065
	2 – 4	100(38.3%)	31(29.2%)	24(29.3%)	
	> 4	33(12.6%)	23(21.7%)	19(23.2%)	
Total	< 2	197(49.3%)	76(46.6%)	70(45.2%	0.008 *
	2 – 4	150(37.5%)	48(29.4)	49(31.6%)	
	> 4	53(13.3%)	39(23.9%)	36(23.2%)	

* Significant

Table 3. Type of game and child body weight in primary school children (6-12 years) in Riyadh 2015

Type of game	Weight	Weight Class			P-Value
		Normal or under-weight	Over-Wight	Obese	
Adventure	Yes	187 (46.9%)	82 (50.3%)	69 (45.1%)	0.63
	No	212 (53.1%)	81 (49.7%)	84. (54.9%)	
Racing	Yes	111 (27.8%)	43 (26.4%)	56 (36.6%)	0.081
	No	288 (72.2%)	120(73.6%)	97 (63.4%)	
Sports	Yes	96 (24.1%)	36 (31.4%)	48 (31.4%)	0.12
	No	303 (75.9%)	127(77.9%)	105 (68.6%)	
Cooking	Yes	141 (35.3%)	48 (29.4%)	36 (23.5%)	0.023 *
	No	258 (64.7%)	115(70.6%)	117 (76.5%)	
Girls	Yes	215 (53.9%)	82 (50.3%)	67 (43.8%)	0.103
	No	184 (46.1%)	81 (49.7%)	86 (56.2%)	
Other	Yes	66 (16.5%)	28 (17.3%)	31 (20.3%)	0.586
	No	333 (83.5%)	134(82.7%)	122 (79.7%)	

* Significant

with weight classes except cooking (P=0.023). (Table 3)

Students who were playing Cooking type of games for more than 4 hours were 9(5.9%) among obese and 8(4.9%) among over-weight and 12(3%) among normal or underweight. Cooking type of games were significantly associated with participants' body weights (*P* =0.018). (Table 4)

Students who were playing Adventure type of e-games

Table 4. Duration of playing different types of electronic games and body weight in primary school (6-12) in Riyadh 2015.

Type of game	Weight	Weight Class			P-Value
		Normal or under-weight	Over-Wight	Obese	
Adventure	No	212 (53.1%)	81(49.7%)	84(54.2%)	0.008*
	<2	89(22.2%)	36(22.1%)	26(16.8%)	
	2-4	77(19.2%)	23(14.1%)	24(15.5%)	
	>4	21(5.2%)	23(14.1%)	19(12.3%)	
Racing	No	(72%)288	120(73.6%)	97(62.7%)	0.056
	<2	56 (14.3%)	16(9.8%)	25(16.12%)	
	2-4	43 (10.7%)	15(9.2%)	19(12.25)	
	>4	12 (3%)	12(7.3%)	12(7.74%)	
Sports	No	303(75.7%)	127(77.9%)	105(67.8%)	0.35
	<2	44(11%)	17(10.4%)	21(13.8%)	
	2-4	40(10%)	12(7.3%)	17(10.9%)	
	>4	12(3%)	7(4.2%)	10(6.5%)	
Cooking	No	258(64.5%)	115(70.6%)	117(75.5%)	0.018*
	<2	73(18.3%)	26(15.9%)	17(10.9%)	
	2-4	56(14%)	14(8.6%)	10(6.5%)	
	>4	12(3%)	8(4.9%)	9(5.9%)	
Girls	No	184(46%)	81(49.6%)	86(55.3%)	0.1
	<2	114(28.5%)	43(26.3%)	32(20.6%)	
	2-4	79(19.8%)	24(14.7%)	22(14.1%)	
	>4	22(5.5%)	15(9.2%)	13(8.3%)	
Other	No	333(83.2%)	134(82.2%)	122(78.7%)	0.31
	<2	21(5.2%)	16(15.9%)	8(5.1%)	
	2-4	26(6.5%)	6(3.6%)	9(5.8%)	
	>4	19(4.8%)	9(5.5%)	11(7.1%)	

for more than 4 hours were 19(12.3%) among obese and 23(14.1%) among over-weight students and 21(5.2%) among normal weight or underweight students. duration of playing adventure games were significantly associated with participants' body weights (P =0.008). (Table 4)

DISCUSSION

The present study is questionnaire based and the response rate was 70%. The study was conducted in randomly selected schools in different parts of Riyadh city (middle, west, east, north and south). Students were classified as Saudis and non-Saudis; however, the nationality didn't show any significant relation to the use of electronic games and obesity.

Many studies have shown the relationship between obesity and watching television. Although watching TV and playing E-games are different they are both considered a sedentary behavior. The difference between them may be due to the fact that when children play, they don't eat because their hands and minds are too busy controlling the game, so they lose a significant factor that make them gain weight.

This study confirms its alternative hypothesis that there

is a significant association between playing E-games and obesity among primary school children in Riyadh.

This is consistent with the Al-Ghamdi study (Al-Ghamdi, 2013), which showed a strong impact of watching TV on body weight leading to obesity among primary school students in Riyadh.

It would not be surprising to find that almost all students in this study play E-games. Different types of E-games showed no significant relationship with obesity except those who are playing cooking and adventure games.

Cooking game players are more likely to be obese perhaps because they are exposed to some temptations that increase their appetite. There are many studies showing evidence that food advertisements increase calorie consumption and foster the belief that consumption of such food is unrelated to being overweight or obese as actors portrayed in such advertisements are generally normal weight (Al-Ghamdi, 2013; Child growth standards, 2014). There is experimental evidence that says there is direct effect from exposure to poor nutritional food advertisements and childrens' snacks choices and consumption. Also some video games developers and companies have started including snack food products in the games (Child growth standards, 2014). Economic factors (parent's educational level, family monthly income,

type and location of the residence in Riyadh city) according to this study were all statistically not significant.

Limitations

One of the limitations of the current study is that some questionnaires were missed or incomplete. While participants' weight and height was measured objectively by trained experts, hours of playing E-games and dietary habits were reported retrospectively by the participants' parents or guardians. This introduces potential error in the measurement that may serve to underestimate or overestimate the true strength of the association between variables in our study. Some confounders like watching TV were not assessed, which may bias the findings and help explain why we found only a little association between plying E-games and weight status.

CONCLUSION AND RECOMMENDATIONS

In conclusion the study showed a statistically significant association between playing e-games and body weight for both genders as total number; however, this is not the case for each gender separately. Adventure games and cooking games also showed an association with child weight. As a recommendation to improve the results for future researchers on the relationship between the obesity and electronic games, they should rely on 24 hours' time use diaries to estimate the amount of electronic games use as well as the time they spend in physical and sedentary activities. Diaries have been found to be more accurate than general estimation that is usually used in surveys.

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