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## THE RELATIONSHIP BETWEEN VIDEO-GAME USING AND OBESITY AMONG PRIMARY SCHOOL MALE STUDENTS IN DAMMAM AND AL-KHOBAR, KSA

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**Abstract:**

**Introduction:** Childhood obesity is a very serious condition and it is one of the most important risk factors for cardiovascular disease and diabetes later in life. Numerous studies have discussed the obesity problem and being overweight in children, which is considered a serious public health problem. The intensive use of technology by the children nowadays made the children prone more to the diseases associated with obesity, as long stay in front of screens without physical activity expose them to obesity.

The aim of the current study is to identify if the videogame playing is a risk factor for development of obesity in Eastern area of Saudi Arabia particularly in Dammam and AL Khobar cities.

**Methodology:** Descriptive cross sectional study through self-administered questionnaire. distributed to 465 parents who have children in primary male governmental and private schools in Dammam and AL Khobar, Eastern provinces.

The questionnaire measured the sociodemographic data of all students as well as Prevalence of obesity by measuring weight, height, Body Mass Index (BMI).

**Results:** The BMI of the studied group showed that 46.0% of the studied student were between 5 – 84th percentile, 32.5% were above the 95<sup>th</sup>, 15.5% were between 85 - 94th percentile and only 6.0% were below the 5th percentile.

Regarding the relation between the obesity and game using, the current study showed that, 95.8% of obese students and 95.8% of overweight student were playing electronic games, while 95.3% of normal weight and 89.3% of underweight students were playing electronic games (*p value = 0.544*).

**Conclusion:** In this sample of children living in Dammam and Al- Khobar, Saudi Arabia, obesity was associated with use of electronic games and also associated with the availability of electronic games and devices in bedroom.

**Recommendations:** Health education among school students is a must, for awareness of the drawbacks of the use of electronic games.

**Key words:** Obesity, BMI, electronic games, students.

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**INTRODUCTION:**

Childhood obesity is a very serious condition and it is one of the most important risk factors for cardiovascular disease and diabetes later in life. Childhood obesity has increasingly incidence which affects developed countries and developing countries as well. As the childhood obesity has serious consequences, obesity is considered one of the leading causes of death in the world[1]. The Body Mass Index (BMI) is used as an indicator to adult obesity, However In the case of children it is not enough to know only the BMI; it is necessary to correlate it with an interval of the rate of growth for the relevant age (percentile); the child is considered Underweight if he is Less than the 5<sup>th</sup> percentile, Normal or Healthy Weight if he is between 5th percentile to less than the 85<sup>th</sup> percentile, overweight if he is between 85th to less than the 95<sup>th</sup> percentile and obese if he is Equal to or greater than the 95<sup>th</sup> percentile [2]. Childhood obesity is a complicated health condition which is related to genetic factors, nutrition habits, levels of physical activity, and environmental factors. The socio economic level of parents is a contributing factor for children overweight or obesity such as low income, and low parental education [3]. Numerous studies have discussed the obesity problem and being overweight in children, which is considered a serious public health problem [4]. The intensive use of technology by the children nowadays made the children prone more to the diseases associated with obesity, as long stay in front of screens without physical activity expose them to obesity [5].

Electronic and mobile games are worldwide played by school students and have been known to cause serious health problems. The use of electronic games is prevalent in developed countries [6]. With the increasing incidence of portable devices, the number of children shifting from playing computer games to mobile phones has increased. Most of teenagers use mobile phones to use the Internet and most of them play mobile games online [7].

Playing electronic games by children for a long period increases the screen viewing time of school students, which expose them to dry eye syndrome and visual fatigue and raises the risk of sedentary lifestyle and obesity [8]. Smartphone abuse can lead to neck, wrist and back pains [9].The Excess use nowadays of smart phones before sleeping can lead to shorting of sleep time which in turn lead to stress and depression, as due to rapid development of portable devices it become so easy to get these games to the bed [10]. In addition, there is proved correlation between the severity of Internet addiction and development of depression especially in adolescents, but no Although there was not proved that there was relationship between development of depression and time spent using

social networks [11].Also, the use of smart phones, electronic games and the online games increases when the person is in a state of stress, such as anxiety and depression, and even lead to addiction of these electronic devices and games[12]. the length of time spent playing video games varies with age also, Smoking and drinking are associated with video games [13] few studies focused on interpersonal relations and social cognitive theory constructs at the time of playing computer and mobile games, especially among students. Interpersonal relations and social cognitive theory constructs (i.e., expectation, self-efficacy, and self-control) are associated with game-playing behavior [14]. In the last decade, health education to children by using multiple interventions with technology to prevent obesity in school environments and in clinical practice [15]. Health education strategy is used to improve the understanding of patients regarding their condition, to allow them improving their health condition [16]. The traditional methods of providing health education to patients, such as lectures or printed pamphlets, are more beneficial than Individualized educational programs [17].

**METHODOLOGY:****Study area/ time:**

The current study was conducted in primary male governmental and private schools in Dammam and AL Khobar ,Eastern provinces.

**Inclusion criteria:**

- 1- Male students in primary schools starting age from 1st grade until 6th grade in Dammam and AL Khobar cities, KSA.
- 2- Governmental and private schools are involved.
- 3- All nationalities are involved .

**Exclusion criteria:**

- 1.Student with chronic diseases as (Diabetes Mellitus (DM), hypothyroidism, genetic/antenatal factors, medication use, metabolic syndrome, cancer).
2. International schools.
3. Special needs education schools

**Study design:**

Descriptive cross sectional study through self-administered questionnaire. distributed to the parents.

**Sample size:**

Our population ( students of primary schools in Dammam and AL Khobar) are 26780 students (according to Ministry of Education website), we calculated the sample size by using Rao soft sample size calculator and increase our sample +10%

Our sample size was  $379 + 10\% = 417$ .

Multistage sampling technique ,stage1: we chose Dammam and AL Khobar by cluster technique, stage2: primary schools in governmental and private in Dammam and governmental and private in AL Khobar according to proportion number between schools of Dammam and schools of AL Khobar, stage3: we chose number of students according to sample size.

### Instruments:

#### Sociodemographic data

Age of the child, Educational level of both parents, Economic status, Number of family members, Sequence of child between siblings, owning his own videogame device, Duration of owning his device in years, time spent on the games, food Consuming during playing.

#### Prevalence of obesity

By measuring weight, height, Body Mass Index (BMI)

#### Part III

Self-administered questionnaire to evaluate the relationship between obesity and video game using among primary school children.

- **Pilot study:**

- Pilot study was done on 30 participants sample similar to the sample that will be studied to clarify the validity and reliability of the questionnaire

### Variables:

- **Dependent:**

Obesity: BMI

- **Independent:**

A. All the Sociodemographic data

B. Video games using (duration of owning, duration of using, sleep quality, exercise daily, food consuming during using).

- **Data Managements and analysis Plan:**

Data were collected, coded, revised and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The data were presented as number and percentages for the qualitative data, mean, standard deviations and ranges for the quantitative data with parametric distribution and median with inter quartile range (IQR) for the quantitative data with non-parametric distribution.

**Chi-square test** was used in the comparison between two groups with qualitative data and **Fisher exact test** was used instead of the Chi-square test when the expected count in any cell found less than 5.

**Independent t-test** was used in the comparison between two groups with quantitative data and parametric distribution and **Mann-Whitney test** was used in the comparison between two

groups with quantitative data and non-parametric distribution.

The comparison between more than two groups with quantitative data and parametric distribution were done by using **One Way Analysis of Variance (ANOVA) test** and **Kruskall-Wallis test** was used in the comparison between more than two groups with quantitative data and non-parametric distribution.

The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:

$P > 0.05$ : Non-significant (NS),  $P < 0.05$ : Significant (S),  $P < 0.01$ : Highly significant (HS)

## RESULTS:

#### Characteristics of the studied population:

This study involved 465 school students. All the participants were from 7 to 14 years old. Of all 465 participants, 74.6% of the participants were resident in Dammam (347 students) and 25.4% of the participants were from Al-Khobar (118 students) **figure 1**.

The BMI of the studied group showed that 46.0% of the studied student were between 5 – 84th percentile, 32.5% were above the 95<sup>th</sup>, 15.5% were between 85 - 94th percentile and only 6.0% were below the 5th percentile as shown in table 1. the obesity scale showed that 46.0% of the studied participants were normal, 32.5% of the participants were obese, 15.5% of the participants were overweight and only 6.0% were under weight.

#### Characteristics of the studied students:

A total of 72.5% were Saudi students (337 participants) and 27.5% were non- Saudi (128 participants), Of the 446 participants, 81.1% were in government schools (377 participants) and 18.9% were at private schools (88 participants). From all students, 14.6% were in level 1, 15.5% were in level 2, 15.9% were in level 3, 17.4% were in level 4, 18.3% were in level 5 and also 18.3% were in level **figures 2, 3,4**.

#### Characteristics of the studied families:

From all 465 studied cases, 34.1 % of the studied cases have a large family consist of more than 6 members, while 25.8% of the students (120 participants) have a family consist of Five members, in 24.5% of the students (114 participants) the family consist of Six members, 12.3% the family consist of 4 members and 2.6 % of family consist of 3 members **figure 5**.

According to the position of the student in family, the current study showed that, 132 participants

representing 28.4% of the participants were the first child in the family, 104 students representing 22.4% of the participants were the second child in the family, 105 students representing 22.6% of the participants were the third child in the family **figure 6.**

According to the socioeconomic level of the family, In 31.0% (144 participants) the family income was between 3000 – 6000 Saudi Riyals (SR), 21.3% (99 participants) the family income was between 6000 – 10000 SR, 21.1% (98 participants) the family income was between 10000 – 15000 SR, 15.3% (71 participants) the income was more than 15000 SR and only 11.4% of the participants ( 53 student) the income of the family was less than 3000 SR.

The current study also found that, 92.7% of the studied students live with both father and mother, 4.7% of the students live with their mother only, 1.7% of the participants live with father only and only 4 participants representing 0.9% of students live with another family member.

Regarding the educational level of the studied families, 49.5% of the student's fathers received low education, 39.1% of the fathers had the bachelor's degree, 7.5% of fathers received high education and only 3.9% of fathers were uneducated. Also, 47.1% of student's mothers received low education, 44.1% of mothers had the bachelor's degree, 5.6% of mothers were uneducated and only 3.2% of student's mothers received high education.

Regarding parent impression about obesity, 26.7% only of parents think their child is suffering from obesity.

#### **Daily Time Spent Playing Computer and Mobile Games among school Students:**

Of all 465 students, 95.1% reported playing electronic games (442 students). 294 participants (representing 63.2%) play station, 241 students (51.8%) play mobile games, 42.4% (197 students) play on the I Pad and 13.3% (62 students) use the laptop for playing **figure 7.**

Regarding time spent by the participants in playing games, the current study found that, 39.6% of the students spend from 2- 4 hours playing games, 37.0% of the students spend less than 2 hours playing games, 17.4% of the students spend from 4 to 6 hours playing games and only 6.0% of students spend more than 6 hours playing games.

According to the age in which students start playing electronic games, the current study reported that,

63.0% of the studied students start playing electronic games after the age of 4 years and 37.0% start playing before the age of 4 years.

#### **Health and food habits of the studied school students:**

As regarding the favorite sport in the studied students, 71.0% of the participants prefer playing football, 21.7% of the students prefer swimming, 5.4% prefer walking and 1.9% prefer other sports.

The current study report that 77.0% of the participants have normal appetite, 15.3% of the participants have high appetite while 7.7% have low appetite. Also, 80.2% of the participants reported taking three meals, 16.3% of participants have four meals, 2.6% of participants have five meals and only have more than five meals. Meanwhile, 32.7% of the participants reported food intake during playing.

Regarding the favorite foods and drinks, 89.5% of the participants report that their favorite food is rice, 84.7% of participants prefer potato in their meals and 82.4% prefer chicken while 77.2% favor juice intake and only 3.9% of students prefer energy drinks **Figure 8.**

Regarding sleeping habits, 69.5% of the studied student claimed sleeping from 6 – 8 hours, 26.0% of students sleep more than 8 hours and 4.5% only sleep less than 6 hours. On the other hand, 24.1% of the participants reported presence of games in the bedroom.

The current study found that, 87.1% of the studied students have no systemic disease, 6.9% of the participants have bronchial asthma and 3.9% have errors of refractions.

Regarding family history of the studied students, 63.0% of the participants reported that no family history of obesity, while 10.3% of students have obese father, 7.1% have obese mother and 6.7% have obese both parents.

#### **Relation between obesity and socioeconomic variants:**

The present study found that there was non-significant relation between obesity and nationality, 73.5% of Saudi students showed obesity and overweight Saudi students represent 69.4%, while 30.6% of non-Saudi students were overweight and 26.5% of non-Saudi students showed obesity as shown in table 2 (*p value = 0.810*).

Regarding the relation between the obesity and game using, the current study showed that, 95.8%

of obese students and 95.8% of overweight student were playing electronic games, while 95.3% of normal weight and 89.3% of underweight students were playing electronic games, shown in table 3 (*p value = 0.544*).

Regarding relation between obesity and medical history there were non-significant relation between obesity and medical disorders, 86.8% of obese and 83.3% of overweight students showed no associated diseases as shown in table 4.

Regarding Relation between Obesity and family income, it was showed that, 32.5% of obese students and of overweight students , family income range between 3000 – 6000 SR while 4.2% of overweight students the family income is less than 3000 SR and 12.6% of obese children the family income is more than 15000 SR, shown in table 5 (*p value = 0.379*).

As regards Relation between Obesity and position in family, it was found that, 32.5% of obese students were the first child in family and 27.8% of the overweight students were the second child, while 32.1% of underweight students were the third child in the family, shown in table 6 (*p value = 0.719*).

Regarding Relation between Obesity and family members the current study showed that, 23.8% of obese students have families consist of 5 members and 21.2% of them have families of 6 members, also 36.1% of overweight students have families with 6 family members, Table 7 (*p value = 0.131*).

Regarding Relation between BMI and time spent uses Video games, 41.7% of students above 95<sup>th</sup> percentile and 43.1% of students between 85 - 94th percentile spent from 2 to 4 hours playing videogames while 40.2% of the students between 40.2% spent less than 2 hours playing as shown in table 8 (*p value = 0.240*).

Regarding the relation between BMI and type of video games, the current study found that more than 95% of students play videogames with significant relation between BMI and playing PlayStation as 55.6% of students above the 95<sup>th</sup> percentile, 61.1% of students between 85 - 94th percentile and 70.1% of students between 5 - 84th percentile prefer PlayStation playing as shown in table 9 (*p value = 0.034*).

## DISCUSSION:

In the current study, All the participants were 7–14 years old; this was in accordance with *Stettler et al.*,[18] who studied students with mean ages 8 years.

In contrast to current study, *Chen et al.*,[19] who chose students between 15- 28 years, *Shirong et al.*,[20] who chose more than 70 % of students

more than 10 years old and *Goldfield et al.*, [21] who studied participants between 14- 18 years old. From all students, 14.6% were in level 1, 15.5% were in level 2, 15.9% were in level 3 this was in accordance with *Chen et al.*,[19] their study showed that, 35.1% were Grade 1, 27.0% were Grade 2, and 38.0% were Grade 3.

The current study found that most of the studied cases have a large family consist of more than 6 members, this was in accordance with *Chen et al.*,[19] who found that 43.4% of studied students had no siblings, and 56.6% had siblings.

The present study found that, 39.6% of the students spend from 2- 4 hours playing games and 6.0% of students spend more than 6 hours playing games, this was in contrast with *Chen et al.*, [19] who claimed that (68.7%) reported spending 0 min playing computer games.

Current study reported that 32.7% of the participants reported food intake during playing, this was in accordance with *Stettler et al.*,[18] who reported that 19.7% of students play electronic games during eating.

Regarding relation between nationality and obesity, The present study found that there was non-significant relation between obesity and nationality, 73.5% of Saudi students showed obesity and overweight Saudi students represent 69.4%, while 30.6% of non-Saudi students were overweight and 26.5% of non-Saudi students showed obesity, this was in contrast with *Stettler et al.*,[18] who found that children of foreign nationality were more likely to be obese than Swiss nationals (17.3% vs. 8.8%).

## CONCLUSION:

In this sample of children living in Dammam and Al- Khobar, Saudi Arabia, obesity was associated with use of electronic games and also associated with the availability of electronic games and devices in bedroom, also bad eating habits such as depending mainly on carbohydrate in diet. Although most of students are practicing physical activity but bad eating and sleeping habits overcome the benefits of these physical activities.

## RECOMMENDATIONS

- Health education among school students is a must, for awareness of the drawbacks of the use of electronic games.
- Encourage healthy food intake in and outside schools that include prevention of selling junk food at schools.
- Health education to the parent to control playing time for their children.

- Further studies are needed for tracking obesity in school students and early prevention of obesity and associated complication.

#### ACKNOWLEDGMENT

We wish to thank the students in Dammam and Al-Khobar schools for their help in the data collection.

#### FIGURES:

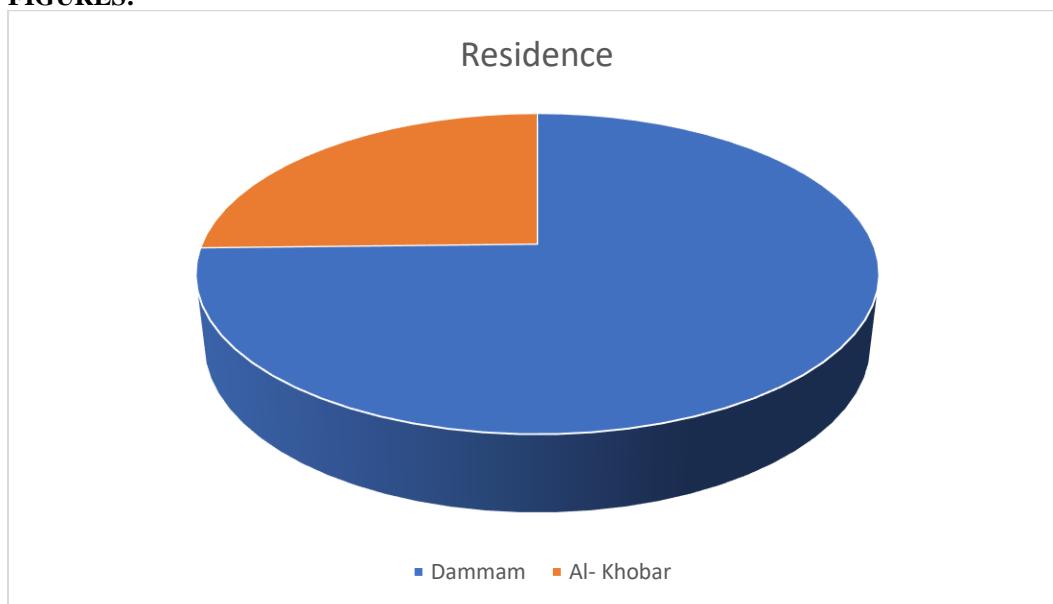


Figure 1: Residence of studied group

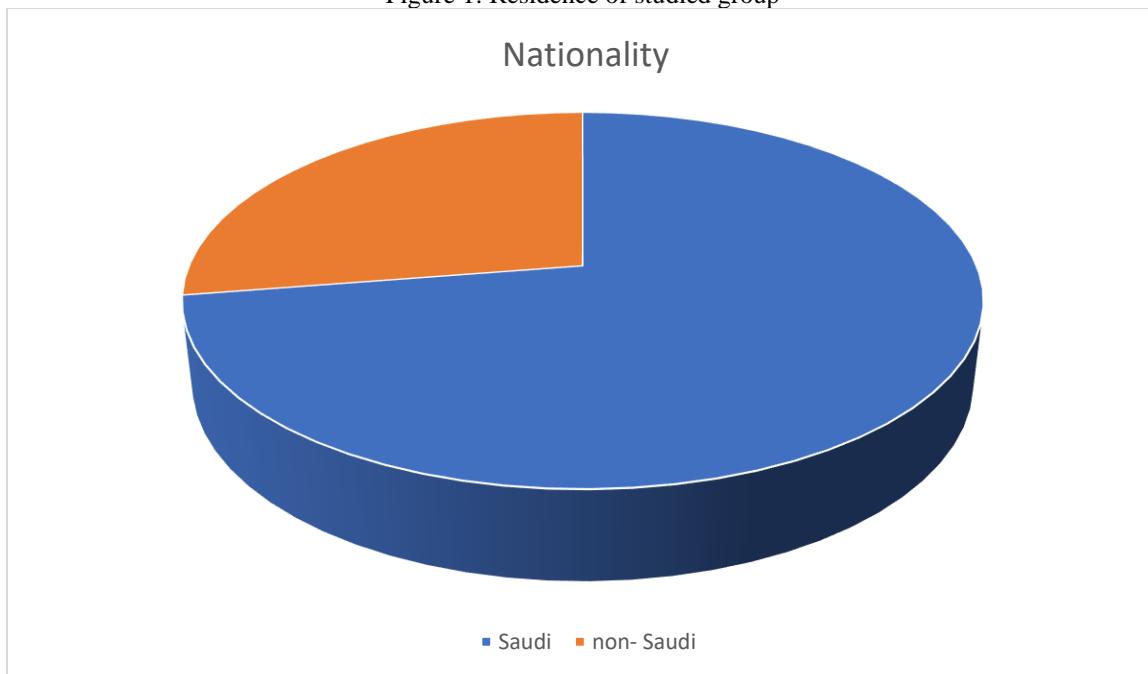


Figure 2: Nationality of studied students.

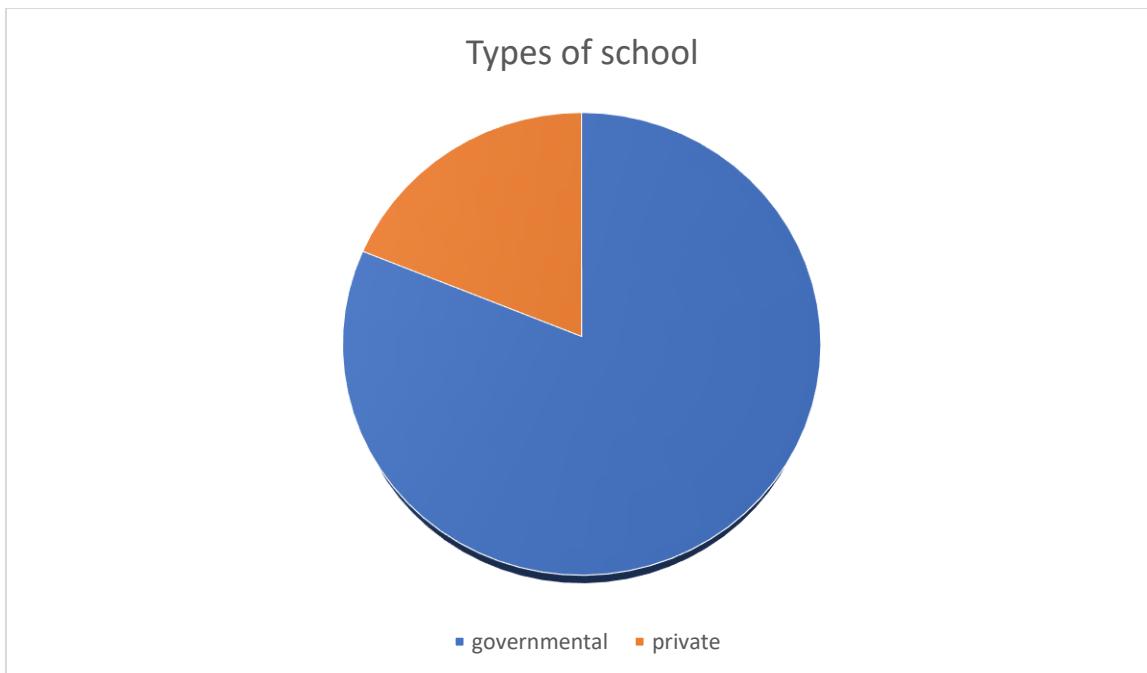


Figure 3: distribution of students in government and private schools.

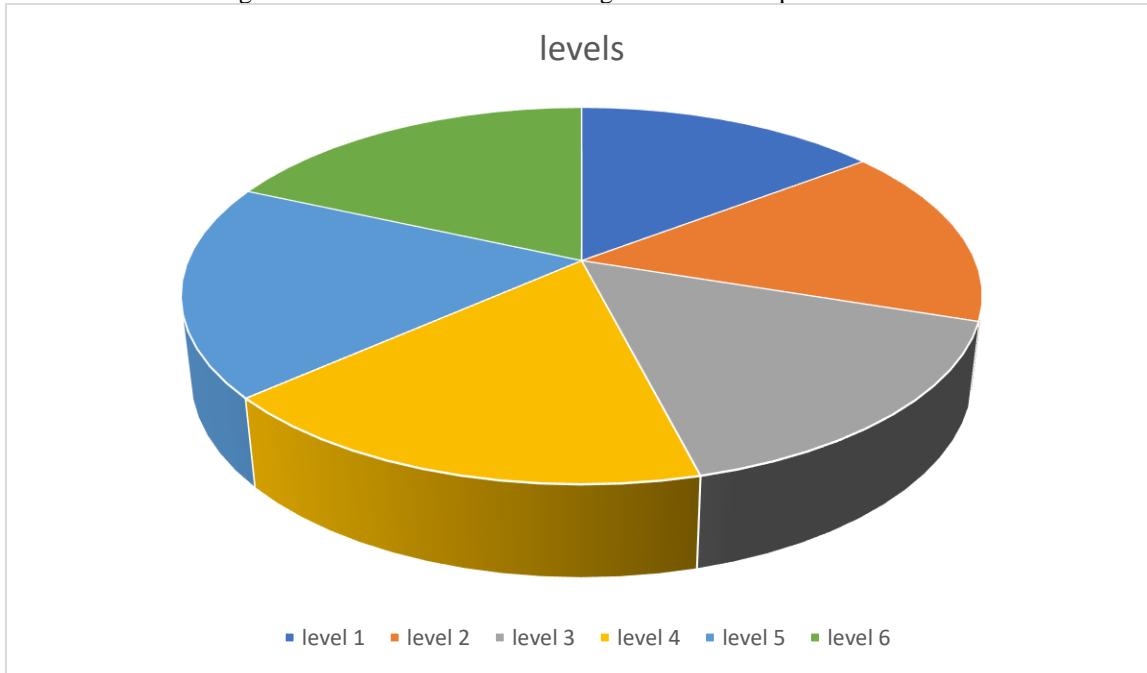


Figure 4: distribution of students in different levels.

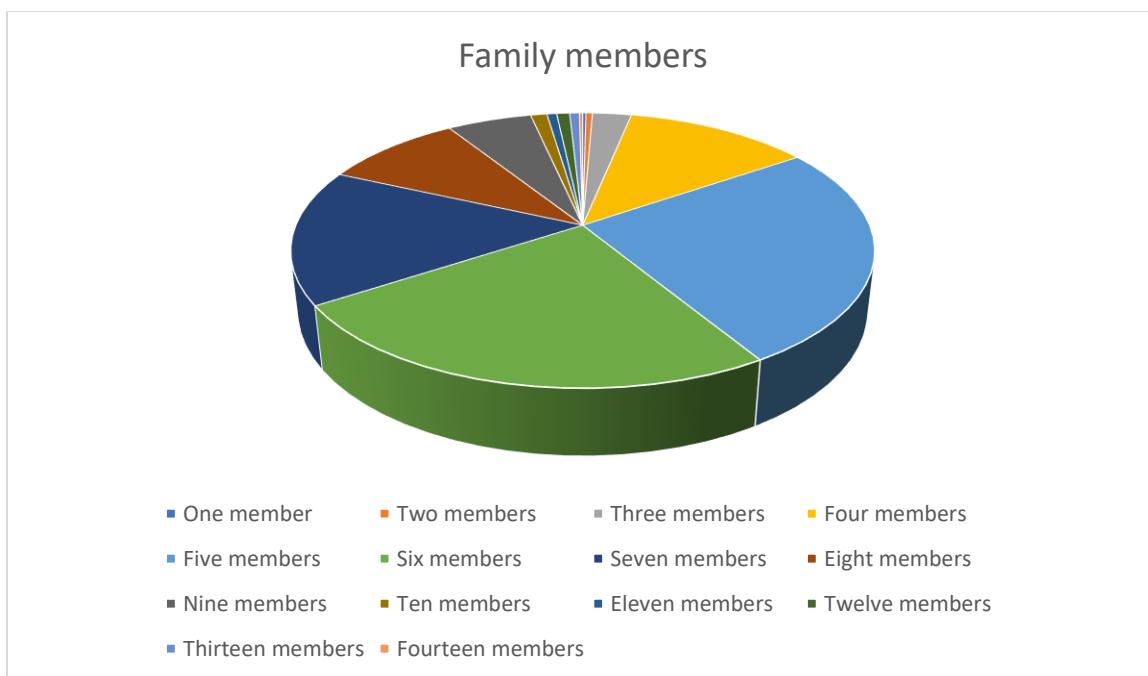


Figure 5: Number of family members.

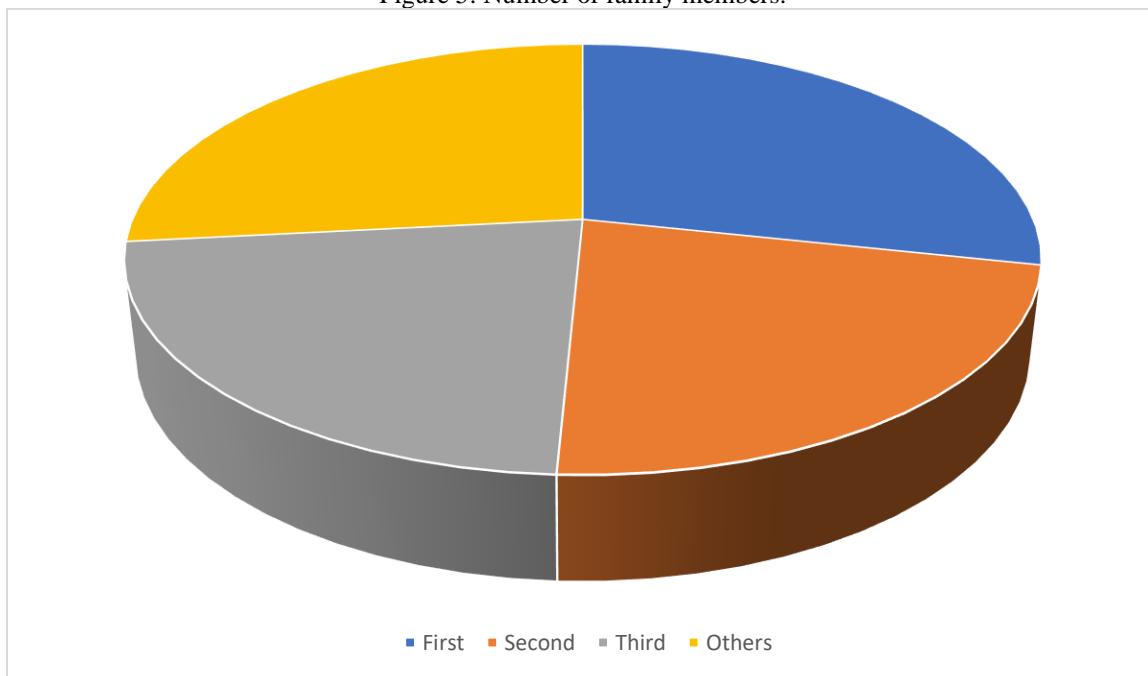


Figure 6: Position of child in family.

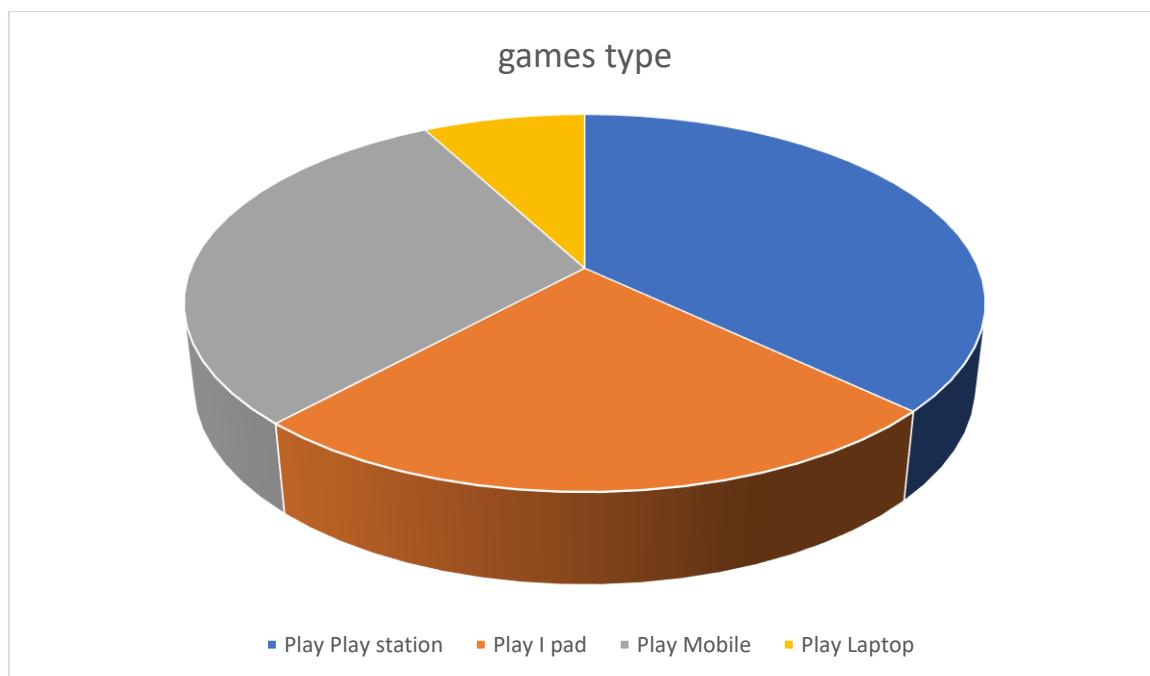


Figure 7: game type.

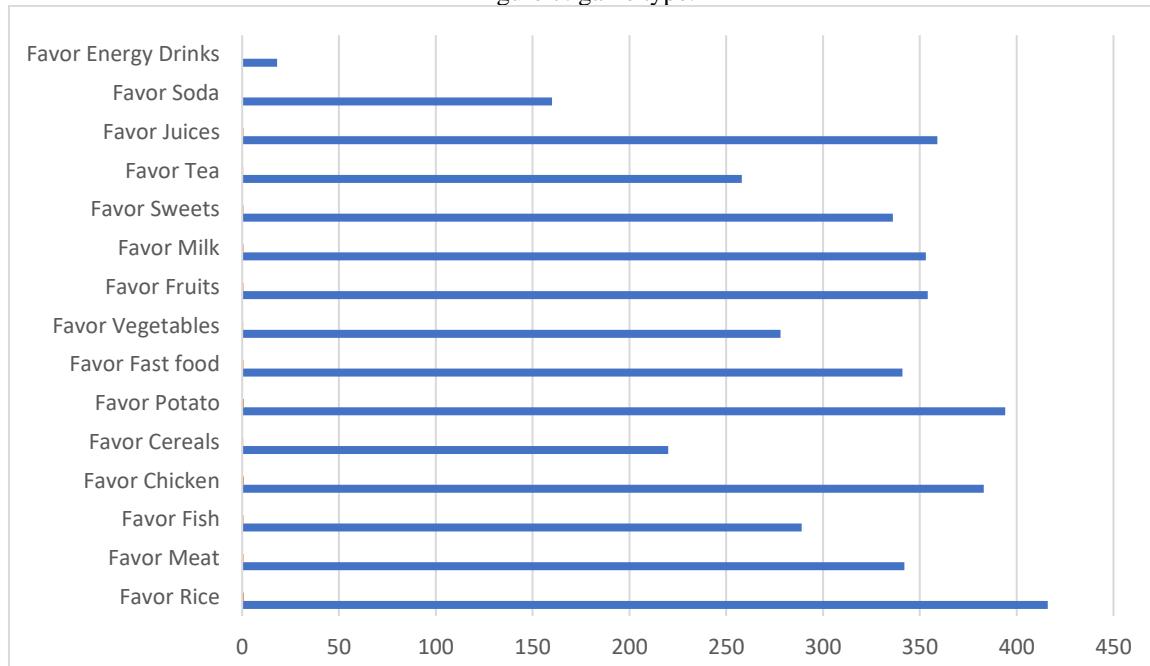


Figure 8: favorite foods &amp; drinks.

**TABLES****Table (1):** BMI of the studied group calculated in percentile

BIMI in Percentile	No	%
	< 5th percentile	28
	5 - 84th percentile	214
	85 - 94th percentile	72
	> 95th	151

**Table (2): Relation between Obesity Scale and nationality**

		Obesity Scale									
		Underweight		Normal		Overweight		Obese		Chi square test	
		No	%	No	%	No	%	No	%	x <sup>2</sup>	p value
Nationality	Saudi	22	78.6%	154	72.0%	50	69.4%	111	73.5%	0.962	0.810
	non- Saudi	6	21.4%	60	28.0%	22	30.6%	40	26.5%		

**Table (3): Relation between Obesity Scale and games using**

		Obesity Scale									
		Underweight		Normal		Overweight		Obese		Chi square test	
		No	%	No	%	No	%	No	%	x <sup>2</sup>	p value
	Games Using	25	89.3%	204	95.3%	69	95.8%	144	95.4%	2.139	0.544

**Table (4): Relation between Obesity Scale and disease**

		Obesity Scale									
		Underweight		Normal		Overweight		Obese		Chi square test	
		No	%	No	%	No	%	No	%	x <sup>2</sup>	p value
Disease Related	Hypothyroidism	0	0.0%	0	0.0%	0	0.0%	1	0.7%	10.946	0.756
	Increased suprarenal hormones	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
	DM	0	0.0%	1	0.5%	0	0.0%	0	0.0%		
	Errors of refractions	2	7.1%	9	4.2%	3	4.2%	4	2.6%		
	Bronchial asthma	3	10.7%	9	4.2%	8	11.1%	12	7.9%		
	Others	1	3.6%	3	1.4%	1	1.4%	3	2.0%		
	None	22	78.6%	192	89.7%	60	83.3%	131	86.8%		

**Table (5): Relation between Obesity Scale and family income**

		Obesity Scale									
		Underweight		Normal		Overweight		Obese		Chi square test	
		No	%	No	%	No	%	No	%	x <sup>2</sup>	p value
Family Income (SR)	< 3000	2	7.1%	28	13.1%	3	4.2%	20	13.2%	12.870	0.379
	3000 - 6000	7	25.0%	65	30.4%	23	31.9%	49	32.5%		
	6000 - 10000	3	10.7%	43	20.1%	17	23.6%	36	23.8%		
	10000 - 15000	10	35.7%	45	21.0%	16	22.2%	27	17.9%		
	> 15000	6	21.4%	33	15.4%	13	18.1%	19	12.6%		

**Table (6): Relation between Obesity Scale and position in family**

		Obesity Scale									
		Underweight		Normal		Overweight		Obese		Chi square test	
		No	%	No	%	No	%	No	%	x <sup>2</sup>	p value
Position In Family	First	8	28.6%	59	27.6%	16	22.2%	49	32.5%	6.207	0.719
	Second	6	21.4%	45	21.0%	20	27.8%	33	21.9%		
	Third	9	32.1%	48	22.4%	18	25.0%	30	19.9%		
	Others	5	17.9%	62	29.0%	18	25.0%	39	25.8%		

**Table (7): Relation between Obesity Scale and family members**

		Obesity Scale								Chi square test			
		Underweight		Normal		Overweight		Obese					
		No	%	No	%	No	%	No	%				
Family Members	1	0	0.0%	1	0.5%	0	0.0%	0	0.0%	48.989	0.131		
	2	0	0.0%	1	0.5%	0	0.0%	1	0.7%				
	3	0	0.0%	4	1.9%	1	1.4%	7	4.6%				
	4	4	14.3%	27	12.6%	7	9.7%	19	12.6%				
	5	10	35.7%	58	27.1%	16	22.2%	36	23.8%				
	6	3	10.7%	53	24.8%	26	36.1%	32	21.2%				
	7	6	21.4%	29	13.6%	10	13.9%	29	19.2%				
	8	3	10.7%	18	8.4%	7	9.7%	15	9.9%				
	9	0	0.0%	15	7.0%	3	4.2%	8	5.3%				
	10	0	0.0%	2	0.9%	2	2.8%	1	0.7%				
	11	0	0.0%	3	1.4%	0	0.0%	0	0.0%				
	12	0	0.0%	2	0.9%	0	0.0%	2	1.3%				
	13	2	7.1%	0	0.0%	0	0.0%	1	0.7%				
	14	0	0.0%	1	0.5%	0	0.0%	0	0.0%				

**Table (8): Relation between percentile grouping and time spent uses Video games**

		BIMI in Percentile								Chi square test			
		< 5th percentile		5 - 84th percentile		85 - 94th percentile		> 95th					
		No	%	No	%	No	%	No	%				
Game Hours Consuming	> 2 hours	15	53.6 %	86	40.2 %	24	33.3%	4	31.1 %	11.5 51	0.240		
	2-4 hours	10	35.7 %	80	37.4 %	31	43.1%	6	41.7 %				
	4-6	3	10.7 %	39	18.2 %	12	16.7%	2	17.9 %				
	> 6 hours	0	0.0%	9	4.2%	5	6.9%	1	9.3 %				

**Table (9): Relation between BMI and type of video games**

	BIMI in Percentile								Chi square test			
	< 5th percentile		5 - 84th percentile		85 - 94th percentile		> 95th					
	No	%	No	%	No	%	No	%				
Games Using	25	89.3%	204	95.3%	69	95.8%	14	95.4 %	2.13 9	0.544		
Play PlayStation	16	57.1%	150	70.1%	44	61.1%	84	55.6 %	8.67 3	0.034		
Play I pad	9	32.1%	101	47.2%	23	31.9%	64	42.4 %	6.44 6	0.092		

Play Mobile	15	53.6%	112	52.3%	35	48.6%	79	52.3 %	0.36 9	0.947
Play Laptop	1	3.6%	26	12.1%	14	19.4%	21	13.9 %	4.93 9	0.176

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