Prevalence of obesity and risk factors among female school-aged children in primary school in Madinah Munawarah

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Abstract: Background: Several studies have reported prevalence of overweight or/and obesity in school children with ages ranging from 7- 14 years. There are not studies on the anthropometric and nutritional status in primary school girls in Madinah Munawarah. **Objectives**: to determine the prevalence and the risk factors associated with obesity among female school-aged children in primary schools. **Methodology:** A cross sectional study was carried out in randomly selected 2000 students from 28 schools in Madinah Munawarah in primary schools girls aged between (6 and 12 years). Their height and weight were measured and weight for age, height for age and body mass index (BMI) for age were calculated. The children's information was obtained by interview and 24hrs recall was completed by mothers for accuracy. **Results:** The prevalence of overweight & obesity was 30.6 & %26.8 %. respectively. There were a high positively significant difference between age & weight, height & BMIFAZscore (*P*<0.01). It is noticed that the 37% for girls were exercise. And noticed that the 100% of girls consume snakes, 33.6% sweets and chocolate and 62.3% chips. While It is noticed that the 43.5% of girls consume fast foods, 48.9% of girls consume fast foods one Week. 38.4 % of girls drinking Carbonated water. The mean for the macronutrients was high, except for fat mean which was within RDI. Total calories come from Carbohydrate 54.96%, Protein 20.5 %, and Fat 25.9 %. **Recommendations**: Removing sugar-sweetened beverages from school food stores. Improving home eating behaviors. Increasing physical education hours and consumption of healthy food by the school curricula.

1. Introduction:

Payandeh et al.,(2013) said that Malnutrition, causes an annual death of at least 5 million children worldwide[1.] An adequate nutrition is the most important environmental factors affecting the development of Man and a good health status. An improper selection of nutrients and food consumption of meals lead to overweight and obesity[2]

A study indicate that a decrease in malnutrition with the prevalence of obesity in developing countries undergoing with rapid economic growth and trends in nutritional status[3].

Saudi Arabia has experienced rapid socio-cultural changes caused by the dramatic rise in the economy of the Arabian Gulf region. This transformation , associated with major changes in food choices and eating habits, have become increasingly cause of the rising rates of overweight and obesity in the Saudi population[4]

Another study also was done in Saudi Arabia to establish the prevalence of obesity among children is an increasing . The prevalence of overweight was 19.0% and of obesity was 23.3%. More than 50% of children between 14 and 18 years had weight above the 85th percentile[5]

Farghaly et al., (2007)found that overweight and obesity were significantly more prevailing among females of primary and secondary grades[6.]

Several studies were establish to study the prevalence of overweight and obesity among Saudi children, but study the association between eating habits, socio-demographic differentials and obesity in these children are still scarce[7].

The prevalence rise in childhood obesity has driven the demand for tools better able to assess and define obesity and risk factors for related to diseases The early life origins of non-.co-morbidities. communicable diseases including type 2 diabetes are associated with subtle alterations in body composition[8].

Eating fast food (sugar-sweetened beverages, fried potatoes, fried chicken, hamburgers-hot pizza, salty snacks). Were associated with overweight (BMI ≥ 85th percentile[9].

Offering french fries and potato products in subsidized school meals more than once per week and dessert more than once per week were each associated with a significantly higher obesity among middle school children.

The availability of low-nutrient, energy-dense foods in the foodservice area was associated with a

higher BMI z score, and the availability of such foods for à la carte purchase in the cafeteria was associated with a lower BMI z score[10].

Objectives of study are to determine the prevalence and the risk factors associated with obesity among female school-aged children in primary schools.

2. Methodology
A- Study design:

Sample multistage were taken of 2000 girls from Public primary school were selected randomly from 28 Public primary school from 5 regions that represent geographical areas(east, west, north, south and middle) in Madina

An informed consent form was sent to all the parents of the children and managers of schools. Almost all (99%) parents and school managers provided signed consent forms.

An estimated sample size of 1000 students was obtained randomly from the total school all of them were girls between the ages of 6 and 13 years.

B-Material and equipments:

This is the list of equipments and materials which used in the study:

1) Digital electronic scale. 3) Nylon tape measure. 5) Mother questionnaire.

2) Height metal tape. 4) WHO Anthroplus. 6) Child questionnaire.

The study Questionnaire:
Child questionnaire contained four major parts: child demographic data, anthropometric data, nutritional data and eating habits and Physical activity data

Mother questionnaire contained three major parts: personal data of mother and child, socioeconomic data and health of child, nutritional data of child.

Anthropometric measurements and anthropometric data analysis
1. Weight measurement: Weight was measured by the help of digital electronic scale. Weight was recorded to the nearest 0.1 kg.

2. Height measurement: Height was measured by the help of a nylon tape without shoes. Height Measurement was taken to the nearest 0.1 cm.

3. Body mass index (BMI) was calculated by using the formula weight (kg) divided by height (m) squared.

4. Anthropometric indices: Body mass index for age (BAZ) was used to define overweight and obesity.

Reference standards:

1. The current study used for Height, weight and BMI and other data the newly recommended NCHS/WHO reference standards[11].

2. The reference for RDA intake for nutrients in calories, grams or mg from the 24hrs recall was used according to AHA recommendations[12].

WHO Anthroplus software :

The age, weight, height were the basic variables required to derive the most common nutritional status indicators for the children, i.e. BMI-for-age (BAZ).

5-Socio-demographic data:

A questionnaire to assess socio-demographic data, includes age, education level of fathers and mothers, family size; children in order and family's income

6-24hrs recall and food analysis by diet power (V.4) software:

Random 500 girls from our sample have been completed food analysis for the 24hr recall that was conducted by diet power software version 4 for all meals over the day prior to the interview Children and mothers.

7-dietary habits:

A questionnaire were used for collecting data about diet history(breakfast eating regular, number of meals. Snack meal. Fast food, food like or dislike, children consumption of, chocolates, sweets, biscuits, carbonated beverages, potato chips, canned foods…etc

8-Statistical package:

SPSS (V.16), 2008) was used to find frequencies and percentage, mean, SD, To find the statistical significant difference for the association of two variables T test was used.

3. Results

One of the main important findings in this study summaries in figures (1 and 2) which show Distribution of Girls student According To age and school years. It was found that 45% of the sample was 12 years old and about 50% were 6nd year.

In *figure 1* High percentile for age for the sample demonstrated that 45% of the children were12 years old and 22% were 11 years. While less percentile 0.1 % were 6 years old. school years In *figure 2,*it was found that 50% were 6nd year. while lower girls in the 3nd year (6.6 %)

Table 1. shows the Level of education of fathers & mothers girls. It can be seen that 40.6 % of fathers of girls children received education to the College level. For mothers of girls children 37.8 % received secondary education.While 0% & 2.6 % of girls received Illiterate education of fathers & mothers respectively.

Data of table 2. Shows the frequency distribution of girls student according to family income. High income ($\geq$ 10000 SR monthly) is found in 34.6% among girls. While low income (<3000 SR monthly) is found in 17.2 % among girls.And 27.3% were income (4000 – 6000SR monthly) among girls.

Table 3. Shows the frequency distirbution of BMI for age and the mean Weight & BMI distirbution of girls. It is noticed that BMI-for-age Z-score 39.6 % of girls were normal. Prevalence of overweight was 30.6 % and of obesity 26.8 %.While shinness and severe

thinness were (2.8 % and 0.2 %) respectively. From the results mean& SD of weight and BMI normal were (31.81±5.59 & 18.19±2.27) respectively, overweight was (35.18±4.25 &20.94±2.28) respectively and obesity were (39.66±7.98 &24.27±3.98) respectively.

Data of table 4. Shows the Frequency distirbution of BMI for age according to age and the mean BMI distribution of girls**.** It is noticed that Prevalence of Overweight 35.5 % & %34.9 of girls in age (10,12 &7) respectively**.** While Prevalence of obesity 51.3 **%,** 50.0**%,**45.8%,31.3% and 18.6 % of girls in age (9,6,10,11&8) respectively. From the results noticed that While Prevalence of obesity 0f girls in age 9 years old.

One of the main important findings in this study summaries in figures (3,4,5,6,7and 8) which show BMI-for-age graph Age **(**6,7,9,10,11 & 12) respectively.

Table (5) show the Correlation coefficient between BMI and anthropometric measurements. There was a high positively significant difference between age & weight, height & BMIFAZscore (*P*<0.01). On the other hand there high negatively between age & BMI. While there were high positively and significantly correlated between weight & height, BMIFAZscore & BMI (r⁻0.275ِ 0.527 & 0.595) respectively. On the other hand there were high negatively and significantly between height & BMIFAZscore& BMI. While there were high positively and significantly correlated between BMIFAZscore & BMI.

Figure (9) shows that distribution of girls according to physical activity. It is noticed that 57% for girls were exercise Sometime and 37% for girls were exercise.

In table (6) results show that number of daily meals, (75.4%)of girls have three meals daily, (37.4% &48.0%) of girls delete of meals intake and Sometime respectively, While there was (37.0% &41.4%) of girls

eat breakfast at school and Sometime respectively. While there was (12.5 %) of girls eat breakfast at home before go to school. On the other hand there were (37.6 %) of girls drink of milk.

Figure **(10)** show the type of the meal snakes, 100% of girls consume snakes. Girls was found to consume snakes when they felt hungry. For girls (33.6%) sweets and chocolate and (62.3%)chips.

Table (7) show the fast food consumption, 43.5% of girls consume fast foods. 48.9% of girls consume fast foods one Week. 44.2% of girls consume porgar and (38.4 % & 52.6%) of girls drinking Carbonated water and Sometime respectively. Studying the analysis of the 24hr recall of food intake for the whole studied sample (**table-8**) had shown that the mean of total calories/day was 1793.4 kcal/d (±258.18). The mean of carbohydrate consumption per day was 246.4 g/d (±51.6).protein mean of consumption was 89.9 g/d (±10.89). With regard to mean of fat consumption was 49.8 2g/ d (±6.86). Fiber mean of consumption was 1.02 g/d (±0.61).Total calories come from Carbohydrate 54.96%, Protein 20.5 %, and Fat 25.9 %.

Table 9. Correlation coefficient between some factors and anthropometric measurements. There was a high positively significant difference between age & weight, height, BMI, Prefere Fast Food & chips Intake, also there were positively significant difference with drink of carbonated beverage, but there were high negatively significant difference with BMIFAZ, Number of meals & sweets intake. On the other hand there were high positively significant difference between weight with height, BMIFAZ, BMI, number of meals, prefere fast food, porgar intake, drink of carbonated beverage, sweets & chips intake. Also there were high positively significant difference between height with number of meals,prefere fast food, porgar intake, drink of carbonated beverage, sweets & chips intake.

Table (1): Level of education of fathers & mothers:

Levels of education	Fathers		Mothers	
	No	%	No	**%**
Illiterate	0	0	53	**2.6**
Primary level	138	6.9	215	**10.8**
Middle level	140	7.0	254	**12.7**
Secondary level	706	35.3	757	**37.9**
College level	811	40.6	624	**31.2**
High College level	205	10.2	97	**4.8**
Total	**2000**	**100.0**	**2000**	**100.0**

Fig.1.Distribution of girls According to Age

Fig.2.Distribution of grils According to School years
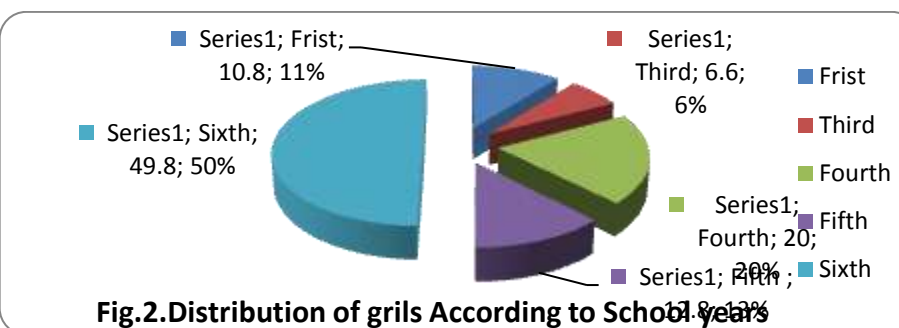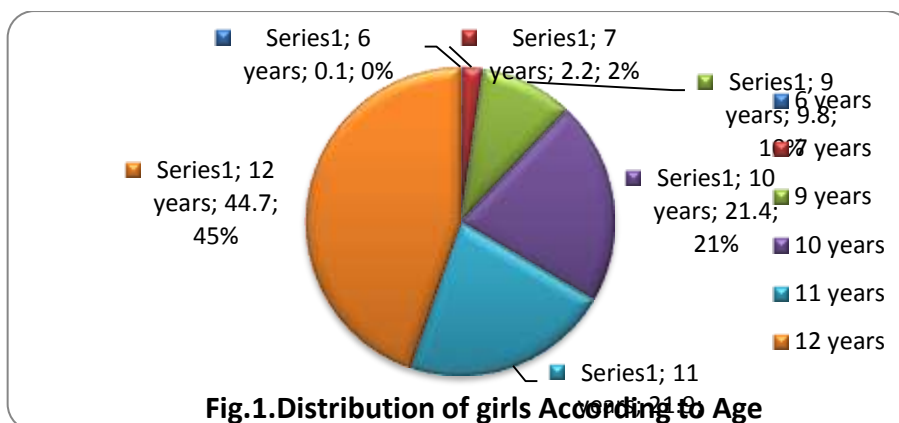
Table (2): Distribution of Girls studient According To Family Income.

Level Income	N0	%
<3000	343	17.15
4000 – 6000	546	27.30
7000- 9000	419	20.95
≥ 10000	692	34.60
Total	2000	100.0

Table 3. Distirbution of BMI for age and the mean Weight & BMI of girls.

BMI-for-age Z-score	No.	%	Weight Mean±SD	BMI Mean±SD
<-3SD Severe thinness	4	0.2	20.0±0.001	11.00±0.01
-3 to <-2SD Thinness	55	2.8	27.18±5.30	16.27±1.79
-2 to 1 SD Normal	793	39.6	31.81±5.59	18.19±2.27
1to 2 SD Overweight	613	30.6	35.18±4.25	20.94±2.28
>2SD Obesity	535	26.8	39.66±7.98	24.27±3.98
Total	2000	100.0	34.79±6.90	20.59±3.82

Table 4. Frequency distirbution of BMI for age according to age and the mean BMI of girls.

| Age	6		7		9		10		11		12	
BMI-for-age Z-score	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<-3SD Severe thinness	0	0	0	0	0	0	0	0	4	0.9	0	0
-3 to <-2SD Thinness	0	0	0	0	0	0	0	0	16	3.7	39	4.4
-2 to 1 SD Normal	1	50.0	20	46.5	51	26.2	80	18.7	196	44.7	445	49.8
1to 2 SD Overweight	0	0	15	34.9	44	22.6	152	35.5	85	19.4	317	35.5
>2SD Obesity	1	50.0	8	18.6	100	51.3	196	45.8	137	31.3	93	10.4
BMI (Mean±SD)	17.8±3.25		17.5±3.08		19.7±2.77		21.4±3.69		21.8±3.93		20.8±3.85	
Weight (Mean±SD)	26.1±4.242		25.93±6.06		31.53±5.85		34.15±6.81		34.88±9.92		36.21±4.31	
Height (Mean±SD)	121.00±1.4		121.65±10		125.30±4.4		126.24±9.0		126.47±6.2		131.76±7.6	
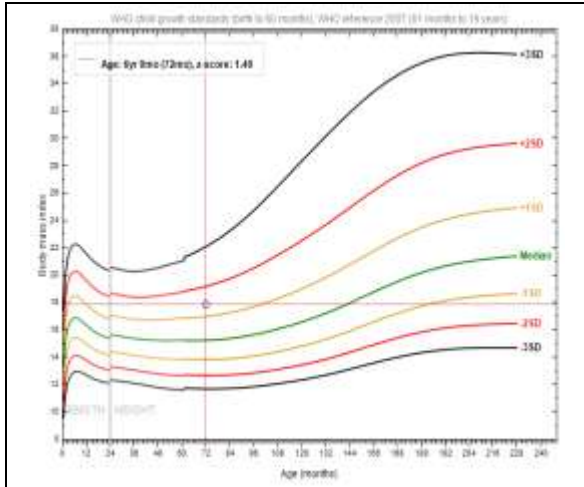
Fig. 3. BMI-for-age graph (Age = 6)
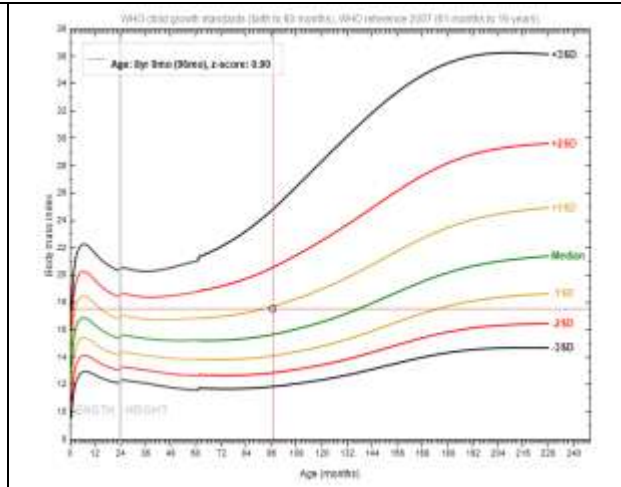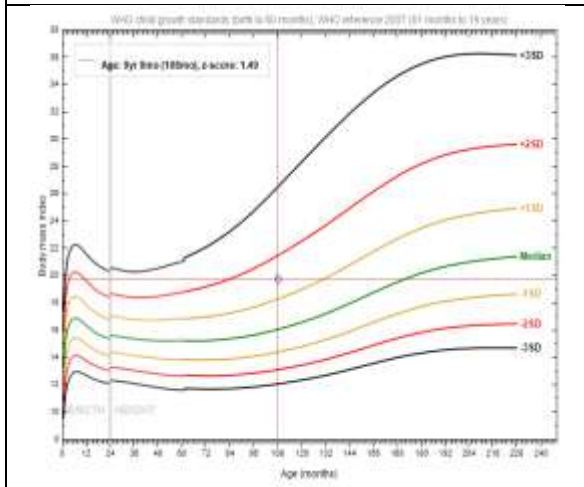
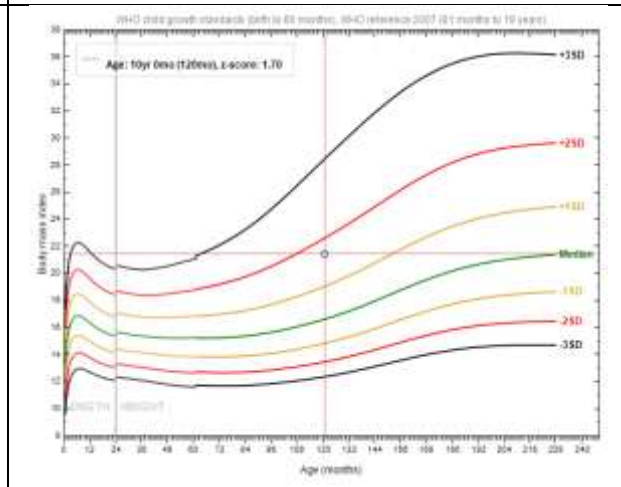
Fig. 4. BMI-for-age graph (Age = 7)

Fig. 5. BMI-for-age graph (Age = 9)

Fig. 6. BMI-for-age graph (Age = 10)
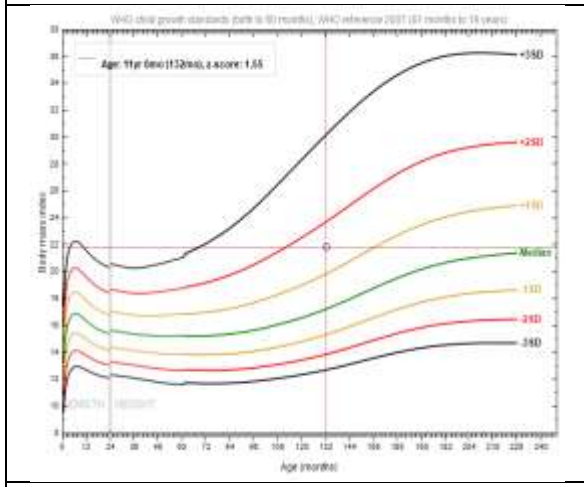
Fig. 7. BMI-for-age graph (Age = 11)

Fig. 8. BMI-for-age graph (Age = 12)

Table 5. Correlation coefficient between BMI and anthropometric measurements.
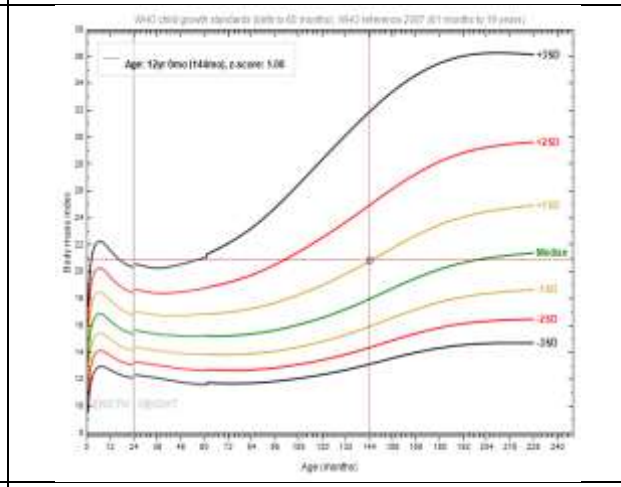
	Age	Weight	Height	BMI for age Z score
Weight	0.270[**]			
Height	0.327[**]	0.275[**]		
BMIFAZscore	-0.225[**]	0.527[**]	-0.291[**]	
BMI	0.174[**]	0.595[**]	-0.241[**]	0.651[**]

Table (6): Food Behavior For Studies Samples.

Variables	No	%
Number of meals daily		
1	69	
2	422	**21.1**
3	1508	**75.4**
4	1	**00.0**
Delete of meals Intake		
Yes	749	**37.4**
No	291	**14.6**
Sometime	960	**48.0**
of breakfast at school		
Yes	739	**37.0**
No	434	**21.7**
Sometime	827	**41.4**
of breakfast at home		
Yes	250	**12.5**
N0	1403	**70.2**
Sometime	347	**17.3**
Milk		
Yes	753	**37.6**
N0	211	**10.6**
Sometime	1036	**51.8**

Table (7):. Frequency distirubtion of girls According to Fast Food consumption.

	No	%
Fast Food		
Yes	870	**43.5**
No	252	**12.6**
Sometime	878	**43.9**
Fast Food consumption		
daily	112	**5.6**
Weekly	978	**48.9**
2-3 weakly	234	**11.7**
porgar		
Yes	884	**44.2**
No	301	**15.0**
Sometime	815	**40.8**
Carbonated beverage		
Yes	768	**38.4**
No	179	**9.0**
Sometime	1053	**52.6**

Table (8): Mean, SD for calories, carbohydrate, protein, fat and fiber from 24hr recall (n=2000)

Statistics tests	Calories (kcal/d)	Carbohydrate(g/d)	Protein(g/d)	Fat (g/d)	Fiber(g/d)
Mean	1793.4	246.4	89.9	49. 8	1.02
Std. Deviation	258.18	51.6	10.89	6.86	0.61
% from total calories	—	54.96 %	20.5 %	25.9 %	
% from DRI	112%	173.52%	264.4%	30.47%	
Recommended intake level by age (DRI)	1200-1600	113-142	19-34	39-85	

Table 9. Correlation coefficient between some factors and anthropometric measurements.

	Age	Weight	Height	BMI FA Z score	BMI	Number of meals	Fast Food Prefer
weight	.270**						
height	.327**	.275**					
BMIFAZ	-.225**	.527**	-.291**				
BMI	.174**	.595**	-.241**	.651**			
Number of meals	-.086**	.144**	.122**	.102**	.018		
Carbohydrate	-.017-	.008	-.017-	.020	-.006	.006	-.003**
Protein	-.001	014	-.005-	.010	.010	.007	.003
Fat	-.012	.018	-.001-	.003	0.016	-.019**	-.014**
Prefer Fast Foods	.099**	0.122**	0.095**	0.203**	0.108**	0.095**	
Porgar Intake	0.035-	0.205**	.099**	0.158**	0.091**	0.050*	-0.615**
Drink of Carbonated beverage	.056*	.271**	.188**	.047*	.126**	.172**	-.083**
Sweets Intake	-.102**	.155**	.160**	.114**	-.101**	-.068**	-.547**
chips Intake	.072**	.153**	.101**	.128**	.035*	-.113**	-.373**

Fig.9.Distirbution of girs according to Physical activity

Fig.10.Distirbution of girls According to snakes

	No	Sometime	yes
Sweets	16.9	49.5	33.6
shipsey	0.05	37.65	62.3
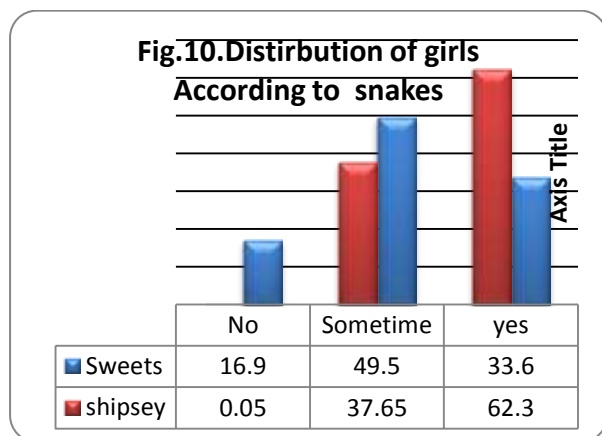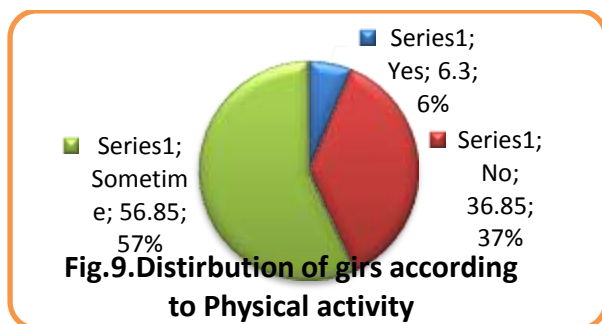
While there were high positively and significantly correlated between BMIFAZscore with BMI, number of meals,prefere fast food, porgar intake, sweetsi & chips intake, also there were positively significant difference with drink of carbonated beverage. On the other hand there were high positively significant difference between BMI with prefere fast food, porgar

intake, drink of carbonated beverage & sweets intake, also there were positively significant difference with chips intake. On the other hand there were high positively significant difference between number of meals with prefer fast food & drink of carbonated beverage. but there were high negatively significant difference with fat, sweets & chips intake. On the other hand there were high negatively significant difference between prefere fast food with Carbohydrate, fat, porgar intake, drink of carbonated beverage, sweets & chips intake.

4. Discussion :
1-Socio-demographic data

In Saudi Arabia, the overall prevalence of overweight, obesity, and severe obesity in otherwise healthy children and adolescents aged 5 to 18 years is 23.1%, 9.3% and 2%, respectivel.It was found in the study that45% of the sample was 12 years old and about 50% were 6nd year. And It was found that 40.6 % of fathers of girls children received education to the College level. For mothers of girls children 37.8 % received secondary. In this study there was 34.6% high family income (≥ 10000 SR monthly) is among girls.These results agreed with[13] sample was aged 7-12 years. El Mouzan et al., (2010) found that the higher the education level of the heads of the household, the lower the prevalence of malnutrition in their children, at least 9-12 years of education (intermediate and secondary school) is needed for better improvement in the nutritional status of the children[14] Wronka (2013) he found that Socioeconomic differences in BMI were increase with age. Parents' higher education were associated with smaller BMI

gain between the ages of 7 and 18 years. Mother and/or father had higher education the prevalence of underweight increased with age[15]. The prevalence of overweight and obesity were 20% and 11%, respectively. The prevalence of overweight was higher among schoolchildren with father in private work (P<0.01) and the prevalence of overweight and obesity was higher among schoolchildren with highly educated mothers (P=0.008). Al-Saeed et al.,(2007) found that the prevalence of overweight and obesity among female school-aged children and adolescents in the Al-Khobar city was very high[16]. Shariff, Bond and johson (2000) study that the prevalence of overweight among low-income school children in Kuala Lumpur proved that underweight and stunting are more prevalent than wasting in primary school children (6-10 years old)[17].

El Mouzan et al., (2010) found that the prevalence of underweight (weight for age below -2 SD) increased from 7.4% for the university level to 15.2% in the children of illiterate heads of household[14]. Macarthy(1977) said that income is the most important factors influencing the food consumption pattern[18]. Imdad et al.,(2011) said that childhood undernutrition is prevalent in low and middle income countries. It is an important indirect cause of child mortality in these countries[19].

2-Obesity and overweight using BMI for age

Al Herbish et al ., (2009) said that there are no reference standards for body mass index (BMI) in Saudi children, we established BMI reference percentiles for normal Saudi Arabian children and adolescents and compared them with international standards[20].

Previous several Saudi studies have confirmed that the prevalence of overweight and obesity among Saudi children of school-age and adolescents is high[16,21.5].

This study demonstrates that the BMI-for-age Z-score as a measure of overweight and obesity. Prevalence of overweight was 30.6 % and of obesity 26.8 %.While shinness and severe thinness were (2.8 % and 0.2 %) respectively. And it was found that that Prevalence of Overweight 35.5 % & %34.9 of girls in age (10,12 &7) respectively. While Prevalence of obesity 51.3 %, 50.0%,45.8%,31.3% and 18.6 % of girls in age (9,6,10,11&8) respectively. From the study it was found that While Prevalence of obesity 0f girls in age 9 years old. Jalali-Farahani et al., (2013) found that the prevalence of overweight and obesity (38.5%) was higher than severe thinness and thinness (2.8%)[22].

Several studies have reported prevalence of overweight or/and obesity in school children with ages ranging from 7- 14 years in Riyadh[23] and in Australia also reported a coexistence of a relatively higher than expected prevalence of overweight/obesity and undernutrition among children from 3 – 12 years[24].

In a report from a representative sample of US children collected between 2003 and 2006 using cut-off values similar to those of the WHO, the prevalence of overweight and obesity in children 2 to 19 years of age was 31.9%[25].

3-Correlation coefficient between BMI and anthropometric measurements

It was found in the study that a high positively significant difference between age & weight, height & BMIFAZscore (P <0.01). And significantly correlated between weight & height, BMIFAZscore & BMI. And significantly correlated between BMIFAZscore& BMI.

Wronka (2013) he found that BMI values increase along with an increase in body height at the age of 7 and 9 years[15].

4- biodemographic status

It was found in the study that 37% for girls were exercise. And found that 75.4% of girls have three meals daily and 37.4% of girls delete of meals intake. And found that 37.0% of girls eat breakfast at school compared to 12.5 % of girls eat breakfast at home before go to school. And there were 37.6 % of girls drink of milk.

From this study it was found that prevalence of obesity and health risk on those children who eat from school, particularly, if the school meals are higher in fat and calories contents and lower physical activity. Briefel et al., (2009) said that foods and beverages on school campuses, at home, and other locations affects children's diet quality, energy intake, and risk of obesity[26].

5- consumption of snakes and fast food

It was found in the study that 100% of girls consume snakes, 33.6% sweets and chocolate and 62.3% chips. And found that 43.5% of girls consume fast foods. 48.9% of girls consume fast foods one Week. 44.2% of girls consume porgar and 38.4 % of girls drinking Carbonated water. Martin-Calvo et al., (2014) found a strong and significant association between sugar-sweetened carbonated beverages consumption and obesity risk[27]. Karatzi et al.,(2014) found that increased consumption of margarine, sweets and savoury snacks, which is a common dietary pattern in childhood, was positively associated with insulin resistance[28]. Sameer and Al-Ghamdi (2013) found that
 higher (body mass index) BMI was associated with a higher eating more than three snacks per day (P = 0.005)[29]. Amin et al .,(2008) found that the prevalence of overweight among the child was 14.2% while obesity was 9.7%, more in urban, mothers of obese and overweight were less educated, more working. Missing and or infrequent intake of breakfast at home, frequent consumption of fast foods, low servings of fruits, vegetables, milk and dairy product per day, with frequent consumption of sweets/candy and carbonated drinks[7].

6-Dietary intake analysis by using the 24h recall for the sample discussion:

It was found in the study that the mean of calories was higher than recommended intake (mean 1793.4 kcal/day, (±258.18), while the normal range is 1200-1600 kcal/day. This was also higher than the findings of the school meal in American study by Perry(2008) [30,] with 1689 kcal/day for the same age groups. This could be evidence that the children, although did take enough calories from the food they eat, yet, this cannot explain the stunning and wasted found in the sample.

Carbohydrate mean was 246.4 g/d (±51.6) in the study which was way above the standard range which was 113-142 g/d. Additionally, it is like the finding of Perry thesis with 231g CHO consumption daily[30]. It was indicated in previous studies that the children who have high level of CHO consumption were overweight or obese. Similar profile of consumption was noticed with protein in the study where it was 89.9 g/d (±10.89) that was high more than four times normal range of 19-34 g/d. These female children in Madina consumed more than recommended level of intake for protein consumption on RDI (19-34 g/day). This might be explained under the light of that the children who have a high protein level daily are coming from high-income family, where it was a very common concept that higher meat consumption is related to the higher income level.

It was unanticipated to find that fat consumption belongs to standard range which is 39-85 g/d and our study sample which was 49. 8 g/d (±6.86). Thus, children should not increase the fat level more than that RDI range to avoid early obesity and heart diseases.

A higher than recommended caloric contribution due to fats (25.9 %) and proteins (20.5 %) and carbohydrates (54.96 %). And this is not coincide with a study that was done about dietary habits and nutritional status of school aged children in Spain that found 40% of calories comes from fat and 16% from protein and 44% from carbohydrate[31]. In our study the high protein consumption can be interpreted by the predominant intake of fast food.

Recommendations

For reduce obesity continued changes to school food environments and practices are removing sweets and sugar-sweetened beverages from school food stores[26]. Improving home eating behaviors and eating breakfast where the largest proportion of total daily and energy from low-nutrient[32].

Establish health programmer school, with the emphasis on increasing physical hours and consumption of healthy food .

Acknowledgments

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