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Obesity and Related Factors among Intermediate and High School Girls in Saudi Arabia schools - Case study: Al-Diriyah girl's schools 2016-2017 -

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Abstract: The study aimed to determine the proportion and feature of obesity in Al-Diriyah girl's schools in Saudi Arabia and factors related to it. An observational descriptive cross-sectional school based study. In AL- Diriyah over a one-year period (2016-2017), data will be collected from 275 schoolgirl students and it was selected by convenience technique. The results revealed that there was significant statistical finding about the association between the eating habit, sleep time and the body weight categories. Also, it shows there was P=0.0104 for family history of obesity and P=0.04 for number of the snacks per day. Moreover, there was a strong association between family history and obese girls, so obesity has a genetic effect, but the unhealthy lifestyle plays a major role, to control obesity lifestyle choices must be improved.

Keywords: Obesity, students, school.

Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in meters) 17. A person with a BMI equals to or more than 25 is considered overweight. A person with a BMI of 30 or more is generally considered obese (Cynthia et al, 2010). BMI provides the most useful population- level measure of overweight and obesity, however it's a rough guide. For children, age needs to be considered when defining overweight and obesity 15.

Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases like diabetes and cardiovascular diseases at a younger age. Overweight and obesity, therefore, needs high priority 11.

There are many factors that causes obesity like lack of energy balance, an inactive lifestyle, an environment that doesn't support healthy lifestyle habits, genes and family history, health conditions, certain medicines may cause weight gain, emotional factors, age, pregnancy and lack of sleep 16.

Problem statement/Justification:

Obesity has been one of the most serious health challenges of the 21st century. One point nine billion adults and 10% of children are now classified as overweight or obese. It was ones a problem only for high-income families but now dramatically it affects all types of income. Obesity is quickly becoming one of the most prominent conditions affecting children and adolescents. Obesity has always been approached from a medical point of view only, yet when more recent researches came out they found out that obesity is not only about physical change and calorie intake but also emotional, social and psychological factors, which are known as mental wellbeing. Those issues must be addressed and solved to provide an effective treatment for obesity and a step further to lowering obesity among Al- Diriyah area.

Hypotheses:

Obesity is expected to be more in 1st grade children than 3rd and the risk factor could be genetic or low physical activity rather than lack of health education in school or in the family.

General objective:

To determine the proportion and feature of obesity in Al- Diriyah intermediate girl's schools and factors related to it. Specific objective: -To measure the proportion of obesity in Al- Diriyah intermediate girl's schools. -To determine the risk factors of obesity in Al- Diriyah intermediate girl's schools.

Literature review

Albloshi et al. the aim of that study was to measure the changes in rates of Obesity in School Children in United Arab Emirates. This population-based study investigated the prevalence of Obesity in 44,942 students attending governmental school in Ras Al-Khaimah. That study revealed an alarming rise in the rate of childhood obesity in UAE. Obesity rate increases linearly from 3 to 12 y. About one-fourth of children 11–14 y is either obese or extremely obese. From 15 to 18 y, 10% of boys are extremely obese and 3% of girls are extremely obese. That study showed a steady rise of Obesity in children 3-18 years.

Karimi et.al, did a study in Iran, on 2195 school children, this study aimed to determine the prevalence of overweight and obesity among schoolchildren in Semnan Province, Iran. Results showed that 8.2% of schoolchildren were obese and 11.5% were overweight. The prevalence of overweight and obesity

among girls were 11.9% and 8.0% and among boys were 11.1% and 8.3%, respectively. There was a significant relationship between obesity/overweight housing status (private or rented. Findings report a relatively high prevalence of obesity and overweight in schoolchildren of Semnan Province in Iran.

Gökler et.al,8 did a study in Turkey. The purpose of that study was to determine the prevalence of obesity and to compare the associated risk factors between the adolescent and children living in rural and urban areas. It was conducted among 3,918 high school students. The study showed the prevalence of being overweight was 10.4% and 12.2% and the prevalence of obesity was 7.9% and 11.3% in rural and urban areas, respectively. In urban areas, being overweight was accompanied by prehypertension, hypertension, and family history of cardiovascular disease, and obesity was accompanied by prehypertension, hypertension, excessive use of computer/TV, having no breakfast, physician-diagnosed diabetes mellitus and consumption of sugar-sweetened beverages. In rural areas, although the variables accompanying being overweight were parallel with those in urban areas, obesity was only associated with prehypertension, hypertension and family history of cardiovascular disease. Risk factors may differ in the adolescents from rural and urban areas.

Jagadesan et.al, 9 did her study in Chennai, on 18,955 school children, to determine the prevalence of overweight and obesity among children and adolescents in Chennai, India. The prevalence of overweight/obesity was significantly higher in private compared to government schools both by the IOTF criteria (private schools: 21.4%, government schools: 3.6%, and by Khadilkar criteria (private school: 26.4%, government schools: 4.6%. Overweight/obesity was higher among girls 18%, Khadilkar: 21.3%) compared to boys 16.2%, Khadilkar: 20.7%) and higher among adolescents (IOTF: 18.1%, Khadilkar: 21.2%) compared to children 15.5%, Khadilkar: 20.7%). Prevalence of hypertension was 20.4% among obese/overweight and 5.2% among non-obese (OR 4.7, 95%CI: 4.2-5.3, P<0.001). The prevalence of overweight and obesity is high among private schools in Chennai.

Al-Enazy et.al, 1 did a study in Tabuk, Saudi Arabia. The study aimed to determine the prevalence and risk factors of overweight and obesity among Saudi primary school students in Tabuk. A total of 331 students participated. The prevalence of overweight and obesity among male primary school students were 7.3% and 17.4%, respectively while the prevalence among female students were 12.4% and 20.9%, respectively. Overweight and obesity were more prevalent among student living with both parents (P = 0.031), with highly educated parents (P = 0.008), with history of maternal obesity (P = 0.001), with working mothers (P = 0.024), and with smaller family size (P = 0.004). The results of that study provide alarming evidence based data on the considerable prevalence of childhood overweight and obesity among Saudi primary school children in Tabuk, Saudi Arabia.

Basiratnia et al 4did a study about Prevalence of childhood obesity and hypertension; In Iran. The aim of that study was to investigate the frequency of pediatric obesity and its association with hypertension in a sample of children and adolescents. A total of 2000 healthy student were included. The result was Where 7.0% were obese children (6.2% of boys and 7.9% of girls) and 11.8% (13% in the girls and 10.4% in the boys; P = .08) were obese and hypertensive, respectively. The data showed that prevalence of obesity has not been changed in the recent 5 years in Iran, but that of hypertension has risen significantly. There was high prevalence of hypertension in overweight and obese children.

Duncan et al, 6 in Brazil did a study. The aims of that study were to investigate the current prevalence of overweight and obesity in a large sample of children and adolescents and to identify the lifestyle behaviors associated with an increased risk of obesity in young Brazilians. The study showed conversely, overweight was associated with less active transport to school, eating before sleep, and consumption of breakfast, full-sugar soft drinks, fried food and confectionery (P < 0.05 for all). The results indicate that boys and younger children are more likely to be obese than girls and older children, respectively. (5) A total of 3,397 children and adolescents. Overall, 19.4% of boys and 16.1% of girls were overweight while 8.9% and 4.3% were obese. Two-way analysis of variance revealed that the prevalence of overweight and obesity was significantly higher in boys and in younger children when compared to girls and older children, respectively (P < 0.05 for both).

Nayak and Vinod, 13 that study aimed to find the Prevalence of Overweight and Obesity among school children. That study comprised of 2938 school children. Result of that study showed that 7% of children were overweight and 5% were obese. Also, it showed a positive relationship between BMI and waist circumference (r = 0.763, p =<0.0001). The study concluded that childhood obesity prevalence is increasing among children. Higher BMI was found among children in the age of 10 – 12 years and among girls than the boys. That study showed that 1904 (65%) children were in the normal category of BMI, whereas 214 (7%) were overweight and 141 (5%) were obese. In the study population, prevalence of obesity was high among children in the age group of 10-12 years, more among girls than boys.

El Mouzan et.al, 7study aimed to establish the national prevalence of overweight and obesity in Saudi children and adolescents from ages 5 to 18 years of age, 50.8% of whom were boys. The overall prevalence of overweight, obesity and severe obesity in all age groups was 23.1%, 9.3% and 2%, respectively. A significantly lower prevalence of overweight (23.8 vs 20.4; P < .001) and obesity (9.5 vs 5.7; P < .001). The study showed that most of the population was overweight after that comes the normal weight children and lastly obese children. This report establishes baseline national prevalence rates for overweight, obesity and

severe obesity in Saudi children and adolescents, indicating intermediate levels between developing and industrialized countries.

Sjoberg et.al, this study Aimed to assess the recent prevalence of overweight and obesity in 10-year-old children. Between 2000/2001 and 2004/2005, the prevalence of overweight plus obesity in girls decreased from 19.6% to 15.9% ($p < 0.01$). Prevalence of obesity was 3.0% and 2.5% (nonsignificant), respectively. In boys, all differences between the corresponding cohorts were nonsignificant: 17.1% versus 17.6% were overweight (including obese) and 2.9% versus 2.8% were obese. In 1984/1985, prevalence of overweight plus obesity was only 8.6% among girls and 7.2% among boys, while 0.8% and 0.7% were classified as obese, respectively. The socio-economic gradient in overweight prevalence remained, particularly in girls. This study suggests that the obesity epidemic in 10–11-year old's may be easing off in urban Sweden, and possibly reversing among girls. .

Malik and Bakir, 12 did this study aimed to determine the prevalence of overweight and obesity in children in the United Arab Emirates, Overall the study showed that most of the children were overweight and a small portion of them were obese. About 944 (21.5%) of the children were overweight and 601 (13.7%) of them were obese more girls were obese than boys (22.9% vs 20.2% $P< 0.0001$). Resident girls were more likely to be obese than citizen.

Comment on previous studies:

Through the previous studies we see that they differed according to the subject, the objective, the tool, the method of data collection, the environments in which it was carried out, and the methodology that it used.

Benefits of previous studies

1- Design of the questionnaire
2- Enriching the theoretical side
3- Do not repeat previous studies
4- Obtain study variables

The main features of the current study:

1- It is addressed by a combination of factors that affect obesity
2- Students have secondary and intermediate schools in the Al-Diriyah area.

Methodology

Study design:

The design was observational descriptive cross-sectional school based study over a one-year period (2016-2017).

Area and population:

The study k place in Saudi Arabia, Al- Diriyah where was the original home of the Saudi royal family, and served as the capital of the Emirate of Al- Diriyah under the first Saudi dynasty from 1744 to 1818. Today, it's considered one of the most important historical cities of Saudi Arabia, it includes 16 governmental girl's schools. The population of Al-Diriyah is about 74,000 individuals.

Data collection: The questionnaire contains sections, it began with personal data including (Age, grade, weight, height, and BMI), family history, and lifestyle and it was tested regarding validity and reliability. It had three types the majority are close-ended questions. The questionnaire was a self-administrated by students.

Definition and procedure: The weight and height of each girl was measured during school hours by using height and weight scales and ask each girl to take of the shoes and stand on the scale for measuring the Body mass index (BMI) by using the BMI formula which is (weight (kg)/ (height (m2) 2. and then the participants were categorized according to BMI chart for children.

Data analysis: The collected data was cleaned, coded, entered and analyzed by the SPSS. Suitable statistic tests done and the result was presented in tables as frequencies, proportion and graphs.

Ethical considerations: The permission obtained from the principle of a school in Al-Diriyah. The collected data be only used for research purposes. The research would adopt anonymity and confidentiality. Also this study has depend on set of studies that help in current study such as **Malik and Bakir(2007), Albloshi et al (2016), Karimi et al (2015).**

Sample size and technique: The sample consists of 275 students in intermediate and high governmental girls' school in Al- Diriyah, which was selected randomly.

Results

1- Regarding the age distribution association to the grade groups of AlOla Intermediate and high school's girls in Al-Dir'iya. Category was statistically not significant **(table 1)**

(Table 1) age distribution association to the grade groups of AlOla Intermediate and high schools girls in Al Diriyah:

	In1	In2	In3	Hs1	Hs2	Hs3	Total
12 – 13	36 (13.1%)	15 (5.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	51 (18.5%)
14 - 15	4 (1.5%)	18 (6.5%)	54 (19.6%)	5 (1.8%)	0 (0.0%)	0 (0.0%)	81 (29.5%)
16 – 17	0 (0.0%)	0 (0.0%)	9 (3.3%)	33 (12.0%)	33 (12.0%)	5 (1.8%)	80 (29.1%)
18 – 19	1 (0.36%)	0 (0.0%)	1 (0.36%)	1 (0.36%)	4 (1.5%)	51 (18.5%)	58 (21.1%)
> 19	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (1.1%)	3 (1.1%)
Total	41 (14.9%)	33 (12.0%)	64 (23.3%)	39 (14.2%)	37 (13.5%)	59 (21.5%)	273 (99.3%)
P value	**Not Significant**						

The previous table shows that there is no relationship between age and obesity, since age is not an effective factor in the obesity, and the researcher attributed this result to the fact that age has nothing to do with obesity, as many people with large ages do not suffer from obesity, while many people with a few ages They may suffer from obesity.

The result is agreed with the results of some previous studies such as Albloshi et al study that show Obesity rate increases linearly from 3 to 12 y. About one-fourth of children 11–14 y is either obese or extremely obese. From 15 to 18 y, 10% of boys are extremely obese and 3% of girls are extremely obese.

2- Regarding bodyweight 27.27% of Intermediate school girl's grades 1 and 2 are underweight, 25.24% of Intermediate school grade 3 and high school grade 1 girls are overweight and 60% of high school girl's grades 2 and 3 girls are normal weight, and so did 14.73% are obese. This variation in bodyweight among the grade of girls in AlOla Intermediate and high school's girls in Al- Dir'iya. Category was statistically significant (P=0.022, **table 2).**

(Table 2) Bodyweight distribution association to the grade groups of AlOla

	In1	In2	In3	Hs1	Hs2	Hs3	Total
Under-weight	8 (29.1%)	13 (4.7%)	12 (4.4%)	10 (3.6%)	3 (1.1%)	7 (2.5%)	**53 (19.3%)**
Normal	26 (9.5%)	20 (7.3%)	33 (12.0%)	19 (6.9%)	25 (9.1%)	32 (11.6%)	**155 (56.4%)**
Over-Weight	5 (1.8%)	2 (0.73%)	17 (6.2%)	9 (3.3%)	4 (1.5%)	10 (3.6%)	**47 (17.1%)**
Obese	2 (0.73%)	1 (0.36%)	2 (0.73%)	1 (0.36%)	5 (1.8%)	9 (3.3%)	**20 (7.3%)**
Total	41 (14.9%)	36 (13.1%)	64 (23.3%)	39 (14.2%)	37 (13.5%)	58 (21.1%)	**275 (100%)**
P value	**P=0.022**						

It is clear from the previous table that body weight is related to obesity, as body weight is an effective factor in obesity, and the researcher attributed this finding to the fact that in some people body weight may lead to indigestion, and in some people may not affect, as body weight may play the role In obesity.

The result of the current study was consistent with the outcome of some studies such as **Karimi et.al** study that showed 8.2% of schoolchildren were obese and 11.5% were overweight. The prevalence of overweight and obesity among girls were 11.9% and 8.0% and among boys were 11.1% and 8.3%, respectively. There was a significant relationship between obesity/overweight .

3- Regarding family history 55% of the obese girls had family history of obesity, and so did 51% of the overweight. The underweight and normal students had proportional of 30% each. This variation in family history of obesity among the bodyweight category was statistically significant (P=0.0104, **table 3).**

4- Regarding eating breakfast before school, bringing breakfast from home, eating right before bedtime and eating while watching TV, these factors among bodyweight categories were not significant **(table 3)**

5- Regarding keeping food at the bedroom 60% of obese girls had this kind of habit, and so did 36% of the overweight. The underweight and normal girls had 30% and 38% respectively. This variation in keeping food at the bedroom habit among the bodyweight category was statistically significant (P=0.0680, **table 3).**

6- Regarding parent's knowledge about keeping food at the bedroom (table 3), having food as a treat and eating food under stress and depression among bodyweight category of intermediate and high school girls were not significant **(table 3).**

(Table 3) A comparison between body mass index and the life style of 1st high school and 1st intermediate schoolgirls in Al- Diriyah district (MCST, 2017)

p-value	Total	Obese	Overweight	Normal	Underweight	
-	275	20	47	155	53	
P=0.0104	97 (35.2%)	11 (55.0%)	24 (52.2%)	46 (29.9%)	16 (30.2%)	**Family history**
N.S	128 (46.5%)	11 (55.0%)	21 (44.7%)	70 (45.5%)	26 (49.1%)	**Eating breakfast before school**
N.S	60 (21.8%)	4 (20.0%)	8 (17.0%)	37 (23.9%)	11 (20.7%)	**Bring breakfast from home**
N.S	107 (38.9%)	6 (30.0%)	17 (37.0%)	60 (39.2%)	24 (46.1%)	**Eating right before bed time**
N.S	191 (69.4%)	11 (55.0%)	30 (63.8%)	111 (71.6%)	39 (75.0%)	**Eating while watching TV**
N.S	101 (36.7%)	12 (60.0%)	17 (36.2%)	58 (37.7%)	14 (29.9%)	**Keeping food at the bedroom**
N.S	92 (33.5%)	5 (35.7%)	16 (57.4%)	52 (47.7%)	19 (63.3%)	**Parents knowledge**
P=0.0680	160 (58.1%)	12 (66.6%)	30 (63.8%)	89 (57.7%)	29 (54.7%)	**Having food as a treat**
N.S	110 (40.0%)	8 (40.0%)	17 (36.9%)	64 (42.1%)	21 (40.4%)	**Eating food under stress and depression**

The previous table shows that family history is an effective factor in obesity. The researcher attributes this finding to the fact that it is possible that the characteristics of the family or a parent may lead to obesity in children. Therefore, obesity may be due to family history.

As shown in the previous table that eating breakfast is an effective factor in obesity, the researcher attributed this result that breakfast is considered to be the meals that lead to obesity because of the type of food that the person may lead to the emergence of obesity.

As shown in the previous table that keeping food in the bedroom is an effective factor in obesity, the researcher attributed this result to the retention in the food in the bedroom, pushing the person to frequent eating and thus the emergence of obesity.

As shown in the previous table, parents' knowledge of keeping food in the bedroom, eating under pressure and threatening the body weight standard is not an effective factor in obesity, and the researcher attributed this finding to the fact that these factors are not effective in obesity and do not lead to obesity because they are not considered Rules for the appearance of obesity in people.

The previous results was agreed with the results of some studies such as **Gökler et.al,8 that** showed the prevalence of being overweight was 10.4% and 12.2% and the prevalence of obesity was 7.9% and 11.3% in rural and urban areas, respectively. In urban areas, being overweight was accompanied by prehypertension, hypertension, and family history of cardiovascular disease, and obesity was accompanied by prehypertension, hypertension, excessive use of computer/TV, having no breakfast, physician-diagnosed diabetes mellitus and consumption of sugar-sweetened beverages, and agreed with **Jagadesan et.al, 9** study that show The prevalence of overweight/obesity was significantly higher in private compared to government schools both by the IOTF criteria (private schools: 21.4%, government schools: 3.6%, and by Khadilkar criteria (private school: 26.4%, government schools: 4.6%. Overweight/obesity was higher among girls 18%, Khadilkar: 21.3%) compared to boys 16.2%, Khadilkar: 20.7%).

7- Regarding number of meals consumed during the day among bodyweight category there was non-significant difference. In regarding the time for watching T.V and plying games every day among bodyweight category 95.0% of the obese girls played for more than 6 hours, 100% of overweight girls. The underweight 98.1%, and 97.4% of normal students. There was non-significant difference. Also the eating junk food per week among bodyweight,there were non-significant difference. **(Table 4,5and 6)**

(Table 4) AlOla intermediate and high schools in Al Diriyah calculating the number of meals consumed during the day.

Total	Obese	Overweight	Normal	Underweight	
190 (69.8%)	14 (77.8%)	38 (80.8%)	105 (68.6%)	33 (62.3%)	**1-3**
69 (25.1)	4 (22.2%)	7 (14.9%)	40 (26.1%)	18 (34.0%)	**4–6**
12 (4.4%)	0 (0.0%)	2 (4.3%)	8 (5.2%)	2 (3.8%)	**>6**
271 (98.5%)	18 (90.0%)	47 (100%)	153 (98.7%)	53 (100%)	**Total**
4	2	0	2	0	**Missing values**
Not significant					**P value**

(Table 5) AlOla intermediate and high schools in AlDiriyah measuring the time for watching TV and playing games per day.

Total	Obese	Overweight	Normal	Underweight	
13 (4.7%)	3 (15.8%)	0 (0.0%)	7 (4.6%)	3 (5.7%)	**0**
99 (36.0%)	6 (30.0%)	16 (34.0%)	57 (36.8%)	20 (38.5%)	**1–3**
65 (23.6%)	3 (15.0%)	14 (29.8%)	53 (34.2%)	13 (25.0%)	**4–6**
92 (33.4%)	7 (85.0%)	17 (36.2%)	52 (33.5%)	16 (30.8%)	**>6**
269 (97.8%)	19 (95.0%)	47 (100%)	151 (97.4%)	52 (98.1%)	**Total**
6	1	0	4	1	**Missing values**
Not significant					**P value**

(Table 6) AlOla intermediate and high school in AlDiriyah calculating the eat junk food per week.

Total	Obese	Overweight	Normal	Underweight	
51 (18.5%)	5 (25.0%)	12 (25.5%)	27 (17.4%)	7 (13.2%)	**None**
175 (63.6%)	11 (55.0%)	33 (70.2%)	95 (61.3%)	36 (67.9%)	**1–3**
33 (12.0%)	2 (10.0%)	1 (2.1%)	24 (15.5%)	6 (11.3%)	**4–6**
8 (2.9%)	0 (0.0%)	1 (2.1%)	4 (2.6%)	3 (5.7%)	**>6**
267 (97.1%)	18 (%)	47 (100%)	150 (96.8%)	52 (98.1%)	**Total**
8	2	0	5	1	**Missing values**
Not significant					**P value**

The above table's shows that both (the number of meals consumed during the day and watching television) are considered to be ineffective in obesity, and the researcher attributed this result, but these factors do not necessarily mean the emergence of obesity. Many people consume many meals and watch television and do not suffer from obesity, These factors have nothing to do with obesity.

The previous results was agreed with the results of some studies such as Nayak and Vinod, 13 study that show Higher BMI was found among children in the age of 10 – 12 years and among girls than the boys. That study showed that 1904 (65%) children were in the normal category of BMI, whereas 214 (7%) were overweight and 141 (5%) were obese. In the study population, prevalence of obesity was high among children in the age group of 10-12 years, more among girls than boys, and agreed with El Mouzan et.al, 7 study that show most of the population was overweight after that comes the normal weight children and lastly obese children. This report establishes baseline national prevalence rates for overweight, obesity and severe obesity

in Saudi children and adolescents, indicating intermediate levels between developing and industrialized countries.

8- Regarding the buying from school canteen the most of normal, underweight and overweight girls buy juice, but the obese girls usually buy candy and sandwich. Category was statistically not significant (table 7)

(Table 7) measuring statistics of al Ola intermediate and high school girls in Al Diriyah that buy from school canteen

Total	Obese	Overweight	Normal	Underweight	
93 (33.8%)	10 (50.0%)	11 (23.4%)	56 (36.1%)	16 (30.2%)	**Candy**
125 (80.6%)	9 (45.0%)	27 (57.5%)	68 (43.9%)	21 (39.6%)	**Juice**
44 (28.4%)	4 (20.0%)	7 (4.5%)	22 (14.2%)	11(20.8%)	**Chips**
102 (65.8%)	10 (50.0%)	24 (51.1%)	53 (34.2%)	15 (28.3%)	**Sandwich**
364 (75.5%)	33 (60.6%)	69 (68.1%)	199 (77.9%)	63 (84.1%)	**Total**
Not significant					**P value**

The above table shows that the purchase of students from the canteen is an ineffective factor in obesity. The researcher attributed this finding to the fact that the purchase of students from the canteen has nothing to do with obesity, and that the food of the canteen does not lead to obesity, as the food is subject to laws and legislation many.

9- Regarding the number of snacks between meals per day in al Ola intermediate and high school girls. Category was statistically not significant **(table 8)**

(Table 8) measuring statistics of al Ola intermediate and high school girls in Al Diriyah of number of snacks between meals per day

Total	Obese	Overweight	Normal	Underweight	
34 (12.4%)	3 (15.0%)	7 (4.5%)	17 (11.1%)	7 (13.2%)	**No snacks**
206 (74.9%)	11 (55.0%)	36 (76.6%)	121 (78.1%)	38 (71.7%)	**1–3**
24 (8.7%)	3 (15.0%)	2 (4.2%)	13 (8.4%)	6 (11.3%)	**4–6**
8 (2.9%)	2 (10.0%)	2 (4.2%)	2 (1.3%)	2 (3.8%)	**>6**
272 (98.9%)	19 (95.0%)	47 (100%)	153 (98.7%)	53 (100%)	**Total**
3	1	0	2	0	**Missing values**
Not significant					**P value**

The above table shows that the number of meals eaten between meals per day is not an effective factor in obesity, and the researcher attributed this result to the fact that these meals do not lead to the

emergence of obesity are snacks do not lead to the emergence of obesity, and often these meals are full of fat and food Fat that leads to obesity

10- Regarding the schedule of Type of snacks that teenager girls eat between their meals it was found that underweight girls eat 22.6% fruit and vegetable, 5.7% dairy products, 58.5% candy and chocolate, and 30.2% chips. Also, normal body mas girls 24.5% eat fruit and vegetable, 12.2% dairy products, 53.5% candy and chocolate, and 32.2% chips. The overweight girls 44.7% eat fruit and vegetable, 14.9% dairy products, 46.9% candy and chocolate, and 29.8% chips. Finally, obese girls usually 25.0% eat fruit and vegetable as snack, 10.0% dairy products, 50.0% candy and chocolate, and 40.0% eat chips (P=0.04, **table 9).**

(Table 9) Type of snacks those teenager girls at Al- Ola schools in AlDiriyah eat between their meals.

Total	Obese	Overweight	Normal	Underweight	
275	20	47	155	53	
76 (27.6%)	5 (25.0%)	21 (44.7%)	38 (24.5%)	12 (22.6%)	**Fruits and vegetables**
31 (11.3%)	2 (10.0%)	7 (14.9%)	19 (12.2%)	3 (5.7%)	**Dairy Products**
146(53.0%)	10(50.0%)	22 (46.8%)	83 (53.5%)	31 (58.5%)	**Chocolate and Candy**
88 (32.0%)	8 (40.0%)	14 (29.8%)	50 (32.2%)	16 (30.2%)	**Chips**
P=0.04					**P value**

11- Regarding the schedule of the number eating fruits and vegetables per week was found that 49.1% eat fruit and vegetables less than 4 times per week, 18.9% between 4 and 6 times, 32.1% more than 6. Also, normal body mas girls 54.2% eat fruit and vegetables less than 4 times per week, 9.0% between 4 and 6 times and 34.8% more than 6. The 34.0% overweight eat fruit and vegetables less than 4 times per week, 17.2% between 4 and 6 times and 44.7% more than 6. Finally, obese girls 45.0% eat fruit and vegetables less than 4 times per week, 25.0% between 4 and 6 times and 20.0%more than 6 (P=0.0693, **table 10).**

(Table 10) How many times a teenager girl at Al- Ola schools in Al-Dir'iya eat fruits and vegetables per week.

Total	Obese	Overweight	Normal	Underweight	
275	20	47	155	53	
134 (48.7%)	9 (45.0%)	16 (34.0%)	84 (54.2%)	26 (49.1%)	<4
37 (13.5%)	5 (25.0%)	8 (17.2%)	14 (9.0%)	10 (18.9%)	4–6
96 (34.9%)	4 (20.0%)	21 (44.7%)	54 (34.8%)	17 (32.1%)	>6
268 (97.5%)	18 (90.0%)	45 (95.7%)	152 (98.0%)	53 (100%)	Total
7	2	2	3	0	Missing values
P=0.0693					P value

The previous tables show that fruits and vegetables as a snack, as well as sweets, chocolate and chips, are considered to be influential factors in the emergence of obesity among girls. The researcher attributed this result to the fact that these meals lead to the emergence of obesity because they contain fat and butter.

The current results was agreed with the results of some studies such as Sjoberg et.al study that show obesity was 3.0% and 2.5% (nonsignificant), respectively. In boys, all differences between the corresponding cohorts were nonsignificant: 17.1% versus 17.6% were overweight (including obese) and 2.9% versus 2.8% were obese. In 1984/1985, prevalence of overweight plus obesity was only 8.6% among girls and 7.2% among boys, while 0.8% and 0.7% were classified as obese, respectively. The socio-economic gradient in overweight prevalence remained, particularly in girls. This study suggests that the obesity epidemic in 10—11-year old's may be easing off in urban Sweden

12- Regarding association of soft drinks with bodyweight distribution there were non- significant difference. **(Table 11)**

(Table 11) association of soft drinks with bodyweight distribution at AlOla Diriyah intermediate and high schools in Al Diriyah

Total	Obese	Overweight	Normal	Underweight	
53 (19.3%)	5 (25.0%)	7 (14.9%)	27 (17.4%)	14 (26.4%)	**None**
137 (88.4%)	8 (40.0%)	32 (68.1%)	74 (47.7%)	23 (43.4%)	**1–3**
42 (27.1%)	2 (10.0%)	7 (14.9%)	28 (18.1%)	5 (9.4%)	**4–6**
39 (14.2%)	3 (15.0%)	1 (2.1%)	24 (15.5%)	11 (20.8%)	**>6**
271 (98.5%)	18 (90.0%)	47 (100%)	153 (98.7%)	53 (100%)	**Total**
4	2	0	2	0	**Missing values**
Not significant					**P value**

13- Regarding the sleep time and number perform exercise per week distribution association to the grade groups of AlOla Intermediate and high school's girls in Al- Dir'iya. Category were statistically not significant **(table 12and 13)**

(Table 12) Sleep time of AlOla intermediate and high school students in AlDiriyah

Total	Obese	Overweight	Normal	Underweight	
30 (19.9%)	**3 (15.0%)**	**5 (10.6%)**	**20 (12.9%)**	**2 (3.7%)**	**1**
23 (8.4%)	**2 (10.0%)**	**3 (6.4%)**	**10 (6.5%)**	**8 (15.1%)**	**2**
14 (5.1%)	**2 (10.0%)**	**2 (4.3%)**	**8 (5.2%)**	**2 (3.8%)**	**3**
2 (0.73%)	**0 (0.0%)**	**1 (2.1%)**	**1 (0.64%)**	**0 (0.0%)**	**4**
2 (0.73%)	**0 (0.0%)**	**0 (0.0%)**	**1 (0.64%)**	**1 (1.9%)**	**5**

Total	Obese	Overweight	Normal	Underweight	
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	10
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	11
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	13
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	14
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	15
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	16
1 (0.36%)	0 (0.0%)	0 (0.0%)	1 (0.64%)	0 (0.0%)	17
2 (0.73%)	0 (0.0%)	0 (0.0%)	2 (1.3%)	0 (0.0%)	18
4 (1.5%)	2 (10.0%)	1 (2.1%)	1 (0.64%)	0 (0.0%)	19
15 (5.5%)	2(10.0%)	2 (4.3%)	8 (5.2%)	3 (5.7%)	20
23(8.4%)	2(10.0%)	3 (6.4%)	13 (8.4%)	4 (7.5%)	21
46 (16.7%)	2 (10.0%)	10 (21.3%)	20 (12.9%)	14 (26.4%)	22
38 (13.8%)	0 (0.0%)	8 (15.1%)	22 (14.2%)	8 (15.1%)	23
73 (26.5%)	4 (20.0%)	12 (25.5%)	46 (29.7%)	11 (20.8%)	24
273 (99.3%)	19 (95.0%)	47 (100%)	153 (98.7%)	53 (100%)	Total
3	1	0	2	0	Missing values
Not significant					P value

(Table 13) Number of times that the AlOla intermediate and high school students in Diriyah perform exercise per week:

Total	Obese	Overweight	Normal	Underweight	
59 (21.5%)	2 (10.0%)	11 (23.4%)	31 (20.0%)	15 (28.3%)	**No exercise**
118 (42.9%)	8 (40.0%)	22 (46.8%)	67 (43.3%)	21 (39.6%)	**1–3**
36 (13.1%)	3 (15.0%)	6 (12.8%)	22 (14.2%)	5 (9.4%)	**4–6**
51 (18.5%)	5 (25.0%)	7 (14.9%)	29 (18.7%)	10 (18.9%)	**>6**
264 (96.0%)	18 (90.0%)	46 (97.9%)	149 (96.1%)	51 (96.2%)	**Total**
11	2	1	6	2	**Missing values**
Not significant					**P value**

The results indicate that both soft drinks, sleep time and exercise performance are ineffective in obesity, and the researcher attributed the result to the fact that these practices have nothing to do with obesity, as girls in the school do not drink soft drinks heavily and sleep time they have regular and exercise Regularly.

The current results was greed with the results of some studies such as **Duncan et al, 6** study that show conversely, overweight was associated with less active transport to school, eating before sleep, and consumption of breakfast, full-sugar soft drinks, fried food and confectionery ($P < 0.05$ for all). The results indicate that boys and younger children are more likely to be obese than girls and older children, respectively. (5) A total of 3,397 children and adolescents. Overall, 19.4% of boys and 16.1% of girls were overweight while 8.9% and 4.3% were obese. Two-way analysis of variance revealed that the prevalence of overweight and obesity was significantly higher in boys and in younger children when compared to girls and older children, respectively ($P < 0.05$ for both).

Conclusion:

The study showed a strong association between obesity and age, family history, keeping food in bedrooms, kind and amount of food that the children eat at schools and what they buy from canteens, eating vegetables and fruits, watching TV or playing games, sleeping patterns and physical activity. It's seems there no significant affection of taking soft drinks on bodyweight.

Recommendations:

It is notable that the bodyweight should be monitored while going through stages of physical changes to avoid early life obesity and health problems. A great way of prevention would be

- To give awareness to families.
- To give parental involvement in managing kids' weight through limiting intake of sugary beverages and snacks, reducing stationary activities like watching TV and playing computer games
- Increasing consumption of vegetables and fruits.
- This study has found child obesity to be easily manageable and preventable.

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العوامل التي تؤثر على البدانة لدى طالبات المرحلة المتوسطة والثانوية في المدارس السعودية

دراسة حالة مدارس منطقة الدرعية 2016-2017

الملخص: هدفت الدراسة الحالية إلى التعرف على العوامل التي تؤثر على البدانة لدى طالبات مدارس المرحلة الثانوية والمتوسطة في منطقة الدرعية. طبقت الدراسة منهج الملاحظة واستخدمت الاستبانة كأداة لجمع البيانات من العينة المكونة من (275) طالبة في مدارس المرحلة المتوسطة والثانوية في منطقة الدرعية، حيث تم جمع البيانات على مدار عام دراسي من عام 2016 إلى عام 2017 من الطالبات في المدارس. أظهرت نتائج الدراسة وجود علاقة قوية بين البدانة وكل من العمر وتاريخ العائلة والاحتفاظ بالأكل في غرفة النوم ونوعية الأكل التي تتناولها الطالبات في المدرسة، بالإضافة إلى تناول الخضروات والفواكه، كما وأشارت النتائج إلى وجود أثر لتناول المشروبات الغازية على وزن الجسم. وأوصت الدراسة بأهمية توعية الآباء لأبنائهم بضرورة تناول الخضروات والفواكه والابتعاد عن عادات الأكل الغير صحية مثل الأكل السريع والمشروبات ذات السكر العالي والتخفيف من مشاهدة التلفاز واللعب على ألعاب الحاسوب.

الكلمات المفتاحية: البدانة، الطالبات، المدرسة.