

## Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Saudi Arabia

Najd Fawaz Alnojaidi<sup>1\*</sup>  
Amani Abdulaziz Al-Rashed<sup>1</sup>  
Dhuha Muhammed Al-Ammar<sup>1</sup>  
Fatimah Saeed Al-Ghamdi<sup>1</sup>  
Hadeel Hussein Asiree<sup>1</sup>  
Hedayah Salman Al-Otabi<sup>1</sup>  
Hawra'a Abdulkareem Al-Dawood<sup>1</sup>  
Mariah Ali Al-Amri<sup>1</sup>  
Najd Ahmed Al-Driweesh<sup>1</sup>  
Rahaf Rajih Al-Harbi<sup>1</sup>  
Ohoud Khalid Al-Otaibi<sup>1</sup>

<sup>1</sup>Al-Maarefa Medical University, Riyadh Saudi Arabia

### Abstract

**Background:** Obesity is a complex multifactorial condition in which excess body fat may put a person at high health risks. Data indicate that the prevalence of obesity is increasing in children and adults.

**Objective:** To determine the prevalence and risk factors of obesity in elementary school girls.

**Methodology:** Observational descriptive cross-sectional school-based survey at Ibn Khaldoun private elementary school, Al-Nafil neighborhood, at the east side of Al-Riyadh, KSA Riyadh 2016. The data was collected from 137 of second and fifth grades elementary school girls students. Height, weight, and body mass index (BMI) were measured for all students, who were then classified as underweight/normal, overweight, or obese according to their BMI values.

**Result:** Of all students surveyed only 29% at grade 5, 71% at grade 5 are obese. About 40% of obese students are taking early breakfast, 54% are eating dinner. Also 88% are practice walking, 46% are practice cycling, 38% are practice rope workout.

**Conclusion:** This study shows clearly that students who are in grade 5 much more obese in grade 2. There was no relationship between the obesity and eating or obesity and physical activity.

**Keywords:** Obesity, Risk factor, Childhood obesity, High proportion of obesity.

### Introduction

#### Background

Obesity is defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health is impaired [1]. Childhood obesity had become familial among many societies, it depends on the geographical area and family economic statement, there are many families who have more than one child who is overweight, Obesity is a complex, multifactorial condition in which excess body fat may put a person at health risk. Data indicate that the prevalence of obesity in the United States is increasing in children and adults. Reversing these trends requires changes in individual behavior and the elimination of societal barriers to healthy lifestyle choices. Basic treatment of overweight and obese patients requires a comprehensive approach involving diet and

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\***Corresponding author:** Najd Fawaz Alnojaidi, Medical student, department of Medicine, Almaarefa University, Riyadh, Saudi Arabia. Tel: +00966539417443; Email: [nalnojaidi\(at\)hotmail.com](mailto:nalnojaidi(at)hotmail.com)

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nutrition, regular physical activity, and behavioral change, with an emphasis on long-term weight management rather than short-term extreme weight reduction [2].

### Problem statement

There is significant evidence for the existence of worldwide increase of obesity in children. The problem is not only confined to developed countries; as there has been significant increase in middle and low-income countries, and Saudi Arabia is not an exception. The problem of obesity in developing countries further impacts on the burden of disease in these countries. Childhood obesity is becoming an increasingly large problem in the Saudi Arabia. The epidemic of obesity and associated diseases a serious public health challenge worldwide [3] Overweight and obesity in childhood have significant effects on both physical and psychosocial health with both short and long term adverse effects. Obese children are more likely in the future to have cardiovascular disease, such as high cholesterol or high blood pressure. Children who are obese are at greater risk for bone and joint problems, sleep apnea, and social and psychological problems such as poor self-esteem.

### Hypothesis

It is expecting that there would be a high proportion of obesity and relationship between obesity and food habits and physical activity.

### General Objective

To determine the prevalence and risk factor of obesity in elementary school children.

### Specific objective

1. To determine the proportion of obesity.
2. To determine the relationship between obesity and physical activity.
3. To determine the relationship between the obesity and eating habits

### Literatures Review

A study was done by Gunter in 2015 in the United States for 1767 children aged from (5-12 years). To evaluate the relationship between physical activity (PA) at school and body mass index (BMI) among rural elementary-aged children. And the result was that Obesity levels were high, particularly among 5th and 6th graders and there was an inverse relationship between BMI and minutes of MVPA (Moderate to Vigorous Physical Activity) for both boys and girls. While there were numerous other factors that likely contribute to this relationship including PA outside of school and child eating behaviors. In conclusion, Children are not meeting minimum MVPA recommendations (60 min/d) during school hours [4]. The relationship between the source of protein intake and obesity risk in children by Stuhrman in USA, 2015. The aim of that study was to investigate the relationship between the source of protein intake (animal vs. plant) and body mass index (BMI) in children between the ages 6-14 years. The population used in the data analysis included 285 children/early adolescents (median

age  $9.8 \pm 2.1$  years; 53% boys; 40% Caucasian). Girls had a significantly higher BMI than boys. The majority (62%) of participants had a normal BMI while 20% of participants were overweight and 18% of participants were obese. No difference in the source of protein intake was observed by gender. However, median protein intake differed significantly by weight classification for total protein and for animal and plant protein ( $P < 0.05$ ). Reported total protein intake was adequate for all children. Total percent protein intake was significantly higher in children of normal weight [5].

A qualitative study done by Chamberlin in USA in 2002 to examined Women Infant and Child (WIC) health care professionals' perceptions about the challenges that exist in preventing and managing childhood obesity. 19 health care professionals participating. The result were twelve major themes clustered into 3 domains, the first domain in the study was centered on how WIC health care professionals perceived the life experiences, attitudes, and behaviors of the mothers they counselled. They perceived that mothers were focused on many issues as, difficulty setting limits with their children around food, lack of knowledge about normal child development and eating behavior also they did not believe their overweight children were overweight. The most important conclusion was to become more responsive to the problem of childhood obesity and its factors in early life [6]. Prospective cohort study done by Reilly in the United Kingdom in 2005 to identify risk factors in early life (up to 3 years of age) for obesity in children. 8234 children in cohort aged 7 years and a subsample of 909 children (children in focus) with data on additional early growth-related risk factors for obesity. Results of this study stated that risk factors were associated with a risk of obesity in the final models are parental obesity (both parents), more than eight hours spent watching television per week at age 3 years, weight gain in first year per 100 g increase and short sleep duration ( $< 10.5$  hours) at age 3 years. The study reported there were eight factors in early life are associated with an increased risk of obesity in childhood [7]. A study was conducted by Lazzeri in 2010, among 77,113 students aged 11-15 year. The aim of that paper is to examine overweight (including obesity) prevalence and its association with geographic area of residence, parental education and daily breakfast consumption. Boys were more likely to be overweight or obese than girls. Overweight and obesity rates increased from the North of Italy to the South in both boys and girls and in all age groups [8].

A study in 2015, done by GyuYoung. Design to assess the factors affecting obesity among elementary school children in South Korea, the Study participants included 4,895 children attending 59 elementary schools across Korea. The study results indicate that demographic characteristics (age and gender), health and disease status (atopic dermatitis and subjective health), diet and exercise (unbalanced diet, diet experience, frequency of fast food consumption, reasons for fast food consumption, favorite snack types, and school environmental characteristics (school location) were associated with overweight/obesity among elementary school children. conclusion was, the demographic

characteristics, health and disease status, diet and exercise, and school environmental characteristics were associated with overweight/obesity among elementary school children. They showed the children who are overweight more likely to be younger and boys, less likely to have good subjective health [9]. Another study in Feb 2010 done in Iran. The aim of that study was to investigate the risk factors of obesity in children between 6-11 years in elementary school the sample size was 6635 students the girls obesity was higher than boys while the prevalence of obesity in children of educated mothers more than children of less educated mothers.

Beside the education the obesity in children with both obese parents was more common. Eating behavior like skipping breakfast is related to increase the prevalence of obesity in children [10]. Prevalence of obesity, overweight and underweight in elementary schoolchildren in Kerman, Iran, this study was done in 2009 aimed measure to obesity in Kerman/Iran elementary school children. It was performed on 1566 elementary school children aged 7-11 years. Obesity, overweight and underweight based on Body Mass Index (BMI) were determined for age and sex and in comparison, to standard percentiles of World Health Organization (WHO). Results the prevalence of obesity, overweight and underweight was 9.7, 4.4 and 0.57% respectively. There was no significant relationship between BMI and gender. There was an increasing rate of obesity and overweight risk in children of parents with higher educational levels and the prevalence of underweight was higher in the students of public schools. No significant relationship was found between BMI and family size. Although obesity was still relatively uncommon in 7-11 year old urban students, the more important problem was the increasing rate of obesity and overweight prevalence [11].

A cross-sectional survey was conducted in 2014-2015 among 521 children, aged 2-12 years old, in Jeddah, Saudi Arabia by Al-Agha. The aim of that study was to evaluate the effect of socioeconomic status, parent educational level and number of family members on body mass index, the rate of severely obese children was between 154 and 162. Children were more likely to be obese if they had families with low income (P-value=0.015), compared to families with high income. Obesity rates decrease when the family consists of four or less members and increases when the family members are more than that (P-value=0.0001). Also, they found that BMI increases with low parents educational level (P-value=0.0001 for father's educational level) (p-value=0.002 for mothers educational level). Overweight and obesity among children living in Jeddah, Saudi Arabia was associated with low family income, low educational levels of both parents and increases the number of family members [12]. This study about obesity and associated factor was done by Memish in 2013. It was aimed to determine the prevalence and associated factor in KSA. The sample was 10,735 Saudis age 15 years and older, 28,7% were obese. Prevalence of obesity higher among women than men. In the men obesity associated with marital status, diet, physical activity, diabetes and hypertension. In women associated with marital status, education, history of chronic condition

and hypertension. The obesity remains strongly associated with diabetes and hypertension in KSA, although the epidemic's characteristics differ between men and women [13,14].

## Methodology

### Study design

Observational descriptive cross-sectional school-based survey.

### Study population and area

The study done at Ibn Khaldoun private elementary school, Al-Nafil neighborhood, at the east side of Al-Riyadh, KSA. The study population was 137 female students.

### Sample size and technique

The study covered a sample of 137 female elementary school students, from 2<sup>nd</sup> and 5<sup>th</sup> grade who were being chosen randomly, the visitors and absentees on that day were excluded from the study.

### Data need

A questionnaire was constructed to contain personal information, eating habits and physical activity sections. The questionnaire was being tested among children in school. Weight and height scale were used for anthropometric measurements. The validity and reliability were checked before doing the study (index I).

### Data analysis

After collecting data, the questionnaire was cleared the data in order to be analyzed by SPSS. The suitable statistic test was done, then the result was presented in tables as frequencies and proportion.

### Ethical issue

School permission was obtained, verbal permission was taken from each participating student. Confidentiality was promised. The data were only used for the research purposes.

## Results

Table 1 shows the percentage of girls who were underweight at 2<sup>nd</sup> grade is 70%, 30% for 5<sup>th</sup> grade. For those who had normal weight at 2<sup>nd</sup> grade is 51%, 49% for 5<sup>th</sup> grade. 18% is the percentage of girls who were overweight at 2<sup>nd</sup> grade compared to 82% for 5<sup>th</sup> grade. 29% is the percentage of obese girls at 2<sup>nd</sup> grade while 71% at 5<sup>th</sup> grade. This variation in this proportion of those who had different body weight category was statically significant (p=0.0008).

**Table 1:** The Class of BMI in student among Ibn khaldoun elementary schools, Al Nafil (Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Al Maarefa Colleges for Science and Technology, 2017).

Category	Grade2	Grade 5	Total
Under weight	14 (24%)	6 (8%)	20 (15%)
Normal	33 (56%)	32 (41%)	65 (47%)
Over weight	5 (8%)	23 (29%)	28 (20%)
Obese	7 (12%)	17 (22%)	24 (18%)
Total	59 (43%)	78 (57%)	137

Table 2 shows that the practice of walking was 75% among those who were underweight, 89% for normal body category, 86% for overweight, 88% for those who were obese. The practice of cycling was 70% among those who were underweight and 60% for normal body category, 46% Among those who were overweight and obese. The practice of rope workout was 35% among those who were underweight, 45% for normal body category, 55% for overweight, 38% for obese. This variation in this proportion of practice physical activity (walking, cycling, rope workout) was statistically non-significant.

Table 3 shows that practicing sports less than three times per week was 50% and three to five times per week was 20% while six to seven times per week was 30% among those who were underweight. practicing sports less than three times per week was 35.4% and three to five times per week was 26.42% and six to seven times per week was 38.5% among those who had normal body category. On the other hand, those who were overweight practicing sports less than three times per week was 21.42% and three to five times per week was 46.42% and six to seven times per week was 32.14%. practicing sports less than three times per week was 33.33% while three to five times per week was 16.66% and 50% for practicing sports six to seven times per week among those who were obese. This variation in this proportion of those who had physical exercise per week was statically non-significant.

Table 4 shows the practice of regular on exercise was 60% among those who were underweight, 60% for normal, 57% for overweight, 71% for obese. Those who were irregular on exercise was 40% among those who were underweight, 40% for normal, 43% for overweight, 29% for obese exercise. This variation in this proportion of those who regular on exercise was statically non-significant.

Table 5 shows that the practice of taking early morning breakfast was 80% among those who were under weight and 74% among those who had normal body category. Among those who were obese and overweight the proportion was 46%. This variation in the proportion of those who taking early morning breakfast was statically significant (p=0.0068). Those who had eating dinner was 70% among those who were underweight and 74% among those who had normal body category. 54% for those who were obese and overweight This variation in this proportion of those who eating dinner was statically non-significant.

Table 6 shows that eating fresh vegetables/fruit was 74% among those who were normal body weight and 62% among those who were obese. Among those who were underweight 65% and who were overweight 57. Those who eating yogurt 40% among who were underweight and 42% among those who were overweight. Among those who were normal and obese the proposition was 37%. Those who had watching TV while eating was 21% among those who were normal and 28% among those who were overweight. Among those who were under weight and obese the proposition was 20%. Those who eating fast food was 5% among those who were under weight and 14% among those who were overweight. 9% Among those who were normal and 16% among those

**Table 2:** Those who answer YES to Physical activity in different class among Ibn khaldoun elementary schools, Al Nafil (Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Al Maarefa Colleges for Science and Technology, 2017).

Physical activity	Body weight category				Total	p. value
	Under weight (20)	Normal (65)	Over weight (28)	Obese (24)		
Walking	15 (75%)	58 (89%)	24 (86%)	21 (88%)	118 (86%)	0.589
Cycling	14 (70%)	39 (60%)	13 (46%)	11 (45%)	77 (56%)	0.593
Rope workout	7 (35%)	29 (45%)	15 (54%)	9 (38%)	60 (44%)	0.19

**Table 3:** Students who answered about their physical exercise class per week among Ibn khaldoun elementary schools, Al Nafil (Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Al Maarefa Colleges for Science and Technology, 2017).

class / week	Body weight category				Total	p. value
	Under weight	Normal	Over weight	Obese		
< 3	10 (50%)	23 (35%)	6 (21%)	8 (33%)	47(34%)	0.594
3-5	4 (20%)	17 (26%)	13 (46%)	4 (16%)	38 (28%)	
6-7	6 (30%)	25 (38%)	9 (32%)	12 (50%)	52 (38%)	
Total	20	65	28	24	137	

**Table 4:** Those who are regular on exercise among Ibn khaldoun elementary schools, AlNafil (Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Al Maarefa Colleges for Science and Technology, 2017).

Regular	Body weight category				Total	p. value
	Under weight	Normal	Over weight	Obese		
Yes	12 (60%)	39 (60%)	16 (57%)	17 (71%)	84(61%)	0.895
No	8 (40%)	26 (40%)	12 (43%)	7 (29%)	53(39%)	
Total	20	65	28	24	137	

**Table 5:** Those who answer (always and usually) to eating breakfast and dinner in differences class of BMI among Ibn khaldoun elementary schools, Al Nafil (Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Al Maarefa Colleges for Science and Technology, 2017).

Meals	Body weight category				Total	p. value
	Under weight (20)	Normal (65)	Over weight (28)	Obese (24)		
Breakfast	16 (80%)	48 (74%)	13 (46%)	11 (46%)	88 (64%)	0.0068
Dinner	14 (70%)	48 (74%)	15 (54%)	13(54%)	90 (66%)	0.194

**Table 6:** Those who answer YES to eating habits among differences class of BMI among Ibn khaldoun elementary schools, Al Nafil (Proportion and Risk Factor of Obesity in Elementary Girls in Riyadh, Al Maarefa Colleges for Science and Technology, 2017).

Eating habits	Body weight category				Total	p. value
	Under weight (20)	Normal (65)	Over weight (28)	Obese (24)		
Fresh veg/fruit	13 (65%)	48 (74%)	16 (57%)	15 (62%)	56(41%)	0.452
yogurt	8 (40%)	22 (33%)	12 (42%)	9 (37%)	51(37%)	0.677
While watching TV	4 (20%)	14 (21%)	8 (28%)	5 (20%)	31(23%)	0.103
Fast food	1(5%)	6 (9%)	4 (14%)	4 (16%)	15(11%)	0.315
Potato chips	1 (5%)	18 (27%)	8 (28%)	3 (12%)	30(22%)	0.299
Fresh juice	6 (30%)	36 (55%)	14 (50%)	8 (33%)	64(47%)	0.15
Ready-made juice	8 (40%)	32 (49%)	12 (42%)	11 (45%)	63(46%)	0.651
Milk	18 (90%)	47 (72%)	21 (75%)	15 (62%)	101(74%)	0.377
Water	19 (95%)	63 (96%)	27 (96%)	23 (95%)	132(96%)	0.172
Laban	10 (50%)	33 (50%)	13 (46%)	7 (29%)	63(46%)	0.347

who were obese. Those who eat potato chips 5% among those who were underweight and 12% among those who were obese. 27% Among those who were normal and 28% among those who were overweight. Those who drink fresh juice was 30% among those who were underweight and 33% among those who were obese. 55% Among those who were normal and 50% among those who were overweight.

Those who drink readymade juice was 40% among those who were under weight and 42% among those who were overweight. 49% Among those who were normal and 45% among those who were obese. Those who drink milk was 72% among those who were normal and 62% among those who were obese. 90% among those who were under weight and 75% among those who were overweight. Those who drink water was 95% among those who were under weight and obese. 96% among those who were normal and overweight. Those who drink Laban was 50% among those who were underweight and normal, 46% among those who were overweight and 29% among those who were obese. This variation in the proposition of those who eating habits includes (fresh vegetables/fruit, yogurt, while watching TV, fast food and potato chips), Drink habits include (fresh juice, readymade juice, milk, water and laban) was statically non-significant.

## Discussion

The finding that that there was a statistically significant association between 2<sup>nd</sup> and 5<sup>th</sup> grade in the BMI was expected. It has been reported in literature that there is association between age and ideal body weight category. It seems that age is a value that has to be taken by people who aim for ideal body weight. The finding that that was statistically insignificant association between body weight category and practice physical activity was expected. It has been reported in literature that there is an inverse relationship between BMI and physical activity. It seems that the practice physical activity is not a value that has to be taken by people who aim for ideal body weight. The findings that that there was statistically insignificant association between body mass category and sport times was expected. It has been reported in literature that there is association between sport times and body weight category. It seems that is not a value has to be taken by people who aim to have an ideal body weight. The finding that that there was statistically insignificant association between body weight category and regular exercise was expected. It has been reported in literature that there is association between regular exercise and body weight category. It seems that practice regular exercise is not a value that has to be taken by people who aim for ideal body weight.

The finding that that there was statically significant association between body weight category and early morning breakfast was expected. It has been reported in literature that there is association between morning breakfast and ideal body weight. It seems that early morning breakfast is a value that has to be taken by people who aim for ideal body weight. There was statically insignificant association between body weight category and eating dinner was not expected. it seems that eating dinner is not a value that

has to be taken by people who aim for ideal body weight. The finding that that there was statically insignificant association between body weight category and eating habits include (fresh vegetables/fruit, yogurt, while watching TV, fast food and potato chips) also drink habits include (fresh juice, readymade juice, milk, water and laban). Fast food and while watching TV were expected. It has been reported in literature that there is association between and fast food and body weight category, also between while watching TV and body weight category. It seems that fast food and while watching TV is not a value that has to be taken by people who aim for ideal body weight.

## Conclusion

The percentage of overweight and obesity was higher at 5<sup>th</sup> grade compared to 2<sup>nd</sup> grade and so underweight girls were higher at 2<sup>nd</sup> grade compared to 5<sup>th</sup> grade. There was no relationship between obesity and eating habits and between obesity and physical activity. Further studies are recommended to correlate family history with over/under weight for elementary girls students.

## Recommendation

1. Families should take much care about their children at age 10 of getting overweight they should be sure that they are not underweight mentally and physically.
2. Try to serve a balanced breakfast that includes some carbohydrates, protein, and fiber.

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## Questioner

We are medical students in Almaarefa colleges; we would like to make a research about proportion and risk factor of obesity in elementary girls in Riyadh. We appreciate your participation in our research. we want to confirm to you that all the information obtained is will only be used for purpose of this research.

1. Age:   years.
2. Level: 1-  2<sup>nd</sup>. 2 -  5<sup>th</sup>.
3. Weight:    kg.
4. Height:    cm
5. BMI: \_\_\_\_\_

Obese	Overweight	Normal	Underweight
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. What type of physical activity that you do mostly?

- |                 |                              |                             |
|-----------------|------------------------------|-----------------------------|
| 1. Walking      | yes <input type="checkbox"/> | no <input type="checkbox"/> |
| 2. Cycling      | yes <input type="checkbox"/> | no <input type="checkbox"/> |
| 3. Rope workout | yes <input type="checkbox"/> | no <input type="checkbox"/> |

7. How many times do you have physical exercise class per week?

Times.

8. Each time for how long?

Minutes.

9. Have you been regular over the time on exercise?

1- Yes  2- no

10. How frequently do you eat?

	Always	Often	Sometimes	Never
1. Breakfast at home.				
2. Dinner with family.				
3. Fresh vegetables/fruits.				
4. Yogurt.				
5. While watching TV.				
6. Fast Food.				
7. Potato chips				

11. How frequently do you drink?

	Always	Often	Sometimes	Never
1. Freshly juice (home prepared).				
2. Ready-made juice.				
3. Milk.				
4. Water.				
5. Laban.				

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