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Risk Factors for Overweight and Obesity among Girl's High School Students in Abha City, Kingdom Saudi Arabia. School Based Case-Control Study, 2019

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ABSTRACT

Obesity represents a major health challenge and it substantially increases the risk of many diseases and contributes to decline both quality of life and life expectancy.

Objective: The study aimed to investigate risk factors of overweight and obesity among high school students in Abha city, 2019.

Methods: Case-control study of 301 participants with the cases being overweight and obese (100) and with control being normal (201) among high school students.

Weight, height were measured and BMI was calculated to classified case and control. Information about risk factors obtained by using a questionnaire girls' High school were selected using simple random sampling technique and data were analyzed by using SPSS version 22.

Results: The results found childhood obesity and parents obesity were significant risk factors for overweight and obesity (OR=1.922 (1.1783.135), OR=3.879 (2.067-7.279), respectively. Other risk factors were not found significant for overweight and obesity.

Conclusion and recommendation: Childhood obesity and parent's obesity were identified as risk factors for obesity and overweight. Therefore these risk factors should be target for preventive program and polices in order to prevent obesity in the future.

Keywords: Obesity, Overweight, Risk factors, BMI

INTRODUCTION

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. Overweight and obesity are linked to more deaths worldwide than underweight. Globally there are more people who are obese than underweight. The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended [1]. Obesity is a major risk factor for illness and death. It is associated with diabetes, hypertension, hyperlipidemia, obstructive sleep apnea, osteoarthritis and causing more years of disability [2].

Obesity is a chronic and multifactorial disease, genetic and environmental factors must also be considered, which are reflected in specific populations with high or low rates, as well as in some ethnic groups that denote more or fewer risks [3]. Obese parents have a higher risk of having obese children as they provide both genetic and eating environment [4]. 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. The transition in nutrition and lifestyle by the popularity of fast foods, soft drinks, sedentary life style, and lack of physical exercise, increased television watching and mobile phone usage are the common trends adopted by children today. These may be the causes of overweight and obesity seen in children of both rural and urban areas [5].

Worldwide, at least 2.8 million people die each year as a result of being overweight or obese and an estimated 35.8 million (2.3%) of global DALYs are caused by overweight or obesity. Overweight and obesity lead to adverse metabolic effects on blood pressure, cholesterol, triglycerides and insulin resistance. Risks of coronary heart disease, ischemic stroke and type 2 diabetes mellitus increase steadily with

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increasing body mass index (BMI), Raised body mass index also increases the risk of cancer of the breast, colon, prostate, endometrium, kidney and gall bladder. Mortality rates increase with increasing degrees of overweight, as measured by body mass index [6]. The metabolic disorders are dramatically increasing among adults in the Eastern Mediterranean Region. Data for adults aged 15 years and older from 16 countries in the Region show the highest levels of overweight and obesity in Egypt, Bahrain, Jordan, Kuwait, Saudi Arabia and United Arab Emirates. In most of the countries, the high total obesity and overweight cost represents a relative economic burden on the GDP. Over the last decade, the prevalence of obesity has increased significantly in several developed and developing countries. Saudi Arabia, which is considered to have the highest obesity and overweight prevalence rates [7]. Therefore Identifying the risk factors associated with overweight and obesity is considered the first step in prevention and management of overweight and obesity.

METHODS

Study design

Case-control study with the cases being overweight and obese and with control being normal among high schools students in Abha City.

Study setting

High school girls located in Abha city.

Study population

The population for this study was girl students from high schools in Abha City

Sampling

Sample size: Sample size of 301 with the cases being overweight and obese (100) and with control being normal (201) was calculated by using online EPI Info version 7.0 with assumptions of 80% power, 95% confidence level and controls to cases ratio of 2:1, to detect at least 2 odds ratio differences between the cases and controls [8].

Sample methods: Two girl schools was randomly selected by using simple random in Abha city, the age range of 16-18 years who satisfy the definition of case and control

Methods of data collection

Risk factors was assessed by using questionnaire structure close question through interview with students to obtain information about socio-demographic characteristic, physical activity, dietary habits, lifestyle and family history.

Anthropometric measurements, height and weight of students were taken in the classroom according to the standard procedures by using standard equipment, BMI is calculated according to the formula (Weight (kg)/height (m^2) then categorized into to:

- Normal (BMI 18.5-<24.9),
- Overweight (BMI 25-<30),
- Obese (BMI>30)
- Underweight (BMI<18.5)

Inclusion criteria

Students who accept to be involved in the study and classified as overweight or obesity (cases) and normal (control).

Exclusion criteria

- Students who reject getting involved in the study
- Underweight students were excluded from this study

Study variables

Height, weight, educational level, dietary habits parents obesity, exercise, sleep, childhood obesity.

DATA ANALYSIS

The data coded, checked and cleaned before entering and analyze by using the statistical package for social science programmer (SPSS version22). Tables used to present the results. Association of variables with obesity was assessed by comparing the Obese (case) group against the Normal (control) group. The odds ratio (OR) and its 95% confidence interval (CI) are computed for each factor, All p values are based on two-tailed tests and compared to a significance level of 0.05. A risk factors with an OR significantly ($p<0.05$) higher than 1.00 was taken as a possible risk factor for obesity while OR significantly ($p<0.05$) less than 1.00 was considered as a protective factor.

ETHICAL CONSIDERATIONS

- The research proposal was approved by ethics committee of public health department at King Khalid University.
- Consents were taken from school administration and from students after explaining the purposes and nature of research.

RESULTS

A total of 301 students (100 cases and 201 controls) were participated in this study. Majority of cases (94%) and control (92.5%) resided in urban area, regarding family size 2-5 siblings more in cases, (27%) than control (18.9%) and family size >6 siblings in control (81.1%) more than cases (73%). Regarding order of family majority of cases are first orders (28%) and in control the middle-la of 1st order is more (76.1%). According to education of father most of cases are no educated (29%), while educated more in control (76.6%) **(Table 1)**.

Table 1. Frequencies and odds ratio (OR) for socio-demographic factors in girls from high school in Abha city (N=301), 2019.

Characteristics	Case N=100	Control N=201	OR (95%CI)	p-value
Birth Place				
Urban	94 (94.0%)	186 (92.5%)	1.263 (0.475-3.362)	0.639
Rural	6 (6.0%)	15 (7.5%)		
Family Size				
2-5	27 (27.0%)	38 (18.9%)	1.587 (0.901-2.792)	0.108
>6	73 (73.0%)	163 (81.1%)		
Order in Family				
First	28 (28.0%)	48 (23.9%)	1.240 (0.720-2.135)	0.438
Middle-last	72 (72.0%)	153 (76.1%)		
Education of Father				
No educated	29 (29.0%)	47 (23.4%)	1.338 (0.779-2.300	0.291
Educated	71 (71.0%)	154 (76.6%)		
Education of Mother				
No educated	46 (46.0%)	83 (41.3%)	1.211 (0.747-1.963)	0.437
Educated	54 (54.0%)	118 (58.7%)		
Occupation of Father				
Employee	55 (55.0%)	112 (55.7%)	0.971 (0.600-1.573)	0.906
Un employee	45 (45.0%)	89 (44.3%)		
Living Situation				
With both parents	94 (94.0%)	188 (93.5%)	1.083 (0.399-2.940)	0.875
Not with parents	6 (6.0%)	13 (6.5%)		

Regarding education most of mothers of cases were not educated (46%) while were educated more in control (58.7%). Regarding occupation of father more than half of cases and controls were employees. In the living situation most of cases (94%) and control (93.5%) live with both parents (94%) and few of cases and controls did not live with both parents (6%, 6.5%, respectively).

The **Table 2** show socio-demographic factors are not significant risk factors for overweight and obesity in adolescents participated in the study.

Table 2. Frequencies and odds ratio (OR) for lifestyle, family history and dietary habits in girls high school in Abha city (N=301), 2019.

Characteristics	Case n=100	Control n=201	AOR (95% CI)	p-value
Hours of sleep				
Less than 6 h	26 (26%)	60 (30%)	0.826 (0.481-1.416)	0.486
6-10 h	74 (74%)	141 (70%)		
Free time exercise per day				
Always-sometimes	75 (75%)	155 (77%)	0.890 (0.509-1.558)	0.684
Never	25 (25%)	46 (23%)		
Parents obesity				
Yes	49 (49%)	67 (33%)	1.922 (1.178-3.135)	0.009
No	51 (51%)	134 (66.6%)		
Practice walking per day				
Walk	76 (76%)	157 (78%)	0.887 (0.503-1.566)	0.680
No walk	24 (24%)	44 (21.8%)		
Childhood Obesity				
Yes	30 (30%)	20 (9.95%)	3.879 (2.067-7.279)	0.000
No	70 (70%)	181 (90%)		
Transport Type				
By car	98 (98%)	192 (95%)	2.297 (0.487-10.837)	0.281
By Foot	2 (2%)	9 (4.47%)		
Do you use social media sites?				
Always-sometimes	98 (98%)	198 (98.5%)	0.742 (0.122-4.516)	0.746
Never	2 (2%)	3 (1.49%)		
Watching TV				
Always-sometimes	53 (53%)	113 (56%)	0.878 (0.543-1.421)	0.597
Never	47 (47%)	88 (43.7%)		
Do you use video games?				
Yes	60 (60%)	123 (61.19%)	0.951 (0.582-1.553)	0.842
No	40 (40%)	78 (38.80%)		
Skipping breakfast				
Always-sometimes	64 (64%)	110 (54.7%)	1.471 (0.898-2.410)	0.125
Never	36 (36%)	91 (45.2%)		
Do you take 3 meals regularly?				
Yes	34 (34%)	77 (38.3%)	0.830 (0.502-1.371)	0.466

No	66 (66%)	124 (61.6%)		
Eating Out				
Always-sometimes	96 (96%)	197 (98%)	0.487 (0.119-1.990)	0.307
Never	4 (4%)	4 (2%)		
Eating Fast Food				
Always-sometimes	91 (91%)	190 (94.5%)	0.585 (0.234-1.463)	0.247
Never	9 (9%)	11 (5.4%)		
Fruit Consumption				
Always-sometimes	91 (91%)	181 (90%)	1.117 (0.489-2.552)	0.792
Never	9 (9%)	20 (9.95%)		
Vegetables Consumption				
Always-sometimes	95 (95%)	179 (89%)	2.335 (0.856-6.363)	0.089
Never	5 (5%)	22 (10.94%)		

The table show childhood obesity (p-value=0.000) and parents obesity (p-value=0.009) are significant risk factors for overweight and obesity.

The childhood obesity odds in cases was 3.879 times higher than odds childhood obesity in control (AOR=3.879; 95% CI; 2.067-7.279) and parents obesity odds in cases was 1.9 times higher than odds parents obesity in control (AOR=1.922; 95% CI; 1.178-3.135).

The result also show all other factors like lifestyle and dietary habit were not significant risk factors for overweight and obesity in students participated in the study.

DISCUSSION

This study found Place of birth and family size were not significant risk factors of overweight and obesity. The findings of case-control study conducted on Southern Ethiopia adolescents in 2017 by Bereket et al. support the current results [9].

Regarding the order of family, the first order child is more in cases, while middle-last order is more in controls and not risk factors for overweight and obesity. Study conducted in Kenya in 2013 reported effect of birth order, on overweight and obesity in adolescence [10], which was reverse of this study.

The present study found that father education and mother education were not risk factor for overweight and obesity in high school students. This finding is in line with study in Southern Ethiopia 2017 [9]. Other study in Morocco in 2018 found positive correlation between obesity and fathers or mothers having with higher education [11]. This is not in agreement with our study. Uneducated parents were more in cases while educated parents were more in controls that explained low educated mothers may not have enough information about healthy food.

The current study found the living situation is not significant risk factors for overweight and obesity; this may be due to some students avoided answering the question. They are ashamed and trying to hide it from their friends.

Our study found parents obesity is significant risk factors for obesity and overweight, odds of parent's obesity in cases were 3.8 times higher than odds of control not exposed to obesity in childhood. Case control study in Brazil 2006 found same results [12]. Study by van der Sande et al. showed a family history of hypertension, obesity, diabetes or stroke was a significant risk factor for obesity and hyperlipidemia [13].Other study by Corica et al. showed BMI was positively associated with family history for obesity [14]. These studies support our current result.

The current study found childhood obesity is significant risk factor for overweight and obesity; odds of childhood obesity in cases were 3.8 times higher than odds of control not exposed to obesity in childhood.

Study by Harrell et al. [15] showed obesity, or overweight, in childhood is a major risk factor for the metabolic syndrome in adolescence. According to WHO [16], 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. These support our current study.

Study about sleep duration and adolescent obesity found increasing sleep from 7.5 to 10.0 hours per day at age 18 predicted a reduction in the proportion of adolescents >25 kg/m^2 by 4%. Each additional hour of sleep was associated with decreases in BMI at the 10^{th} [17]. This does not support our study.

Free time exercise per day was not seen as a risk factor for overweight and obesity. This finding is not in line with the report from a cross sectional study conducted in KSA 2013 [2]. According to previous studies exercise reduces body weight and affects body fat distribution by promoting regional fat loss especially at the abdomen. [18].

This study found transport type to school not significant risk factors. Study in Morocco in 2018 reported the motorized transport to school was correlated with an increased risk for overweight and obesity [11]. This does not support our study.

This study found watching TV and video games are not risk factors. Barr-Anderson and colleagues found that adolescents, who watched television for more than 5 hours a day, ate fewer fruits and vegetables and consumed more sugar [19].

Study by Campbell in 2011 reported video games may not boost teenage obesity [20]. This finding is in line with current study.

This study did not find use of social media to be risk factors for obesity. The literature in this area is scarce. This is may be attributed to sitting for long periods on social media it can lead to bad lifestyle. Skipping breakfast wasn't found to be a risk factor for overweight and obesity This is not in agreement with the report from Brazil in 2009 [21]. According to previous studies skipping breakfast has been linked with obesity [22].

Regarding to previous studies there are facts about eating out and fast food is associated with higher body mass index, less successful weight-loss maintenance and weight gain [23]. This was not supported by our study.

LIMITATION OF STUDY

- This study was conducted in two Government Girls High Schools in Abha city.
- The study did not investigate all possible factors that may have effect on obesity.
- In this study, the information collected by the questionnaire was prone to recall bias and may have effect on our findings.

CONCLUSION AND RECOMMENDATION

The study concluded that childhood obesity and parent's obesity are significant risk factors for overweight and obesity. Other important risk factors like dietary habits, lifestyle and socio-demographic factors were not found to be significantly related to overweight and obesity in this study. The study recommended that it necessary to encourage healthy eating habits among all family members and screening obesity in childhood should be promoted in schools to identify and track children at risk of developing into overweight adults.

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