A survey on obesity and overweight among intermediate school Saudi male students at Albaha city

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ABSTRACT

Introduction: Childhood obesity is a major health problem associated with a widespread range of comorbidities and complications. As its prevalence is increasing, childhood obesity is emerging as a genuine public health problem among globally as well as in the Gulf countries including Saudi Arabia. *Methodology:* A cross-sectional prospective study targeting intermediate school Saudi male

students, who were classified according to their body mass index, then the prevalence of obesity/overweight was calculated, a questionnaire was used to assess them for possible risk factors and presence of complications. *Results:* The prevalence of overweight and obesity among Intermediate school Saudi male students at Albaha city is 17.3%, and 8.97% respectively. The most common risk factor of overweight and obesity encountered in the studied group is the sedentary life followed by poor dietary habits. *Conclusion:* The obtained prevalence of obesity is comparable to studies done at the national and international levels. All known complications of obesity have been reported to occur in the studied group except for stroke.

Keywords: Obesity, Overweight, BMI, Prevalence, Risk factors.

1. INTRODUCTION

Childhood obesity is emerging as a genuine public health problem, with its major worries being that it can proceed to adulthood obesity, in addition to predisposing to all known obesity-associated complications/comorbidities (Pietrobelli et al., 2008). In children, overweight is defined as body mass index (BMI) values ranging between the 85th and 95th percentiles and obesity as BMI values lying above the 95th percentile for age (Rolland-Cachera, 2011), while adults are regarded to be overweight if their BMI ranges from 25 to 29.9 kg/m^2 and obese if it is ≥30 kg/m^2 (Schienkiewitz et al., 2017). Internationally, the prevalence of childhood obesity has been rising in recent years. According to the International Association for the Study of Obesity (IASO) and International Obesity Task Force (IOTF), 200 million school children are suffering from either overweight or obesity. The last updated figures from the IOTF site revealed prevalence rates of overweight/obesity as 40 percent in both sexes in the United States (Ranjani et al., 2016). In the year 2016, over 340 million children aged 5–19 years were overweight or obese worldwide. The prevalence of obesity and overweight in children and adolescents between 5 - 19 years was only 4% in 1975, it raised to 18% in 2016. Based on gender, 18% of girls and 19% of boys were overweight (S D and AF O, 2019). These rising rates of obesity and overweight represent a considerable public health problem in both developing and developed countries (Albarrak et al., 2016; Duran Aguero and Haro Rivera, 2016).

In Saudi Arabia, the overall prevalence of overweight is 10.7% in boys and 12.7% in girls, while that of obesity is 6.0% and 6.74% in boys and girls respectively (El-Hazmi and Warsy, 2002). In another study, the overall prevalence of overweight, obesity, and severe obesity in all age groups was found to be 23.1%, 9.3%, and 2%, respectively (El Mouzan et al., 2010). A third study targeting male primary school students carried out in Al-Hassa in the Eastern Area of Saudi Arabia showed the prevalence of overweight and obesity among the male primary school students was 14.2% and 9.7% respectively (Amin et al., 2008). Obesity results from an imbalance between caloric intake and consumption. In most children, obesity is primary or resulting from caloric excess leading to fat deposition and hence weight gain. Recognized risk factors for simple obesity include High socio-economic classes, decreased physical activity, sedentary lifestyle including watching television for a long time (for >2 h/day), excessive use of smart phones or other devices for playing video-games, which have become widely spread recently, occupying most of the leisure time of children so it can lead to a considerable reduction of outdoor physical activities of children. Fast-food consumption has increased dramatically nowadays because of its availability, deliciousness, its widespread advertisement, and lack of knowledge about its adverse dietary effects. Sometimes the child may have a pathological cause of obesity this may be a genetic cause such as Bardet Biedl, Prader Willi syndrome, and Carpenter syndrome or endocrine disorders such as hypothyroidism, growth hormone (GH) deficiency, and Cushing syndrome (Seth and Sharma, 2013; Xiaoqing Yi et al., 2012) also, the prevalence of overweight and obesity was found to be high among individuals with Down syndrome in comparison to the general population (Muireann et al., 2018). Childhood obesity is a sensitive predictor for obesity later on during adolescence and adulthood (Elske De Jong et al., 2011). Obesity also runs in family and the offspring of obese parents have a high risk of obesity during childhood and early adulthood, especially if the two parents are obese (Lake et al., 1997). Childhood obesity has alot of serious sequelae that include hypertension, and hyperlipidemia, (Which predisposes to cardiovascular complications), type-2 diabetes, respiratory complications as asthma, obstructive sleep apnea, and obesity-related hypoventilation syndrome (Pickwickian syndrome), musculoskeletal problems as osteoarthritis, Blount's disease (tibia vera) in which there is bowing of the legs and tibial torsion due to early excess weight bearing, gastrointestinal complications as fatty liver which can be complicated with steatohepatitis, gastro-esophageal reflux disease, and gallstones which may lead to cholecystitis. In addition to the related psychological problems as anxiety, depression, and social stigmatization of obesity (Alsultany et al., 2019; Must and Strauss, 1999).

2. MATERIALS AND METHODS

This prospective cross-sectional, community-based study was carried out during the academic year 2018-2019 from September 2018 to April 2019. The study aimed to estimate the prevalence, risk factors, and complications of overweight and obesity among

intermediate school Saudi male students at Albaha city the capital of Albaha region, which is located in the southwest of Saudi Arabia. Nine intermediate male schools in Albaha city were chosen using a random sampling technique. The study sample was 301 intermediate school students. The data were collected using a pre-structured, self-introduced questionnaire covering the following points:

Demographic data of the student

Dietary habits (Consuming high CHO diet, soft drinks, fast foods)

Lifestyle:

Daily physical activity and its duration

Prolonged T.V. watching (> 2 hours /day)

Using computers & mobile phones

Family history of obesity

Any underlying disease (genetic, endocrine)

Use of long-term medications

Presence of any of the obesity-related complications

The questionnaires were given to the students and they were instructed to handle it to their parents at home to fill it and bring it back. This distributed questionnaire was in the Arabic language then it was retranslated back to the English language. After that, the weight and height of the participants were measured in the school by a trained team from six-year medical students. The weight was measured with the students wearing light clothes, barefoot using electronic scales which were calibrated and checked daily. The weight was taken to the nearest 100g then rounded to the nearest kilogram. Height was measured using a tape measure, while standing the student next to the wall, with barefoot, and his knees were fully extended, and his head was placed straight, and height was recorded to the nearest 0.1Cm then rounded to the nearest Cm. Then the weight/Age and height/age percentile were worked out, and the body mass index was calculated using the formula: $BMI = Weight (Kg)/Height (m)^2$

Then each student's BMI was plotted on the BMI percentile and categorized accordingly to underweight, normal, overweight, and obese. The Saudi growth charts (El Mouzan et al., 2005) were used to interpret BMI and weight percentiles (figure 1).

Analytical Methods

The data were analyzed with SPSS version 25, while proper statistical tests will be performed, data considered statistically significant when P-value ≤ 0.05.

Ethical considerations

Written consent was taken from regional education authority, the school managers, and verbally from the class supervisors, and students included in the study, ensuring that no student will lose any school period, and the data will be kept confidentially and used only for research purpose.
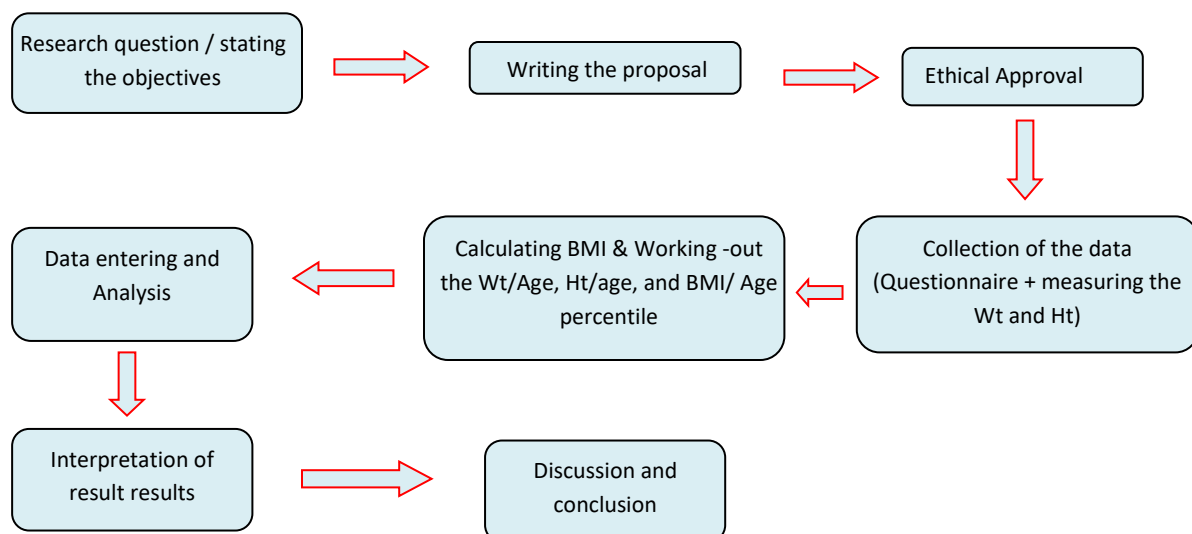
**Figure 1** Flow chat for methodology

3. RESULTS

301 intermediate school Saudi students participated in this study their ages range from 12-16. Their demographic data are shown in (Table 1).

Table 1 Demographic data, n= 301

Patterns	frequency/percentage
Age	(n/%)
12 years	5(1.7)
13 years	87(28.9)
14 years	95(31.6)
15 years	94(31.2)
16 years	20(6.6)
Educational level (Class):	
First class	87(28.9)
Second class	113(37.5)
Third class	101(33.6)

Our result showed that 27 students of the participant were obese with a prevalence rate of (8.97%), and 52 students were overweight with a prevalence rate of (17.3%). On plotting the participants' weight on the Wt/Age percentile only 0.3% were underweight and only 3.7% were overweight and the remaining 96% were normal (Figure 2).
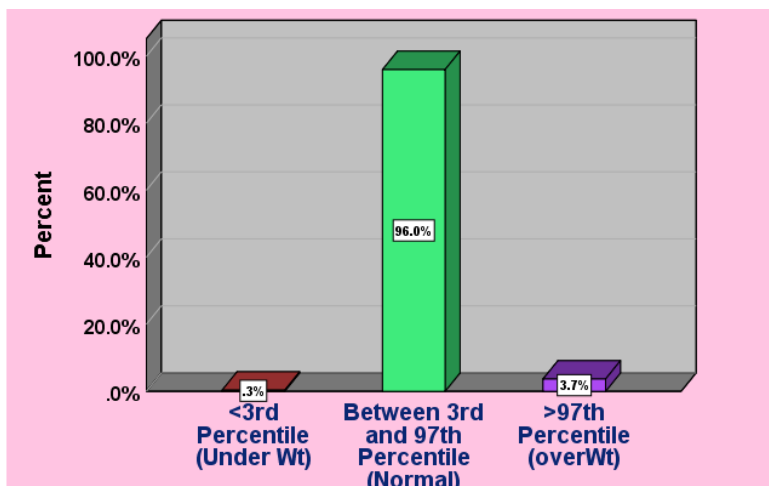

Figure 2: Weight/Age Percentilenote

Table 2 Risk Factors for overweight and obesity

No	Question	Response			
		Obese & overweight Students n = 79		All Participant n = 301	
		Yes (n/%)	No (n/%)	Yes (n/%)	No (n/%)
A. Dietary Habits					
1	Taking high carbohydrate & sugars?	49(62)	30 (38)	160(53.2)	141(46.8)
2	Consuming a lot of readymade fast food?	45(57)	34(43)	134(44.5)	167(55.5)
3	Drinking soft drinks?	46(58.2)	33(41.8)	143(47.5)	158(52.5)
B. Daily Activity & watching T.V:					
1	Regular Exercise and physical activity	35(44.3)	44(55.7)	173(57.5)	128(42.5)
2	Watching T.V for long times	48(60.8)	31(39.2)	163(54.2)	138(45.8)
3	Using mobile phone for long times	53(67.1)	26(32.9)	176(58.5)	125(41.5)
C. Diseases and drugs:					

| 1	Family history of obesity?	25(31.6)	54(68.4)	70(23.3)	231(76.7)
2	Suffering from genetic or disease?	0(0)	79(100)	1(0.3)	300(99.7)
3	Suffering from any endocrine disease	5(6.3)	74(93.7)	8(2.7)	293(97.3)
4	On any long-term medication?	6(7.6)	73(92.4)	11(3.7)	290(96.3)

While assessment of their body builds by BMI percentile showed almost about 9% were obese, 17.3% were overweight and 73.7% lie in the normal and underweight category (Figure 3).

Most of the obese and overweight students used to take high sugar (62%), consume readymade fast foods (57%), drinks soft drink frequently (58.2%). Also, they were found to have a sedentary lifestyle in form of low physical activity 55.7% (P. value 0.004), prolonged TV watching was found in 60.8% P. value = 0.026. (of these 50% stated that they watch TV for more than 4 hours/day and the remaining 50% for 1-4 hours), play videogames or use the Smartphone for a long time 67.1%, P-value = 0.05 (of these 64.2% stated that they play for more than 4 hours/day and 35.8% for 1-4 hours) as shown in (Table 2).
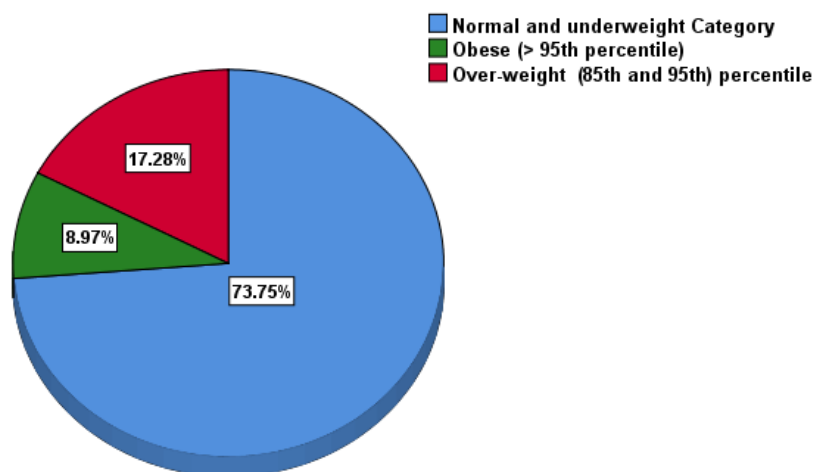
Figure 3: Prevalence of Over-weight, Obesity, underweight and normal category

68.4% of the obese and overweight students stated that they have no family history of obesity, and only 31.6% have a family member with obesity. 93.7% of the overweight and obese students have no associated endocrine disease while the remaining 6.3 % have associated endocrine disease Type-1 diabetes and hypothyroidism (figure 4).
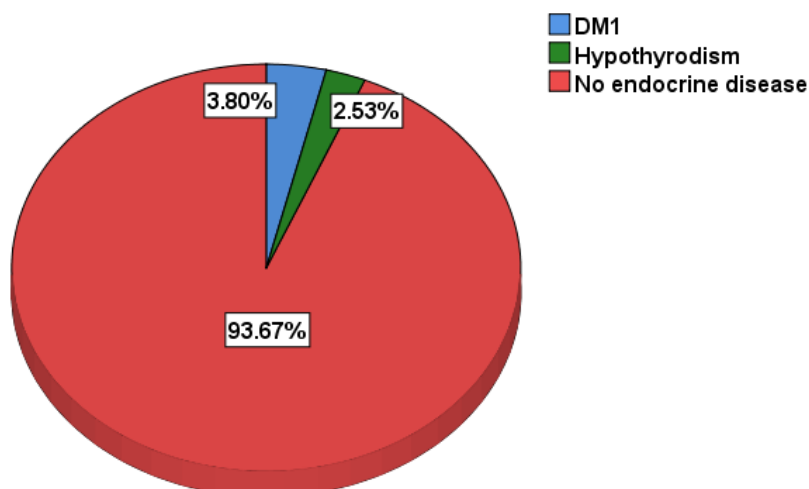
Figure 4: Associted endocine diseases in obese students

Assessment for the possible presence of complications of obesity among the participants revealed that all the known complications of obesity have been encountered in the obese or non-obese participants, in the latter group this may be a consequence of other diseases or illness (Table 3).

Table 3 Complications of overweight Obesity

Complication	Response			
	Obese & overweight Students n = 79		All Participant n = 301	
	Yes (n/%)	No (n/%)	Yes (n/%)	No (n/%)
Hypertension	4(5.1)	75(94.9)	12(4)	289(96)
Diabetes Mellitus	4(5.1)	75(94.9)	13(4.3)	288(95.7)
Hyperlipidemia	4(5.1)	75(94.9)	9(3)	292(97)
Cholecystitis	1(1.3)	78(98.7)	2(0.7)	299(99.3)
Stroke	0(0)	79(100)	1(0.3)	300(99.7)
Bowing of the legs	1(1.3)	78(98.7)	7(2.3)	294(97.7)
Arthritis	6(7.6)	73(92.4)	11(3.7)	290(96.3)
Mental disorder (Anxiety, depression, etc.)	8(10.1)	71(89.9)	18(6)	283(94)
Suffering social stigma of obesity	6(7.6)	73(92.4)	20(6.6)	281(93.4)
Sleep Apnea	11(13.9)	68(86.1)	30(10)	271(90)

4. DISCUSSION

The overall prevalence of obesity and overweight in our study is 8.97%, and 17.3% respectively these findings are more or less similar to that of a study conducted in Al-Hassa eastern area of Saudi Arabia which showed the prevalence of overweight and obesity among the male primary school students was 14.2% and 9.7% respectively (Amin et al., 2008), as well as to another study targeting public primary school children aged from 6-12 year in Baquba city in Iraq which showed the prevalence of obesity was 9.4% while the overweight was 14.3% (Kahtan et al., 2012).

There was a big difference between the percentage of overweight and obesity (together) estimated by the weight/Age percentile which was 3.7% and that estimated by BMI percentile which was 26%. This reflects the accuracy and sensitivity of BMI in picking up cases of overweight and obesity. Assessment of the participants for possible risk factors for obesity was performed using three parameters: dietary habits, daily activity, and sedentary life, and underlying disease or use of medications. The most common risk factor encountered to predispose to overweight/obesity in the studied group was the sedentary life followed by poor dietary habits, and the least common risk factor was the underlying disease or long-term use of medications.

Regarding the complications of obesity, all were reported in obese children but to a lesser extent. The most encountered complication was sleep apnea and the least common was bowing of the legs and cholecystitis while stroke was not encountered in the studied sample table 3.

5. CONCLUSION

The prevalence of overweight and obesity among Intermediate school Saudi male students at Albaha city is 17.3%, and 8.97% respectively. The most common risk factor of overweight and obesity encountered in the studied group was the sedentary life followed by poor dietary habits, and the least common risk factor was the presence of an underlying disease or long-term use of medications. All known complications of obesity have been reported to occur in the studied group except for stroke.

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