Childhood overweight and obesity in Qatar: A literature review

Josephine Mandeya, Suha Al-Oballi Kridli*

ABSTRACT

Childhood obesity and overweight have reached epidemic proportions in both developed as well as some developing countries including Qatar. This paper is a literature review of studies published in the last 10 years in the area of childhood overweight and obesity in the state of Qatar. A high gross domestic product in Qatar has led to a high socio economic status among the Qatari population and the adoption western lifestyles that promote childhood overweight and obesity. Risk factors for overweight and obesity include poor dietary habits, lack of physical activity, sedentary lifestyles and socio-cultural practices. The prevalence of childhood overweight and obesity in Qatar was found to be comparable to other GCC countries. The state of Qatar is called upon to prioritize this public health issue and implement interventions to combat the problem.

Keywords: childhood, obesity, overweight, Qatar
INTRODUCTION
Childhood overweight and obesity have become a worldwide problem that has serious medical implications for those affected and is also a major public health concern in most developed as well as developing countries. According to the World Health Organization (WHO), in 2011, over 40 million children below the age of 5 years were overweight. Additionally, over 30 million overweight children now live in developing countries and about 10 million in developed countries. Qatar is a prosperous oil producing country located in the Arabian Gulf region. It is a developing country with about 22 urban and semi urban districts and no rural population. In the past two to three decades, state of Qatar has gradually become plagued by childhood overweight and obesity. The 2006 Qatar World Health Survey (WHS) reported that 16% of Qatari children were too large for their age as measured by body mass index (BMI), per (WHO) guidelines. In addition, the 2006 Qatar WHS reported that about 28% of Qatari children below 5 years of age were found to be overweight.

The definition of overweight and obesity for children vary from those established for adults. Furthermore, currently there is disharmony in relation to how childhood overweight and obesity are defined. The references for measuring childhood overweight and obesity established by the Centers for Disease Control and Prevention (CDC), International Obesity Task Force (IOTF) and WHO are recommended for research use because they make study comparison more manageable. According to the CDC, childhood overweight and obesity are measured by BMI, which is calculated by dividing the child’s weight and height using the formula (weight in kg/square of height in meters). Age and gender specific percentiles for BMI are used for children due to the fact that the body make up of children changes with age and gender. Please refer to CDC growth charts. These growth charts can be used to determine BMI specific to age and sex for children aged 2 to 19 years old. A BMI at or higher than the 85th percentile but below the 95th percentile is considered overweight. On the other hand, a BMI at or over the 95th percentile is defined as obesity for children who are the same age and sex.

The IOTF child cut off tables which are used as guidelines for measuring BMI in all children aged 2 to 18 years are provided. The IOTF used the WHO adult obesity cut offs as a basis to establish their cut off tables for overweight and obesity in children and also based the cut off values on information collected from six representative countries. The WHO published the most recent recommendations for measuring childhood overweight and obesity in boys and girls aged 2 to 19.

The problem of childhood overweight and obesity currently being faced by several countries worldwide is a result of a myriad of factors. In Qatar, the rapid economic success of the state has led to the espousal of some unhealthy lifestyles. These include adoption of poor dietary habits that were more commonly associated with affluent people in Qatar. Both girls and boys enjoy high caloric diets that consist mainly of fast food which are heavily advertised on television, sugar snacks, soft drinks and sweet beverages because their parents can easily afford to pay for these foods. In one survey, two out of three children in Qatar reported eating fast food at least once or twice a week with about 90% of the children further consuming unhealthy snacks between meals. Sedentary lifestyles with little to no form of physical activity may be due to some cultural factors. Additionally, increased urbanization and technological advancement adds to the problem of overweight and obesity among the children. It is reported to be commonplace for countries in the GCC region to view being plump as aesthetically acceptable. Being heavy set is also seen as a sign of wealth, which may be one of the reasons why the prevalence of childhood overweight and obesity continues to rise.

With the continued rise in overweight and obesity prevalence in Qatar, there is increased concern for the overall health and quality of life. Overweight and obesity have reached proportions high enough to be a public health concern in Qatar. One of the major reasons why childhood obesity is a major health concern is that, if it is not addressed and corrected, it is likely to persist into adulthood, which is associated with high morbidity and mortality rates. Some of the undesirable health outcomes that can be found later in life include, cardiovascular disease, insulin resistance and type 2 diabetes mellitus (DM), hypertension, obstructive sleep apnea, non alcoholic steatohepatitis, some cancers such as colon, breast and endometrial cancer, as well as musculoskeletal disorders.

The purpose of this paper is to review current research on childhood overweight and obesity in Qatar.

METHOD
An extensive review of research studies published in English between 2003 and 2013 was conducted with the use of PubMed, Medline, Google Scholar, WHO infobase, Oxford Journals, the British Medical Journal, Wiley online library and Sage Journals. Manual cross references from retrieved articles were
also used to source for research studies. The keywords used in the search for literature included childhood, obesity, overweight, pediatric, adolescent, Qatar, Gulf. This search was limited only to studies on childhood overweight and obesity conducted in the state of Qatar for all children up to age 19 with a publishing date no later than 10 years prior to 2013. An extensive search of both electronic and print journals was conducted. There were limited studies available on the topic of childhood overweight and obesity in Qatar. Only a total of eight research studies were applicable to this literature review, with some studies focusing on the prevalence of overweight and obesity and others concentrating on the adverse health outcomes brought on by overweight and obesity in Qatari children. Most of the studies reviewed included both boys and girls enrolled in school up to age 19 and one study focused on adolescent girls and their struggle with dieting and obesity. Below is a detailed description of each of the studies that were found relevant to this literature review. Table 1 provides a summary of all reviewed studies.

**REVIEWED STUDIES**

Rizk and Yousef\(^{16}\) conducted a cross sectional study with the purpose of investigating how cardiovascular risk factors such as lipid profile and waist circumference are associated with being overweight and obese. A total sample of 315 Qatari school children aged 6 to 11 took part in the study, with 151 girls and 164 boys. The children were randomly selected from six local schools in Doha and the children were chosen from three geographic areas in order to include a diverse population, representative of various racial, ethnic and socioeconomic backgrounds. Inclusion criteria into the study were healthy status of all participants, meaning that the children had to be free of any illness or preexisting chronic condition.\(^{16}\) In addition, children were excluded if they smoked, had recent surgery or hospital admission.\(^{16}\) A self administered questionnaire was sent out to parents to collect the children's health history and sociodemographics.

Anthropometric measures for this study were carried out by trained nurses and a physician. Weight to the nearest 0.1 kg using a scale was measured. A stadiometer was used to measure height to the nearest 0.1 cm and while the students were still standing and lightly dressed, their waist circumference was measured. A flexible tape was used to measure the waist circumference and the results were rounded off to the nearest 0.5 cm. BMI was calculated after obtaining the weight and height.\(^{16}\)

Additionally, the children had to fast overnight and have a venous blood draw in the morning in order to measure fasting blood glucose, total cholesterol (TC), triglycerides (TG), low and high density lipoprotein, (LDL-C) and (HDL-C) respectively. Results from the blood draws were then used to calculate atherogenic index (AI) using the equation $AI = \frac{(TC-HDL-C)}{HDL-C}$.\(^{16}\)

Classification of children as overweight or obese was done with the utilization of IOTF reference values. The IOTF values were obtained by matching BMI percentiles to the IOTF values. According to the IOTF values, overweight is defined as BMI greater than 25 kg/m\(^2\) and obesity is considered BMI greater than 30 kg/m\(^2\) at the age of 18 years.\(^{16}\) Any waist circumference greater or equal to the 90\(^{th}\) percentile for both gender and age was classified as abdominal obesity. For lipid levels, any concentration at or above the 95\(^{th}\) percentile for TC, TG, LDL-C are deemed abnormal for gender and age. On the other hand HDL-C levels below the 5\(^{th}\) percentile for age and gender are considered as undesirable.\(^{16}\) Lastly the American Diabetes Association has cut off values for fasting blood glucose set at less or equal to 5.6 mM.\(^{16}\)

The results from this study showed that using IOTF reference values, the prevalence of obesity was 21.95% for boys and 16.56% for girls. In addition, the study found that 9.76% of boys and 17.22% of girls were overweight.\(^{16}\) The mean waist circumference and mean triglyceride levels were found to be significantly higher in overweight and obese children than in children who were neither obese nor overweight as determined by IOTF cut offs. HDL-C was found to be lower in overweight and obese children as opposed to those who were not obese or overweight.\(^{16}\) No significant difference was found in the levels of blood glucose, TC and LDL-C between obese and overweight children and those who were neither.\(^{16}\) Children who were found to be overweight and obese were also determined to be at high cardiovascular risk. High percentages of cardiovascular risk factors such as high cholesterol, increased TG, high AI and low HDL-C were found more commonly in children who were overweight and obese.\(^{16}\) However, no significant relationship was found between being overweight or obese and increased LDL-C, blood glucose.

Overall, the study results show that overweight and obese children were more predisposed to unfavorable cardiovascular risk factors, namely, increased waist circumference (WC), high cholesterol,
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<tr>
<td>Bener &amp; Kamal</td>
<td>Investigation of physical growth of Qatari children and Comparison of findings to the NCHS/CDC guidelines</td>
<td>n = 2,467 boys and girls, 6–18 years old. Multi-stage Stratified Random sampling</td>
<td>Cross-sectional</td>
<td>BMI measured using CDC reference and IOTF cut-offs</td>
<td>Prevalence of obesity and overweight was below CDC and IOTF rates, except for girls aged 6 to 9 years who were found to be obese. 4.7% males obese, 5.6% females were obese. Children at risk for obesity.</td>
<td>No limitations mentioned in study</td>
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<td>Bener</td>
<td>Estimation of underweight, overweight and obesity among Qatari Adolescents</td>
<td>n = 3,923, 1,968 boys and 1,955 girls aged 12 to 17 years old. Multi-stage Stratified Random sampling</td>
<td>Cross-sectional</td>
<td>BMI per IOTF cut-offs</td>
<td>Boys underweight, obesity and overweight rates were 8.6%, 28.6% and 7.9% respectively. Girls underweight, obesity and overweight rates were 5.8%, 18.9% and 4.7% respectively. Underweight most prevalent for boys at age 16 and for girls at age 17. Obesity prevalence highest at age 12 for boys and at age 13 for girls. Obesity rates higher in girls whose fathers were at least university graduates. Children whose mothers have at least secondary education more likely to be obese.</td>
<td>Quota sampling use which may not be representative of population. Anthropometric measures done once only, making it difficult to correct measurement errors.</td>
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<td>Bener &amp; Tewfik</td>
<td>Investigation of the result of dieting and its connection to being overweight and obese. Effect of dieting on body satisfaction and psychological health also investigated in Qatari adolescent females</td>
<td>n = 566 Qatari females, Ages 14 to 19 years in primary and secondary school. Multi-stage Stratified Random sampling</td>
<td>Cross-sectional</td>
<td>BMI Adolescent Dieting Scale, Self Reporting Questionnaire</td>
<td>Prevalence of overweight and obesity were 13.4% and 1.8%. Frequent dieting associated with overweight, body image dissatisfaction and psychological problems</td>
<td>No limitations mentioned in study</td>
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<td>Bener et al.⁹</td>
<td>Investigation of obesity and low vision in Qatari children as impacted by hours spent in front of the television or computer</td>
<td>n = 2467 school children ages 6 to 18 years old. Multi-stage stratified random sampling technique</td>
<td>Cross-sectional</td>
<td>BMI per Qatari growth pattern curves, Visual Acuity (measured by use of tumbling E letters at 20 feet distance), Eye exam (measured by Slit Lamp). ICD-10 used to determine visual impairment.</td>
<td>18.8% children were overweight and 5.1% children were obese. Increased prevalence of obesity among teenagers aged 15 to 18. Same age group reported spending 3 or more hours daily on the internet and had low vision. The same group reported sleeping only 5 to 7 hours at night. 15.6% of overweight and 7.6% of obese children ate fast food daily.</td>
<td>No limitations mentioned in study</td>
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<td>Kerkadi et al.⁸</td>
<td>To estimate prevalence of overweight and obesity risk among Qatari children. To compare overweight and obesity prevalence using IOTF CDC BMI Investigation of what makes up metabolic syndrome (MeS) and its prevalence among children in Qatar</td>
<td>n = 1213, 683 girls and 540 boys (Only Qatari nationals attending public school) Ages 9 to 11.</td>
<td>Cross-sectional</td>
<td>BMI per CDC and IOTF references</td>
<td>Using CDC and IOTF cut offs, risk of overweight was 15.8% and 21.1%. Prevalence of overweight using CDC and IOTF cutoffs was 17.7% and 21.8%. Highest prevalence of risk of overweight and overweight seen in ages 10-18 for both genders.</td>
<td>Only 9 to 11 age group was included in the study. Lack of socio demographic data other than gender and age</td>
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<td>Rizk et al.¹⁷</td>
<td>To investigate metabolic syndrome in Qatari children of ages 6 to 12 years.</td>
<td>n = 67, 30 boys, 37 girls aged 6 to 12 years</td>
<td>Cross-sectional</td>
<td>BMI per IOTF reference values, Waist circumference (WC), Blood pressure (BP), Fasting blood glucose (FBG), Total Cholesterol (TC), Triglycerides (TG), (HDL-C), LDL-C</td>
<td>14.9% of boys and 16.9% of girls were overweight and obese. Increased TG was the most common (28.4%) component of MeS, followed by low HDL-C at 19.6%, and elevated blood glucose at 16.6%, high BP at 10.5% and abdominal obesity at 4.5%. 3% of children showed signs of MeS with boys having a higher prevalence of MeS components than girls. A high prevalence of 9.5% of MeS and its components was found in overweight and obese children compared to those who were neither overweight nor obese.</td>
<td>Small sample size. Accuracy of MeS measurement in children under 10 years old.</td>
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<td>Rizk &amp; Yousef16</td>
<td>Investigation of how cardiovascular risk factors such as lipid profile and waist circumference are associated with being overweight and obese.</td>
<td>n = 315, 151 girls, 164 boys aged 6 to 11, randomly selected</td>
<td>Cross-sectional</td>
<td>BMI per IOTF reference values, Atherogenic Index (AI), HDL-C, LDL-C, TC, TG, WC, FBG</td>
<td>Prevalence of obesity was 21.95% among boys and 16.56% among girls. Prevalence of overweight was 9.76% for boys and 17.22% for girls. Increased WC for overweight and obese boys and girls than normal weight children. No correlation between overweight and obese and high levels of FBG and LDL-C. Overweight and obese children were more predisposed to unfavorable cardiovascular risk factors such as increased WC, high TC, TG, AI and low HDL-C.</td>
<td>Small sample size, Exclusion of blood pressure measurement as a cardiovascular risk factor, Inability to take into account pubertal stages for lipid profile measurement</td>
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<td>Qotba &amp; Al-Isa15</td>
<td>To determine Qatari primary school children’s anthropometric measurements and dietary habits</td>
<td>n = 271, 124 boys and 147 girls attending primary school and enrolled in first grade, selected through cluster random sampling</td>
<td>Cross-sectional</td>
<td>BMI, Skinfold thickness (measured with use of calipers)</td>
<td>3.2% boys and 8.8% girls were overweight 1.6% boys and 5.4% girls were obese. Using the NCHS as a reference, Qatari children found to be leaner, shorter and lighter than American children. Obesity rates for Qatari children were lower than those of other children in the Gulf Cooperation Council. 65% children ate breakfast, while 86% and 87% ate lunch and dinner respectively.</td>
<td>No limitations mentioned in study</td>
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TG, and high AI, as well as lower HDL-C levels. Some of the study limitations included a small sample size, omission to measure blood pressure (BP) as part of the potential cardiovascular risk factors, and inability to take into account pubertal stages for lipid profile measurements.

A cross sectional study by Bener et al. was conducted with the purpose of investigating the impact of spending hours in front of the television or computers on childhood obesity and low vision in Qatar. The study sample included 2,467 Qatari school children aged 6 to 18 years old. A multi stage stratified random sampling technique was used to select study participants. A questionnaire was used to interview the participants face to face and information pertaining to physical activity, dieting, watching television, and sociodemographics was collected. Eye exams were done with the use of a slit lamp and the tumbling E letters were used to assess visual acuity at 20 feet. Visual impairment was defined with the use of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision. A BMI greater than the 85th percentile was considered as overweight and BMI more than the 95th percentile was deemed obese based on Qatari growth curves.

The study results showed that 18.8% were overweight and 5.1% were obese. The highest prevalence of obesity (9.4%) was seen in children between 15 and 18 years of age and this same age group reported spending 3 or more hours on the internet daily and additionally was found to have low vision. The same age group mentioned above slept only between 5 and 7 hours, which is significantly fewer than the recommended 9 hours. Furthermore, 15.6% of children who were overweight and 7.6% of obese children ate fast food on a daily basis. No study limitations were reported.

A pilot study was conducted with the purpose of investigating what makes up the metabolic syndrome (MeS), and its prevalence among children in Qatar. The study design was cross sectional with a sample size of 67 participants aged 6 to 12 years old. This was a convenient sample where the 30 boys and 37 girls were enlisted from an outpatient pediatric clinic in Qatar. The children were required to be dressed lightly and wear no shoes for height, weight and WC measurements. A stadiometer was used to measure standing height and this was rounded off to the nearest 0.1 cm. A digital scale was used to weigh children and measurements were rounded off to the nearest 0.1 kg. A non elastic flexible tape was utilized for waist measurements and results were rounded off to the nearest 0.1 cm. A digital sphygmomanometer was used to check BP, with the subject in a sitting position. Fasting blood was drawn to measure blood glucose, TC, TG, HDL-C and LDL-C.

IOTF cut offs were used to classify children as overweight or obese. WC greater or equal to the 90th percentile for gender and age was defined as abdominal obesity, blood sugar level greater or equal to 5.6 nM was considered as impaired blood glucose, BP greater or equal to the 90th percentile for height and age was out of range, TG greater or equal to 1.24 mM were abnormal and lastly HDL-C below the 5th percentile was undesirable. MeS was defined as the presence of any of the three abnormalities mentioned above. The study results showed that 14.9% of boys and 16.4% of girls were overweight and obese. The most common component of MeS found in the participants was increased TG (28.4%), which was also higher in boys than girls. This was followed by low HDL-C at 19.4%, elevated blood glucose at 16.4%, hypertension at 10.5% and abdominal obesity at 4.5%. Overall 3.0% of the children exhibited signs of MeS, with more boys having higher prevalence of MeS components than girls. In addition, a high prevalence (9.5%) of MeS and its components was found in overweight and obese children than those who were neither overweight nor obese. Study limitations included a small sample size and accuracy of MeS diagnosis in children less than 10 years of age.

A cross sectional study conducted by Kerkadi et al. sought out to estimate the prevalence of overweight as well as the risk of overweight in Qatari children from the age of 9 to age 11, and to compare the results of the prevalence by using IOTF and CDC cut offs for BMI. A total of 1,213 randomly selected Qatari school children enrolled in public school from different socioeconomic backgrounds in the city of Doha provided a representative sample for the study. Of the total number of children aged 9 to 11, 683 were girls and 530 were boys. They were further divided into three age groups, of 9, 10 and 11 years old. Inclusion criteria into the study required the subjects to be Qatari nationals who were also attending public school. Anthropometric measures were taken and used to measure BMI. The children were weighed without shoes on while wearing light clothes. A scale was used to weigh the children and their weight was measured to the nearest 0.1 kg. The participant’s height was measured with the utilization of a wall mounted stadiometer and was recorded to the nearest 0.1 cm. CDC BMI charts and IOTF cut offs were used as references to classify the children based on their BMI.

Participants with a BMI between the 85th and 95th percentile were deemed to be at risk for overweight, whereas those who were at or above the 95th percentile were determined to be overweight.
based on CDC-BMI charts. The BMI percentiles obtained from the measurements were used to classify the children under the IOTF cutoffs. According to the IOTF cut offs for children 2 to 18 years, being overweight is defined as BMI greater than 25 kg/m² and obese is greater than 30 kg/m² at the age of 18 years. The study results showed that according to both the CDC and IOTF references for BMI, the prevalence of risk of overweight and overweight among Qatari children is significantly high.

Risk of overweight using the CDC and IOTF cut offs was found to be 15.8% and 21.1% respectively for all study participants. On the other hand, the prevalence of overweight was 21.8% and 17.7%, again based on CDC and IOTF cut off values. While there are some inconsistencies in the results obtained using the CDC and IOTF cut off values, the overall results do indicate that there is a significant number of children who are either at risk for being overweight or are already overweight. No significant difference was found between risk of overweight and overweight between girls and boys in the study.

The study limitations mentioned include the fact that the study only involved a particular age group and no sociodemographic information was gathered for the study other than age and gender.

Qotba and Al-Isa carried out a cross sectional study to determine Qatari primary school children’s anthropometric measurements as well as their dietary habits. The study sample comprised 271 children enrolled in primary school in their first grade. Cluster random sampling was used to select study participants and the final breakdown was 124 boys and 147 girls, all in the first grade. No specific age group was explicitly mentioned in this study. Height was measured to the nearest 0.1 cm using a portable stadiometer, and the children had their shoes off for measurement. Weight was measured to the nearest 0.1 kg using a scale while the children were lightly clothed. Lastly, calipers were used to measure skin fold thickness.

After BMI calculation, the study results revealed that 3.2% of boys and 8.8% of girls were overweight. In addition, 1.6% boys and 5.4% of girls were found to be obese. Using the American National Center for Health Statistics (NCHS) as a reference population, the study found that Qatari children were leaner, shorter and lighter than American children of the same reference population. Obesity rates for Qatari children were also found to be lower than those of other children of the same age in the GCC region. As far as dietary habits, 65% reported eating breakfast, 86% ate lunch and 87% ate dinner on a daily basis. No study limitations were identified by the researchers.

The purpose of a cross sectional study carried out by Bener was to estimate the prevalence of underweight, overweight and obesity as determined by BMI measurements in Qatar adolescents. This study in particular used the IOTF reference values for BMI measurements. A multistage stratified random sampling technique was used to select the participants from government schools in both urban and semi urban areas. The participants were either in intermediate or secondary school and were randomly selected from a classroom. The classrooms where study participants were recruited from were picked out on a systematic random basis and subjects were randomly selected from the chosen classrooms. The final sample consisted of 3,923 adolescents from both urban and semi urban areas aged 12 to 17 years, including 1,968 boys and 1,955 girls.

Sociodemographic information was obtained from parents via questionnaire. Trained school nurses conducted the anthropometric measurements required for BMI calculation. Weight was measured by a scale, and height was measured using a portable stadiometer; both instruments were calibrated every morning for the duration of the study. The children were required to dress lightly and have their shoes off for measurements. For weight measurement, grams were converted to kilograms and rounded off to the nearest three decimal places and height was measured in centimeters, changed to meters and rounded off to the nearest two decimal places. There was no specific mention of inclusion criteria for this study.

Study results showed that the prevalence of underweight, overweight and obesity was 8.6%, 28.6% and 7.9% respectively, with the highest level of obesity at 12 years of age for Qatar boys. Underweight was most prevalent for boys at 16 years of age and at 17 years of age for girls. For the girls, it was found that 5.8% were underweight, 18.9% were overweight and 4.7% were obese, with obesity levels being highest at 13 years of age. In addition, girls whose fathers were at least a university graduate were more likely to be obese. No significant association was found between the education level of the father and obesity rates for the boys. However, children of mothers who had at least a secondary school level of education were at higher risk for obesity.

Overall, the prevalence of obesity, overweight and underweight among Qatari adolescent boys and girls aged 12 to 17 per IOTF standards was estimated to be 23.8% for obesity, 6.3% for overweight, and 7.2% for underweight. Another finding in this study was the fact that at age 16, adolescent boys were at
greatest risk for overweight and at age 12 they were at greater risk for obesity compared to girls. On the other hand, at age 14 and 13 years, the girls were at greater risk for overweight and obesity than boys. One of the limitations in the study is the use of quota sampling for the selection of participants which may not be representative of the population. A second limitation mentioned is that the anthropometric measures were only carried out once, thus making it difficult to correct measurement errors.

Bener and Tewfik carried out a cross-sectional study to investigate the result of dieting and its connection to being overweight or obese, body satisfaction as well as the psychological effects this has on adolescent females in Qatar. A total of 566 Qatari adolescent females aged 14 to 19 years agreed to participate in the study. A multi-stage stratified random sampling method was used to select study participants who were recruited from primary and secondary schools in Qatar.

Anthropometric measurements were done by trained nurses and BMI was calculated thereafter. Overweight was defined as BMI 25-29.9 kg/m² and obese was classified as BMI more than 30. The Adolescent Dieting Scale was used to gather data on dietary and dieting habits. The Arabic Version of the Self Reporting Questionnaire was used to screen for psychiatric problems. Sociodemographic information was also gathered for the study. Results from the study revealed that the incidence of overweight was 13.4% and obesity was 1.8% among Qatari female teenagers aged 14 to 19 years old. About 80.7% of adolescent girls were dieting, with 8.3% being extreme dieters and 18.3% of being overweight. Girls who were extreme dieters mostly came from families of dieters. These girls also reported having poor appetite, poor sleep, digestive problems, and emotional problems as well as easily getting frightened. Additionally, it was also found that adolescents who repeatedly dieted were more likely to be overweight, dissatisfied with their body image and have psychological problems. No limitations were mentioned in this particular study.

In their study, Bener and Kamal investigated the physical growth of children in Qatar and compared their findings to the NCHS/CDC guidelines. This was a cross-sectional study, with a study sample of 7,442 boys and girls enrolled in both urban and semi-urban Qatari schools, aged 6 to 18 years. A systematic sampling technique was used to choose study participants. Inclusion criteria for the study included children aged from 6 to 18 years and good health with no serious health problems. Sociodemographic data was gathered using a questionnaire, and face to face interviews were also conducted as required. Height was measured in centimeters using a stadiometer and it was estimated to the nearest two decimal places after conversion to meters. The children were required to be barefooted for height measurement. A beam balance was used to measure weight with participants dressed lightly. Participant’s weight was measured in grams and then converted to kilograms then estimated to two decimal places. BMI was calculated and risk for being overweight was defined as a BMI between the 85th and 95th percentile, overweight was defined as a BMI greater than the 95th percentile. The study results showed that 4.7% of boys and 5.6% of girls were obese. Moreover, a large number of boys was found to be either overweight or obese compared to girls based on CDC and IOTF reference charts for weight with the trend increasing with age. Prevalence of overweight in Qatari children was found to be lower compared to the CDC reference except for girls aged 6 to 9 years, who were found to be more obese. In general, this study found that a substantial percentage of Qatari children were at risk of being overweight. No limitations in particular were mentioned in this study.

DISCUSSION

Some of the highest rates of overweight and obesity among children have been reported in the WHO’s Eastern Mediterranean region and more precisely, in the emerging economies that make up the Gulf Cooperation Council (GCC), including Qatar. The other countries in the GCC include Bahrain, Kuwait, Oman, Saudi Arabia and United Arab Emirates (UAE). Recent economic prosperity resulting in adoption of unhealthy lifestyles in Qatar and other GCC countries has led to an alarming increase in the number of children who are overweight and obese. Moreover, a markedly increased per capita income from oil production has resulted in rapid economic and social changes in Qatar in the last few decades, which in turn has led to a significant rise in nutritional health issues and associated diseases. In general, the prevalence of overweight and obesity in Qatar is comparable to the rates in UAE. A previous study conducted in the UAE showed that the rates of childhood overweight and obesity are high with 21.5% and 13.7% of boys and girls aged 5 to 17 being overweight and obese respectively. The prevalence of overweight and/or obesity was found to be higher among Qatari girls than boys in our reviewed studies. A previous study conducted in Saudi Arabia showed that more girls were obese compared to boys. El-Hazmi and Warsi found that overweight and obesity rates for girls
aged 1 to 18 years old was 12.7% and 6.7%. A study conducted in Bahrain found that the prevalence of obesity among boys and girls aged 12 to 17 years was 21% and 35% respectively. In Kuwait, obesity rates for boys and girls aged 6 to 10 years were found to be 15.7% and 13.8% respectively.

Similarities were found between Qatar and other GCC countries in terms of dietary habits during childhood. Our reviewed study by Qotba and Al-Isa found that 65% of Qatari children reported eating breakfast, 86% ate lunch and 87% ate dinner on a daily basis. Previous studies conducted in other GCC countries found that 28% of Bahraini children ate breakfast and 22% skipped breakfast. In Saudi Arabia, 40% children skipped breakfast as well as 22% of children in Oman. In one of our reviewed studies by Bener and Tewfik, 80.7% of Qatari adolescent girls were dieting, with 8.3% being extreme dieters and 18.3% of them being overweight. Similar findings were found in the UAE where 16% of adolescents were overweight and 9% were extreme dieters, with 38% being intermediate dieters.

A total of eight studies on childhood overweight and obesity were reviewed. All researchers acknowledge the lack of empirical evidence on this ever increasing public health problem in the state of Qatar. All eight studies investigated the prevalence of childhood overweight and obesity among Qatari school children. Five studies compared the prevalence of obesity and overweight based on the gender of the children. Out of the five, one found that more boys were overweight compared to girls. Three studies found that more girls were overweight compared to boys. Boys were found to be more obese than girls in two studies. On the other hand, in three studies, girls were found to be more obese than boys. The statistics on which gender is more overweight or obese vary with each study; however, the general finding is that a substantial number of boys and girls in Qatar aged 6 to 11 are either obese or overweight.

Anthropometric measures varied with some studies, but all eight studies at least included height and weight for the calculation of BMI in order to classify children as overweight or obese. Three studies used IOTF and CDC references, and one of these further used the NCHS references to classify the children as either overweight or obese. The study by Qotba and Al-Isa used the NCHS reference population to compare their results with those of the American children and also measured skin fold thickness to assess overweight and obesity. Two studies used the IOTF guidelines to define overweight and obesity, and they were the only ones that included WC measurements to determine overweight and obesity. The study by Bener et al. used Qatari growth pattern curves that were created by Bener and Kamal as their reference for defining overweight and obesity. Only one study did not explicitly mention what their definitions of overweight and obese were based on.

Besides investigating the prevalence of overweight and obesity, two studies further explored MeS as a risk factor for adverse cardiovascular outcomes as a result of overweight and obesity among Qatari children. In their research studies, Rizk et al. and Rizk & Yousef found that children who were overweight and obese had a high prevalence of MeS and its components, thus putting them at high risk for adverse cardiovascular outcomes later in life. Rizk et al. included BP measurements to evaluate cardiovascular risk while all other components measured were similar in both studies. Further investigation of MeS components, such as hormones and biomarkers, would need to be measured as well in order to have a better understanding of MeS in Qatari children.

Four studies gave an explanation of the possible contributors to the problem of overweight and obesity. A sedentary lifestyle due to a variety of factors, such as culture and excessive amounts of time spent on the internet or watching television, are blamed for the perpetuation of this problem. For those studies that found female children to be more overweight and obese than males, a cultural phenomenon in conservative societies like Qatar where males are generally more active than females is offered as a possible explanation of the problem. Poor dietary habits, such as skipping meals, also contributed to the higher prevalence of obesity and overweight.

Sociodemographic data collected in one study showed a positive correlation between higher levels of parental education and increased rates of obesity in their children. Other studies collected sociodemographic information but did not investigate the relationship between sociodemographics and prevalence of overweight and obesity in Qatari children. The ramifications of childhood overweight and obesity include psychological problems, visual problems, MeS, morbidity and mortality in adulthood. Five studies emphasized the importance of the Qatari government to recognize the ongoing problem of childhood overweight and obesity, increase awareness of the problem and to begin determining specific interventions to implement in order to help combat this public health problem.
The percentage of overweight and obese children in Qatar has actually been found to exceed that of the United States. The problem of overweight and obesity in Qatari children is the need for the government to recognize the problem as a public health issue and start implementing interventions to help manage the problem. Obesity in children has been shown to persist into adulthood and is associated with adverse cardiovascular outcomes. Researchers recommend early intervention in order to avoid the morbidity and mortality that can persist into adulthood. For example, interventions that are implemented between the age of 9 and 11 can have positive lasting effects because this is the age when children are transitioning into adolescence.

Health professionals in Qatar now have to take on the challenge of promoting regular exercise among Qatari children, while taking into account cultural factors that may influence the amount and type of exercises. A strong coalition between the government, health care providers and school officials is required in order to educate Qatari children and parents on healthy lifestyle choices including food choices and physical activity.

The exploration of school mentorship programs where teenage students can act as mentors or role models to younger schoolchildren in order to help them eat healthy and exercise. Studies done on teen mentoring in the United States showed positive results, such as improved knowledge of nutrition and participation in physical activity. These studies found that using teenagers as mentors can help to promote healthy habits and reduce unhealthy choices.

A review of the literature revealed that the state of Qatar has a significantly high prevalence of childhood overweight and obesity even though the search yielded a limited number of studies on the subject. Metabolic syndrome was found to be strongly correlated to children who were overweight and obese, and this was identified as a risk for adverse cardiovascular outcomes in later life. Interventions to combat this problem at an early age are more likely to be successful and lead to a healthier adult life. Childhood overweight and obesity in Qatar is increasingly becoming an urgent public health issue and in order to prevent it from spiraling out of control, the state of Qatar needs to implement interventions that can help improve outcomes. Efforts to better manage this looming epidemic will have to come from public health officials, schools and parents.

REFERENCES


