ORIGINAL ARTICLE

Prevalence and Risk Factors of Overweight and Obesity Among Primary School Children in Hawally District, State of Kuwait

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ABSTRACT
Background: Obesity and overweight are serious epidemic issues worldwide in general and in Middle East countries including the state of Kuwait especially due to multiple risk factors like sedentary lifestyle activity. **Objectives:** To estimate the prevalence of overweight and obesity among primary school children in Hawally District, State of Kuwait and to determine identify risk factors associated with them. **Methods**: The study surveyed 143 and children aged 6–12 years in 4 selected public schools. Questionnaires were developed to elicit information from parents' and their children's perceptions of weight status, physical activities, sedentary activities, daily food intake as well as their attitudes toward overweight and obesity in general. The children's body mass index (BMI) was measured according to the Center for Disease Control's (CDC) guidelines. **Results**: One quarter of the surveyed children (35.0%) were overweight. An additional one third of the participants (17.4%) were classified as obese. There was a high statistical significant association between dietary habits and lifestyle with the BMI of children. Lack of Physical exercise, watching television > 2 hours/day was associated with overweight and obesity. **Conclusion**: This study demonstrated a relatively high prevalence of overweight and obesity among primary school children aged 6–12 year-old in state of Kuwait. Socioeconomic class, faulty dietary habits, sedentary life style, low level of physical activity were the most important risk factors.
Keywords: School children; overweight;obesity; prevalence; risk factors.

INTRODUCTION

Obesity and overweight are serious epidemic issues worldwide in general and in Middle East countries including state of Kuwait especially due to multiple risk factors like sedentary life style activity, eating behavior and high calories food intake mainly carbohydrate. The progression of childhood obesity into adulthood is associated with development of significant morbidity including type 2 diabetes (T2D) [1] and cardiovascular diseases, suggesting that the pathogenic process begins during childhood [2].

The Gulf States and Kuwait in particular have experienced many challenging problems regarding obesity and overweight due to rapid economic movement toward easy life style in general and eating habits in children. Government of Kuwait have been tried to create rules to control obesity and overweight problems in children especially and whole population in general, by supporting physicians and researchers to obtain data analysis regarding association risk factors of obesity and overweight [3].

Furthermore, Kuwait has a very hot climate [summer temperatures may reach 50 °C {122 °F}] that compromises physical activity, and as a result, Kuwait has one of the highest rates of childhood obesity in the Middle East [4].

Several studies although have been conducted on the prevalence of obesity in Kuwait. It is clear that Kuwaiti nationality citizen suffering from overweight and obesity with highest percentages numbers of Arabian Gulf countries including Iraq, Yemen and others Middle East Arab countries. According to World Health Organization WHO (2010) international data for Kuwait, 30% of males

and 55% of females beyond 15 years old were named large, making Kuwait the nation with the most large percentages group facing challenging of obesity as well as overweight issues [5].

Literature review of many scientific resources websites talking about prevalence of obesity and overweight in primary school children showed that several studies and cases reports briefly describing the pervasiveness of childhood and youth obesity and overweight in varying age groups, we can agreed that rapid modernization of this issue leading to changed dietary, mentally and physical activity patterns is often hypothesized to be vitally catalyst in State of Kuwait regarding overweight and obesity problems .

Rationale and Justification

Obesity and overweight issues becoming worldwide problems and State of Kuwait stay in highest positions in the international curve of Obesity with second high percentages in the world. This study has been done before in Kuwait but without focusing in different aspects, this study will try to fill missing gaps of previous studies.

SUBJECTS AND METHODS

Study design and Target population:

A cross-sectional study was conducted on a random sample of students who attended government schools in Hawalli Governorate, Hawally District, in state of Kuwait during the last school term between February 2018 and May 2018. The sampling frame included the listed governmental schools given by the Educational Directorate of Hawally.Written information consent was obtained from all participants or their parents.

Sampling technique:

Multistage sampling technique was taken by choosing 4 schools from the district of Hawally (Two primary schools for boys, and two for girls) by simple random sample technique, Inside each school, pupils were chosen out of different school grade strata.

Sample size:

The sample size was calculated by Epi Info 7 version 7.2.0.1 using the following parameters:

Prevalence of overweight and obesity among primary school children was 40% [6]. Total number of primary school children in Hawally District in state of Kuwait during the First school term was about 15,275 students (9165 girls and 6110 boys) [7]. Confidence interval (CI) level was 95%. So, the sample size was 143 students (86 girls and 57 boys).

Inclusion and exclusion criteria:

Students aged between 6 to 12 years were included, while students < 6 or > 12 years of age were excluded. Also, children with chronic illness as well as those on corticosteroid therapy or growth hormone replacement therapy and children with chromosomal disorders were excluded.

Data collection procedure

After having got the agreement consent, the researcher measured the height, and weight for each student in the examination room of the school. The researcher himself did all measurements and the assistant did the registration; and then the students were asked to take the questionnaire to their homes to be filled by one of their parents or guardians and to bring it back the next day. The filled questionnaires were collected on the next day and defaulters were asked to bring it on the following day.

Questionnaire

The semi-structured Arabic questionnaire was prepared by the researcher. A pilot study was done one month before data collection to detect any difficulties and to test content validity and reliability of the questionnaire. It also helped to estimate time needed for data collection and expected frequency. Students included in the pilot study were excluded from the main sample because of the changes that were done in the final version of the questionnaire. Cronbach's Alpha of the final version of the questionnaire was estimated to be 0.74. It included:

a) **Socio-demographic characteristics** as age, grade, gender, birth date, school name, residence, parents' educational level, father occupation, mother occupation, family size and numbers of house rooms.

b) **Feeding pattern data** included the frequency of breakfast intake in a week, number of

meals, eating snacks and fast food consumption.

c) **Life style factors** included: Hours of television watching and computer/video games were recorded for each day of a typical week and divided into three time categories, such as no television watching, 62 h per day, >2 h per day. Eating while television watching. A questionnaire on physical activity was developed by asking the participants to recall the number of hours per week if they had participated in any structured physical activity or team sport in the last six months. The participants were also asked about the time spent in commuting between home and school. Physical activity were divided into three time categories, such as no physical activity (less than 10 min per day), sometimes (10–30 min per day) and frequent (more than 30 min per day).

Anthropometric measurements

The researchers personally took different anthropometric measurements at the clinic of school room, using the 2000 CDC Growth Charts for children and adolescents from ages 2 to 20 years [8].

i. Weight: One suitable weight balance measuring to nearest 0.5 kg was used. Students were weighed while wearing light school uniform.

ii. Height: Suitable metallic meter scale measuring to the nearest 0.5 cm, fixed on the scale was used .

Body mass index (BMI): Calculating BMI by dividing weight in kg by square height in meters [9]. BMI for age percentile: The body mass index "BMI"/age for males and females charts was used to determine the body status as follows: Underweight: < 5th percentile Normal weight: 5th - <85th percentile Overweight: 85th - <95th percentile Obese: > 95th percentile.

Data management:

Scoring of socio-economic status: Total scoring of the 7 domains is 84. Socioeconomic status is classified into 4 socioeconomic levels according to the 3 quartiles depending on the score calculated: Score 0-21 (very low), > 21-42 (low), > 42-63 (middle), > 63-84(high) [10].

Computer using Statistical Package of Social Services version 22 analyzed the collected data (SPSS) [11]. Data were represented in tables and graphs as frequencies and percentages. Pearson Chi square test ($\chi2$) was used to analyze qualitative independent data. The results were considered statistically significant when the significant probability ≤ 0.05.

Administrative and Ethical consideration:

Approval of the study protocol by the institutional review board (IRB) taking the number (3965) at 20/8/2017. An official permission was obtained from heads of educational directorates.The title and objectives of the current study were explained to the educational directorate managers of the selected schools in Hawally District in state of Kuwait during the period study to insure their cooperation. The Students and their parents were informed about the nature and the purpose of the study and informed consent was taken from their parents before their participation. Students' data were confidential. The work was carried out in accordance with the code of ethics of the world medical association (declaration of Helniski) for studied involving humans.

RESULTS

Our study included 143 students at primary schools (57 boys and 86 girls) aged between 6-12 years old who were screened, 42.6% were high social class and 27.3% were in grade IV (Table 1).

We found that 35 per cent of the studied participants (50 students) were overweight, 17.4 per cent (25 students) were obese and 47.6 per cent (68 students) represent normal average body weight (Figure 1).

There was no statistical significant between socio-demographic characteristics and BMI in the studied students (Table 2).

There was high statistical significant relation between dietary habits and body mass index of studied children. High consumption of fast food, candy carbonated beverage and sugary juice were associated with overweight and obesity. While high consumption of fresh fruits and vegetables and breast feeding 1st 6

months of life were associated with average body weight (Table 3).

Also, there was statistical significant relation between life style and body mass index of studied children. Lack of Physical exercise, watching TV > 2 hours/day was associated with overweight and obesity. While having obese parents was associated with average body weight (Table 4).

Table 1: Distribution of studied children according to sociodemographic characteristics

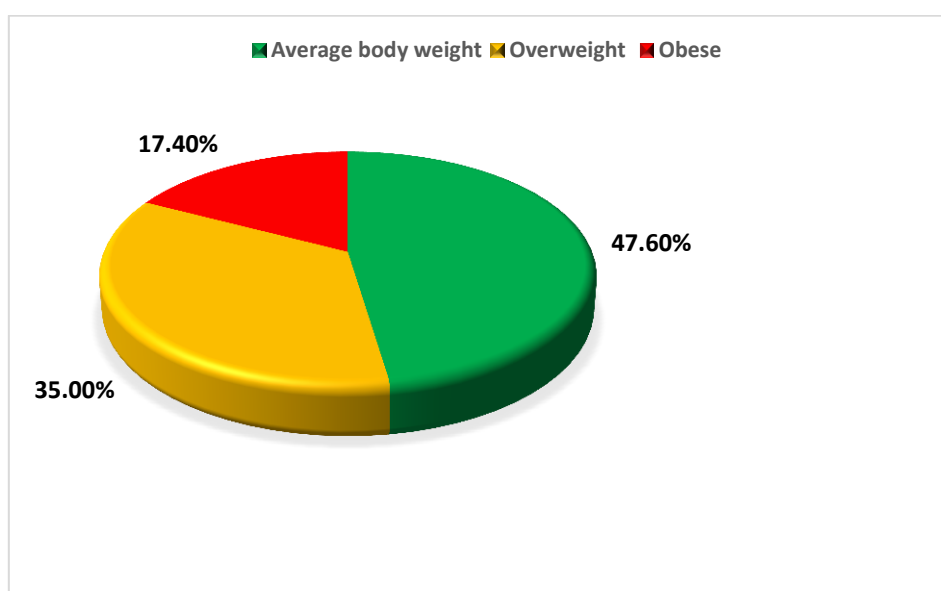| Variables	Studied children (n=143)	
	No.	*%*
Gender:		
Boys	57	39.9
Girls	86	60.1
Age (years):		
• 6 – < 8	40	28.0
• 8 – < 10	59	41.2
• 10 – 12	44	30.8
Social class:		
Low	24	16.8
Middle	58	40.6
High	61	42.6
Grade:		
I	16	11.2
II	17	11.9
III	29	20.3
IV	39	27.3
V	27	18.8
VI	18	12.5

Figure 1: Prevalence of overweight and obesity in studied children.

Table 2: Relation between sociodemographic characteristics and body mass index (BMI) of studied children

Sociodemographic characteristics	Body Mass Index						χ²	P
	Average		Overweight		Obese			
	No.	*%*	*No.*	*%*	*No.*	*%*		
Gender:								
Boys (n=57)	24	42.1	22	38.6	11	19.3	1.1	0.5
Girls (n=86)	44	51.1	28	32.6	14	16.3		
Age (years):								
6 – < 8 (n=40)	22	55.0	12	30.0	6	15.0	1.4	0.5
8 – < 10 (n=59)	31	52.5	18	30.5	10	16.9	1.1	0.5
10 – 12 (n=44)	15	34.1	20	45.5	9	20.4	4.7	0.09
Social class:								
Low (n=24)	10	41.7	9	37.5	5	20.8	0.5	0.8
Middle (n=58)	30	51.7	20	34.5	8	13.8	1.1	0.6
High (n=61)	28	45.9	21	34.4	12	19.7	0.4	0.8
Grade:								
I (n=16)	7	43.8	7	43.8	2	12.4	0.6	0.7
II (n=17)	6	35.3	6	35.3	5	29.4	2.1	0.3
III (n=29)	13	44.8	9	31.0	7	24.1	1.1	0.5
IV (n=39)	17	43.6	13	33.3	6	15.4	0.04	0.9
V (n=27)	15	55.6	11	40.7	1	3.7	4.3	0.1
VI (n=18)	10	55.5	4	22.2	4	22.2	1.5	0.4

Table 3: Relation between dietary habits and body mass index of studied children

Dietary habits	Body Mass Index						χ²	P
	Average		Overweight		Obese			
	No.	*%*	*No.*	*%*	*No.*	*%*		
Fast food meals:								
Do not eat (n=43)	35	81.4	6	14.0	2	4.6		
Once/week (n=42)	18	42.9	18	42.9	6	14.2	35.5	**<0.001**
Twice/week (n=40)	10	25.0	20	50.0	10	25.0		
> twice/week (n=18)	5	27.8	6	33.3	7	38.9		
Liking toward candy:								
Occasional (n=37)	35	94.6	1	2.7	1	2.7		
Once daily (n=37)	13	35.1	14	37.8	10	27.1	51.5	**<0.001**
Twice daily (n=43)	12	27.9	19	44.2	12	27.9		
> twice daily (n=26)	8	30.8	16	61.5	2	7.7		
Liking toward carbonated beverage:								
Occasional (n=28)	25	89.3	1	3.6	2	7.1		
Once daily (n=30)	18	60.0	5	16.7	7	23.3	38.3	**<0.001**
Twice daily (n=40)	14	35.0	20	50.0	6	15.0		
> twice daily (n=45)	11	24.4	24	53.3	10	22.3		
Sugary juice consumption:								
Occasional (n=38)								
Once daily (n=44)	31	81.6	6	15.8	1	2.6	53.1	**<0.001**
Twice daily (n=33)	13	29.5	27	61.4	4	9.1		
> twice daily (n=28)	14	42.4	13	39.4	6	18.2		
	10	35.7	4	14.3	14	50.0		
Fresh fruits & vegetables:								
Irregular (n=31)								
Once/week (n=40)	10	32.3	20	64.5	1	3.2		

	No.	%	No.	%	No.	%	χ²	P
Twice/week (n=52)	18	45.0	14	35.0	8	20.0	15.8	**<0.001****
> twice/week (n=20)	20	38.5	12	23.1	10	19.2		
	10	50.0	4	20.0	6	30.0		
Feeding in 1st 6 months of life:							32.5	**<0.001****
Breast feeding (n=22)	20	91.0	1	4.5	1	4.5		
Bottle feeding (n=110)	38	34.5	48	43.6	24	21.8		
Mixed feeding (n=11)	10	91.0	1	9.0	0	0.0		

Table 4: Relation between life style and body mass index of studied children

Dietary habits	Body Mass Index						χ²	P
	Average		**Overweight**		**Obese**			
	No.	*%*	*No.*	*%*	*No.*	*%*		
Physical exercise:							10.6	**0.004***
Yes (n=28)	21	75.0	4	14.3	3	10.7		
No (n=115)	47	40.9	46	40.0	22	19.1		
Transportation to school:							5.1	0.07
Walking or biking (n=0)	0	0.0	0	0.0	0	0.0		
Common transportation (n=48)	28	58.3	17	35.4	4	8.3		
Private car (n=94)	40	42.6	33	35.1	21	22.3		
Time consumed watching TV:							21.1	**<0.001****
< 1 hour/day (n=0)	0	0.0	0	0.0	0	0.0		
1 – 2 hours/day (n=28)	23	82.1	1	3.6	4	14.3		
> 2 hours/day (n=115)	45	39.1	49	42.6	21	18.3		
Parents overweight or obese:							31.4	**<0.001****
No (n=0)	0	0.0	0	0.0	0	0.0		
One parent (n=96)	30	31.2	45	46.9	21	21.9		
Both parents (n=47)	38	80.9	5	10.6	4	8.5		

DISCUSSION

The prevalence of obesity has increased over the last few decades and has now become a worldwide public health problem. It is becoming more prevalent among all age groups including children in developing countries [12]. The prevalence of childhood overweight and obesity has risen substantially in Kuwaiti children, irrespective of growth standard classification used. In the present study, the overall prevalence of obesity among children aging from 6 to 12 years was 17.4%, while the overall prevalence of overweight was 35.0% as compared to 47.6% of studied children had average body weight. Our results are higher childhood overweight than previously reported from different states of Kuwait (26.5%, 14.6%, 16.8%, 17.4% and 23.3%) [13], [4], [14], [15] and [16], suggesting a dramatic increase in total overweight in the last two decades. However, heterogeneity in research methodologies, sample size and different age stratification may limit comparability.

In United Arab Emirates' (UAE) global school-based students, a health survey was conducted in 2008. The prevalence of overweight and obesity was as follow: 21.5% of students were at risk of becoming overweight, 12.1% were classified as overweight. There was no significant difference between male students (21.2%) and female students (21.7%) at risk of being overweight. Also there was no significant difference between the overweight male students (13.2%) and the overweight female students (11.0%) [17].

The specific cause of obesity is not known, for it is multifactorial, and is influenced by several factors. Some of these factors are modifiable while others are not. The major causes of obesity among children are namely sedentary life, dietary composition and pattern, and socioeconomic status [18].

A systematic review and meta-analysis of studies on Australian children found that there was a slight increase in overweight, with almost no changes cited in the past 10 years. Findings suggest that the rate of overweight and obesity settled at between 21% and 25% in boys and girls [19]. Since this study relied on a review of published studies collected from a wide range of earlier studies, it is likely that subjects from specific geographical areas or age groups were overrepresented or underrepresented in the study's findings.

Obesity appears mainly when the intake of calories is higher than the calories consumed (positive energy balance) [20]. During the last two decades, obesity has emerged as a leading public health problem; it is more prevalent in developed countries, affecting adults and children alike [21].

In contrast to our study results, a study conducted in Kuwait reported that neither breastfeeding nor duration of breastfeeding was associated with childhood obesity at 3–6 years when potential confounders were controlled. However, introduction of solid foods to infants before two months was significantly associated with obesity, as children who received solid foods before 2 months of age were two times at risk of being overweight than those who received solid foods between 4 and 6 months (odds ratio 2.39, $p < 0.01$) [22].

Our findings were agreed with Scholtens et al. (2008) where they reported in their cohort study on Dutch children that breastfed children had significantly lower risk of overweight at 8 years. The differences may be due to differences in duration of lactation. Majority of mothers here lactate their children for > 16 week which is the recommended breastfeed duration [23].

Nowadays, the modern food environments provide a wide range of opportunities to consume food and drink products leading to what is called passive consumption [24]. This study showed significant positive correlation between BMI and drinking carbonated beverages. This is in agreement with [25] who found that for each consumed additional serving of sugar sweetened drinks BMI and

obesity increased after adjustment for anthropometric, demographic, dietary and life style variable. On other hand, eating quick meals did not significantly correlate with BMI. This is not in agreement with a study done by Thompson et al. (2004) where they reported that the frequency of eating quick food was positively associated with BMI z-score in their longitudinal study among girls at Massachusetts Institute of Technology [26]. The difference is probably due to difference in gender and the lack of sufficient power of the study to detect significant association of obesity with quick meals.

The present study shows that there was statistical significant relation between life style and body mass index of studied children. Lack of Physical exercise, watching TV > 2 hours/day was associated with overweight and obesity. While having obese parents was associated with average body weight. Our findings were in agreement with the study of Kyriazis et al. (2012) who examined the prevalence of overweight and obesity among elementary school students (6-12 years old) [27]. The percentage of overweight or obese children is high, boys outnumbering girls in all age groups. A significant positive cross-correlation was found among the students' BMI and frequent consumption of fast food, as well as time spent in front of the computer and TV.

Also, the result of the current study was agree with the results which emerged from WHO/HBSC survey which found that prevalence of obesity increased by 2% in 8-12 years old for each additional hour of TV viewed. Obesity incidence increases in children who viewed more than 4 hours per day (WHO/HBSC, 2006). Kruger et al. (2005) found that overweight children were the least active, mainly watching TV all the time [28]. In addition, with Khader et al. (2009) also found that the prevalence overweight (obesity) is more if sitting more than two hours/day [29]. Al-Sabbah et al. (2008) found that of overweight boys were significantly less physically active than non-overweight [30].

CONCLUSION

This study demonstrated a relatively high prevalence of overweight and obesity among primary school children aged 6–12 year-old in state of Kuwait. Socioeconomic class, faulty dietary habits, sedentary life style, low level of physical activity were the most important risk factors.

LIMITATIONS

This study was limited to a sample of primary school students attending public schools in all Kuwaiti provinces. Therefore, the results may not be applicable to students in private education settings. This is a very important limitation of this study, as the existing literature indicates a positive link between high socioeconomic status (SES) in developing countries and childhood obesity. Therefore, as this study is limited to children in public schools, this might mean that the majority of the children who participated in this issue are in the lower family income classes.

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