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Evaluation of Risk Factors Associated with Obesity among Adolescent Libyan student's in Malaysia

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ABSTRACT

The main objective of this study was to evaluate the hypothesized risk factors associated with obesity among Libyan adolescents schooling in Malaysian Libyan schools representing primary, middle and high schools level education. A cross-sectional study was conducted by using a self-administered questionnaire to access the anthropometric parameters, physical activity, dietary intake, food habits, sedentary behavior's and nutrition knowledge among 180 adolescents in Libyan Schools of Malaysia. Descriptive statistics, chi-square test, independent t-test, and ANOVA were performed on the collected data. The results indicated that the highest percentage of overweight was in the primary school students and the highest percentage of obesity was in the high school adolescents. A significant difference was found in mean physical activity scores between male and female students. The means of time (hrs) spent on dietary habits for male and female students were found to be 3.06±0.49 times/week and 3.09±0.46 times/week respectively. The means of time spent on sedentary behaviors's for male and female students were found to be 2.69±0.71 hours/week and 2.73±0.71 hours/week respectively. The mean nutrition knowledge score for male and female students were found to be 2.97±0.294 and 2.92±0.27, respectively. There was no significant difference between the mean nutrition knowledge scores of male and female students. About 53.6% of students have moderate or high (45.9%) nutrition knowledge respectively. A high percentage of the students 42.0% could not identify the healthiest way to lose body weight while 17.2% chose all of above are healthy methods of losing body weight. In conclusion, obesity was found to be prevalent in high school adolescents. There was no significant differences in the responses for the risk factors such as physical activity, dietary intake, food habits and sedentary behavior's between male and female adolescent students in Libyan School here in Malaysia. About 45.9% have high nutrition knowledge. Future intervention may consider incorporating the elements in the scheme to increase its effectiveness in nutrition knowledge and health awareness.

Keyword: Adolescence, Obesity, Risk factors, Libyan Students, Malaysia

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INTRODUCTION

Overweight and obesity are defined as abnormal or excessive fat accumulation that may damage health. Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify adult overweight and obesity. International data indicates that the obesity epidemic is in fact, a global health problem [1]. Child obesity and overweight are major public health problems in developed and developing countries [2]. The World Health Organization (WHO) has declared the current increase in population obesity to be an epidemic and describes obesity as one of the most visible, yet most neglected public-health problems that threaten to overwhelm both more and less developed countries [3]. More than half of the world's population is considered to be over weight [4] Furthermore the International Obesity Task Force estimates that at present at least 1.1 billion adults are overweight, including 312 million who are obese [3]. Although the neurobiological process controls food intake, this epidemic reflects the progress of physical activity and age-related reduction, as well as a large number of dietary changes and passive over-consumption of energy. Accurate and appropriate assessment of overweight and obesity among children and adolescents is an important aspect of contemporary health care. BMI has become the standard for overweight and obesity reliable indicator [5] In other word, it is the tool most commonly used to estimate overweight and obesity in children and adults U.S. Department of Health and Human Services, 2010. In children and adolescents, the body mass index varies significantly with age and gender. Few studies seem to identify factors related to obesity and overweight in Libyan adolescents, especially those living and schooling in Malaysia at this age group. It is in view of this the present study was done to specifically identify the determining factors associated with obesity and overweight and also studied its prevalence among adolescent's of government and private schools in Libyan schools in Malaysia

MATERIALS AND METHOD

An analytical cross-sectional study design was carried out which comprised of both descriptive and analytical components of overweight and obesity. The study population included both male and female students (10-19 yrs) studying at primary, middle and high schools levels in government and private secondary Libyan schools in Malaysia for the data collection. The inclusion criteria included; (1) Age category between (10 -19 yrs), (2) male and female secondary school students, (3) students studying in defined area of Libyan schools in both government and private secondary schools in Malaysia.

A well-structured and validated questionnaire was used to capture respondent's information regarding socio-demographic factors, risk factors of overweight and obesity among the target population of the study. It was framed with eight sections including socio-demographic and

personal characteristics; physical activity, sedentary behavior's (watching TV and using computer), food habits, nutrition and weight management knowledge. Descriptive statistics, chi-square test, independent t-test, and ANOVA were performed on the collected data.

RESULTS AND DISCUSSION

Socio-demographic and personal characteristics of the respondents

Gender, Age and Menarche status

The study population sample consisted of 51.9% male and 47.5% female students. Among this 32.2.% (n = 56, aged 12-13 years), were studying in primary, 32% in middle (n = 58, aged 13–16 years), and 36.6% (n = 66, aged 12–18 years) at high school levels. For girls (12-18 yrs), the mean age at menarche was found to be 14.65 ± 1.82 . Out of 86 female students responded, almost 79% have reached menarche and as expected, the percentage was the highest for the high school students at 99.5%.

Table 1 Gender, Age and Menarche status of the respondents by educational level

Demographic Variables	All (Mean ±s.d)	Educational level		
		Primary (Mean ±s.d)	Middle (Mean ±s.d)	High (Mean ±s.d)
Age (Year)	14.65±1.82	12.96±0.186	14.92±0.493	16.1±0.403
Age at Menarche	77(50.3)			
Menarche Status	39(25.5)			
Yes	34(22.2)			
No	3(2.0)			
Gender				
Male	81(52.9)			
Female	72(47.1)			

The values representing the mean ±s.d for Age, Menarche status of males and females study participants

Table 2 Height, Weight, BMI of the respondents by educational level

All (n=180)		Primary (n=56)	Middle (n=58)	High (n=66)	Significance
Height (m)	1.61 ± 0.05	1.58± 0.04	1.61 ± .033	1.65 ± 0.48	$< 0.001^*$
Weight (kg)	65.47 ± 6.38	63.7 ± 4.1	65.4±5.48	69.42 ±7.07	$< 0.001^*$
BMI*(kg/m^2)	25.11 ± 2.09	25.66 ±1.43	24.52±2.21	25.30 ±2.31	
BMI Status					
Underweight	0(0.0)	0(0.0)	0 (0.0)	0 (0.0)	0.50
Normal	70(38.7)	25.6(1.4)	10 (2.3)	9 (2.3)	
Overweight	100(55.2)	(78.1)	324 (75.9)	305 (77.6)	
Obese	1(0.6)	__	26 (6.1)	29 (7.4)	

The values representing the mean ±s.d for height (M), weight (KG), BMI scores*(kg/m^2), BMI status of the study participants. . *p<0.001

As indicated in Table 2.0, Among the respondents, 38.7% of the students were within the normal weight range. The prevalence of overweight and obesity among the respondents were

found to be 55.2% and 0.6% respectively. The highest percentage of overweight was in the primary educational level (78.1%), and the highest percentage of obesity was in the high school adolescents with 7.4%. The mean values of BMI was found to be 25.11 ± 2.09 ranging between 12.05 to 32.56 kg/m2. However, chi-square test for independence revealed no significant association between body weight status and educational level.

Descriptive analysis showed that the prevalence of overweight was highest among the middle school adolescents, which is consistent with the previous study. However, the prevalence of obesity showed a dramatic increasing trend through educational levels and it was the highest among high school adolescents, in contrast to a previous report. [5], [6]. However, the finding of the present study is in line with the outcome of an analysis of two cohort studies among Spanish school children which indicated that the prevalence of obesity has increased more dramatically than the prevalence of overweight among adolescents along time. [7], [8]. The prevalence of underweight and overweight was far different from the NHMS III study which reported a higher prevalence of underweight (13.5%) and lower prevalence of overweight and obesity (6.1%) among children in Sarawak, Malaysia (IPH, 2008). However, the comparison was made impossible as different tools were used in defining the body weight status. Another possible explanation for difference in prevalence of body weight status between the present study and the NHMS III could be due to background differences of the students as most students in this study are living in an urban area. The high prevalence of overweight and obesity needs immediate attention. [9], [10].

In Malaysia, another which was done in Kuantan, reported that about 30.3% of the secondary school students were found to be underweight while 20.3% was reported to be overweight and obese. The prevalence of overweight/obesity in the present study was found to be almost similar [12], [13]. An effective monitoring program to monitor adolescent‘s health was crucial as suggested in a recent study which concluded that body weight status during adolescence may forecast body weight status in adulthood. This means that prevention during early life might put a halt to the uprising trend of overweight and obesity during adulthood and thus improving the quality of life and reducing morbidity rates [14].

Lifestyle factors

Four variables were considered as lifestyle factors consisting of physical activity, watching TV, using computer, and dietary habits. The physical activity in spare time, school time, after school, at evening time, and on typical weekdays and weekends were assessed.

Physical activity

The physical activity scores during free-times and in every day of the past week by educational level are indicated in Table 3.0. There was a significant difference in the mean of physical activity scores during free time across educational levels ($p < 0.001$) with the primary school children reporting the highest mean of physical activity score in their free time. Likewise, primary school children reported higher physical activity score in the days of the past week than middle and high school adolescents [$F (2, 1) = 18.53$, $p < 0.001$].

Table 3 Mean and standard deviation (SD) of physical activity (PA) scores in free time and weekdays by educational level

Variables	All(n= 180)	Primary (n=56)	Middle (n=58)	High (n=66)	
PA scores during free time	1.61 ± 0.05	1.58± 0.04	1.61±.033	1.65 ± 0.48	< 0.001*
PA for score for each day	65.47 ±6.38 25.11 ± 2.09	63.7 ± 4.1 25.66±1.43	65.4±5.4824.52±2.1	69.42±7.07 25.30±2.31	< 0.001*

PA= Physical Activities

Mean SD of PA during Free time 1.61±0.05

Mean SD of PA of each day 25.11 ± 2.09

Table 4.0 presents the mean scores of the types of the respondent's physical activity. Skipping for exercise was the most popular physical activity as around four fifths of the students (38.7%) were involved in the activity for at least one to two times a week. It was followed by jogging and running for which around one third of the students (28.2%) took part in the activity at least one to two times a week. Badminton and baseball were the most unpopular activities, as a high percentage of the students (badminton: 98.9%, baseball: 98.3%) were found to skip the activities during last week. These were followed by bicycling (87.8%).

Around four fifths of the students (32.6%) rated their participation in physical education class as'sometimes'. Two third of the students (91.7%) claimed that they only sat down (talking, reading, and doing homework) during lunchtime. Involvement of students in physical activity right after school was not high, as 32.0% of the students responded as none'. 33.1% of the students answered one time last week', while 27.6% of the students chose _two or three times last week'. Participation in physical activity during the evening was also low.

Table 4 Types of physical activities

Item		No n (%)	1-2 times n (%)	3-4 times n(%)	5-6 timesn(%)
1a	Skipping	99 (54.7)	70(38.7)	71 (39.2)	39 (21.5)
1b	In-line skating	145 (80.1)	30 (16.6)	10 (5.5)	140 (77.3)
1c	Hide and Seek more	153 (84.5)	12 (6.7)	8 (4.4)	7 (3.9)
1d	Walking for exercise	96 (53.0)	44 (24.3)	47 (26.0)	89 (49.2)

1e	Bicycling more	159 (87.8)	16 (8.8)	7 (3.9)	157 (86.7)
1f	Jogging or running	87 (48.1)	51 (28.2)	45 (24.9)	84 (46.4)
1g	Aerobics more	106 (58.6)	30 (16.6)	41 (22.7)	109 (60.2)
1h	Swimming more	93 (51.4)	48 (26.5)	42 (23.2)	90 (49.7)
1i	Baseball, softball	178 (98.3)	-	3 (1.7)	177 (97.8)
1j	Dance more	134 (74.0)	24 (13.3)	22 (12.2)	134 (74.0)
1k	Football more	120 (66.3)	36 (19.9)	23 (12.7)	121 (66.9)
1l	Badminton more	179 (98.9)	2 (1.1)	1 (0.6)	177 (97.8)
1m	Skateboarding more	154 (85.1)	26 (14.4)	5 (2.8)	149 (82.3)
1n	Volleyball	125 (69.1)	31 (17.1)	28 (15.5)	121 (66.9)
1o	Basketball more	141 (77.9)	30 (16.6)	16 (8.8)	133 (73.5)

In the current study, physical activity was independently and inversely associated with BMI only in male adolescents. This could be related to the fact that in the current study female adolescents had a less frequency of physical activity than males. The lack of a predictive role of physical activity for BMI in the current study corroborates the finding of a cohort study and a longitudinal study [16] which revealed that physical activity was not a predictor of BMI . Physical activity may not be a predictor for body weight status over long time and cannot protect the negative effects of other risk factors such as watching TV. [15, 16**]**

The current study strongly supports the finding of a study [17**]** that found no significant relationship between physical activity and likelihood of overweight and obesity among adolescents aged 10 – 14 years (equals to primary and middle school levels of education in the current study). The findings of the univariate analysis in this study is in line with a study [18**]** in US states which revealed an unhealthy trend from primary school to high school for physical activity where by high school adolescents reported the lowest physical activity score. These results add to the growing evidence that intensity and frequency of physical activity decrease with increasing age in children [18**].**

Dietary habits

The means of frequency of dietary habits for male and female students were 3.06±0.49 times/week and 3.09±0.46 times/week respectively as indicated in Table 5.0. There was no significant difference in the mean time spent in dietary habits between male and female students (t = -2.76, p = 0.783).

Table 5 Frequency of dietary habits

	Variable	**Mean±SD(times)**		**Mean**	**Standard**	***P***
		Male	**Female**	**(Times)**	**Deviation**	
D1	100% fruit juices	2.61±1.47	2.69±1.53	2.66	1.49	0.719
D2	Fruit	3.97±1.89	2.96±2.20	3.97	2.04	0.965
D3	Green salad	4.01±2.02	3.49±1.80	3.76	1.93	0.068
D4	Carrots	3.00±1.88	2.87±1.85	2.94	1.86	0.647
D5	Other vetables	2.52±1.40	2.44±1.58	2.48	1.49	0.723

D6	Can (pepesi, Coke etc)	2.43±2.49	2.92±2.59	2.67	2.55	0.206
D7	Can sweet	3.74±1.56	3.87±1.89	3.81	1.72	0.624
D8	Potato chips	3.03±1.67	3.36±2.23	3.19	1.96	0.269
D9	Chacolate	3.41±1.98	3.52±1.85	3.46	1.92	0.735
D10	Anything between 6-8am	3.76±1.58	3.66±1.96	3.71	1.77	0.729
D11	Milk	4.2±1.88	4.01±1.81	4.12	1.85	0.466
D12	Fast food as lunch			1.26	1.15	0.850
D13	Fast food as dinner	1.98±1.38	2.18±1.79	2.08	1.59	0.388

*p<0.001

Adolescence is a crucial period with physiological and psychological changes that affect food choices and eating habits such as skipping breakfast and frequent snacking [19] these characteristics put adolescents at risk of energy imbalance. Understanding dietary intakes and food habits among adolescents is central to controlling and preventing excess body weight. The intakes of fruits and vegetables, soft drinks, sweetened drinks, candies/chocolates, chips/fried potatoes, breakfast, milk and fast food and also eating meals and snacks in front of the TV were assessed in the current study. The current study is consistent with study [20] that showed that high school adolescents (older adolescents) consumed vegetables more often than primary and middle school adolescents. This is the main reason for higher dietary fiber intake in high school adolescents than the other two educational groups. This finding does not support the findings of a cohort study performed [21**]** who reported a declining trend in frequency of eating fruits per week between ages 14 and 21 and a cross-sectional study by Pearson and colleagues [20**]** who reported more intake of fruits in older adolescents than younger ones.

Sedentary behavior's

As indicated in Table 6.0 for sedentary behaviors, the means of time spent on for male and female students for a week were found to be 2.69±0.71 minutes/week and 2.73±0.71 hours/week respectively. However, no significant difference was observed in the mean time spent in sedentary behaviors between male and female students (t = -0. 353, p = 0.725). Most time was spent on the watch TV which recorded 3.97±2.04 hours/week. The time spent on play video or computer games on school day was recorded as 3.76±1.92 hours/week. The time spent on watching television was the highest.

Table 6.Sedentary behaviour's

	Variable	**Mean±s.d (Hours)**		**P value**
	Time Spent on Sedentary Activities	**Male**	**Female**	
B1	Watch television on school day	1.61±0.91	1.72±0.95	0.411*
B2	Watch television on weekend day	2.44±1.11	2.66±1.10	0.172*
B3	Play video or computer games on school day	1.98±0.95	1.98±1.05	0.989NS
B4	Play video or computer games on	3.09±1.35	3.15±1.31	0.739NS

	weekend day			
B5	Eat breakfast with TV tuned on	3.19±1.67	3.10±1.62	0.724NS
B6	Eat lunch with TV tuned on	2.77±1.51	2.99±1.66	0.350*
B7	Eat dinner with TV turned on	2.66±1.72	2.89±1.68	0.354*
B8	How many times you eat while TV turned on	2.57±1.62	2.62±1.66	0.865NS

The values representing the mean ±s.d values of sedentary behavior's. *p<0.001 NS not significant.

The mean time spent by adolescents on sedentary activities was considered moderate 2.71±0.71 hours per week. The finding was consistent with [22] who reported that time spent on sedentary activities between Grade six, eight, and ten students were 34, 41, and 45 hours a week. No significant difference observed in the mean time spent in sedentary behaviors between male and female students (t = -0. 353, p = 0.725), Contrasting results were presented by [23] as significant sex by day and by time differences in sedentary (p = 0.005) and physical activity (p < 0.001) were found.

Nutrition knowledge

The mean nutrition knowledge score was 2.95±0.28 the mean scores for male and female students were 2.97±0.294 and 2.92±0.27, respectively. There was no significant difference between the mean nutrition knowledge scores of male and female students (t = 1.386, p = 0.167). About (53.6%) of students have moderate or high (45.9%) nutrition knowledge respectively. A great majority of the students (53.6%) was grouped as having moderate nutrition knowledge. A higher percentage of male students (27.2%) were categorized as having high nutrition knowledge as compared to female students (26.6%). A high percentage of the students could not identify the content of a healthy balanced diet (26.0% answered wrongly and 23.8% did not know the answer), get all the nutrients needed (29.8% answered wrongly and 6.6% did not know the answer). About 61.3% know about food pyramid while 38.1% do not know. According to the food pyramid, 15.5% answered correctly while 1.1% don't know. For further detailing refers to the table 4.6 below.

The nutrition knowledge among adolescents was not high as majority of them scored moderately (53.6%). The finding was consistent [24] who found a low overall dietary knowledge among adolescents in rural Bangladesh as more than half of them could not recognize the main food sources for energy and protein. There was no significant difference between the mean nutrition knowledge scores of male and female students (p = 0.167). The finding was consistent with [25], [26]. A same finding was found by [27] who reported that nutrition knowledge was not significantly correlated to BMI in children and adolescents. Furthermore, [28] reported that there was no significant difference in nutrition

knowledge between the obese and non-obese adolescent groups. In contrast, [29**]** showed that limited nutrition knowledge was associated with the increase risk (five times more likely) of childhood obesity (*OR* = 5.3, 95% *CI* = 1.1-24.9). Some adolescents might have good nutrition knowledge but they did not apply the knowledge in their normal life for better health.

Weight management knowledge

The current study showed that there was no difference between weight management knowledge in male and female adolescence in Libyan schools in Malaysia. The primary school students with higher score of weight management reported lower weekly frequency of consuming sweetened drinks and soft drinks. Those of the adolescents with higher weight score consumed more dietary fiber compared to adolescents with lower score. To date, limited evidence has been reported differences in weight management knowledge in children and adolescents. Based on the weight management knowledge inventory [30] this finding concurs with those of recent studies [31] [32] that found no association between weight management knowledge and body weight status among Malaysian female adolescents. In line with the current finding found studies have reported that that both categories of overweight/obese and normal weight adolescents had low level of weight management knowledge. [31] [32].

CONCLUSIONS

The present study showed the significant association between dietary factors, physical activity, lifestyle, and sedentary behavior with obesity status. Future interventions may consider incorporating the identified factors to increase their effectiveness. More studies should be carried out to investigate the interaction between socio-demographic factors, behavioral factors and physical environment factors with body weight status of adolescents. In addition, this research suggests that educational level should be considered in the prevention programs of overweight and obesity among adolescent.

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