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Research Article

Physical Activity and Perceived Barriers to Activity among Kuwaiti Adolescents in Government Schools

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ABSTRACT

Regular Physical activity among young people is associated with many positive health outcomes related to prevention and control of obesity and non-communicable diseases which have a high prevalence in Kuwait.

Objectives: The objectives of our study were to investigate if Kuwaiti adolescents were performing sufficient physical activity and to identify the interfering barriers to performing physical activity.

Design: A cross sectional study design was used to collect data on current physical activity level among Kuwaiti adolescents.

Settings: Data were collected from students studying in Kuwait government secondary schools.

Subjects and Methods: Data were collected from 1000 school going Kuwaiti adolescents using the Arab Teen Life Style, Arabic version. Perceived barriers to physical activity were investigated using an ecological framework. Main Outcome.

Measures: The main outcome measures of the study were to identify if respondents were performing sufficient levels of physical activity and also identify the barriers to performing physical activity.

Results: The results revealed that only half of the boys (51.1%) and one fourth of the girls (20.8%) from the sample met the recommended daily physical activity levels (2520 MET min/week, moderate to vigorous physical activity). The most common perceived. barriers were hot weather (52.8%), having lot of homework (41.1%), lack of time (39.4%), prefer other hobbies (24.9%) and no motivation to exercise (21.3%).

Conclusion: Majority of the Kuwaiti adolescents from government schools perform insufficient physical activity. A comprehensive health promotion program including environmental modifications like indoor play areas and health education highlighting benefits of regular physical activity is suggested to improve physical activity level among Kuwaiti adolescents.

Keywords: Physical Activity; Adolescents; School; Teen Lifestyle Study; Barrier, Kuwait; Gulf Country.

INTRODUCTION

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that require energy expenditure [1]. Many studies have indicated that regular participation in PA among young people is associated with many positive immediate and long-term health benefits related to musculoskeletal tissues, cardiovascular system, neuromuscular awareness and maintain a healthy body weight. PA is also associated with positive psychological benefits in young people by improving their control over symptoms of anxiety and depression, building self-confidence and demonstrating better academic performance at school [2].

Adolescence is an important stage of life as it is the time when lifestyle behaviors are formed and established. PA during adolescence may contribute to development of healthy adult lifestyles, helping reduce chronic disease incidence Physical inactivity on the other hand is the fourth leading risk factor for global mortality and ranking before overweight and obesity (5%) after high blood pressure (13%), tobacco use (9%) and high blood glucose (6%) [3, 4].

The rapid increase in wealth and subsequent development of Gulf countries has led to dramatic changes in lifestyle. Fast food chains, easy access to cars and increased popularity of processed foods, lack of exercise, etc. have caused an increase in obesity in Gulf countries [5,6]. The report from the National Nutrition

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Surveillance showed that fast food, excessive consumption of energy drinks, soft drinks, frequent snacking and lack of physical activity are the major risk factors for overweight and obesity among Kuwaiti children and adolescents [7]. A recent study on the prevalence of overweight and obesity among Kuwaiti adolescents showed over half of the adolescents overweight or obese and the prevalence of overweight and obesity was higher in boys (59.8%) than in girls (49.9%) [8].

WHO data for people aged 15 years and older from 16 countries in the eastern Mediterranean region shows the highest levels of overweight and obesity existing in Egypt, Bahrain, Jordan, Kuwait, Saudi Arabia and United Arab Emirates. The prevalence of overweight and obesity in these countries ranges from 74% to 86% in women and 69% to 77% in men. Increasing levels of overweight and obesity among children and adolescents is of grave concern as recent evidence links childhood and adolescent's obesity to increased obesity and morbidity in adulthood [9]. Despite these alarming figures, previous studies revealed a low level of physical activity among school students, college students and chronic patients in Kuwait [6,8].

Latest guidelines on recommended levels of PA for children and youth indicate that engaging in moderate to vigorous intensity PA for at least 60 minutes and up to several hours daily and reducing, the sedentary time is highly beneficial for overall health [1, 4]. This conclusion is based on evidence from observational studies in which higher levels of activity were associated with more favorable health outcomes. Equally important is the physical or built-up environment, which has received a lot of attention in public health research over the last ten years. This has led to many research studies on environmental conditions and their relationship with PA behaviors. [10, 11]

Although barriers to physical activity were investigated in other Gulf countries, these may not apply completely to Kuwait as health behaviors and influencing barriers depend on cultural, economic and political environments which are different in each country [8].

The high rate of obesity among adolescents in the Arab world and an environment that encourages an unhealthy lifestyle makes it essential to study the barriers to physical activity. Studies from some western countries indicate that there are various social, personal, cultural and environmental barriers to physical activity among adolescents [10]. Understanding these barriers among adolescents and acting upon them in a positive way is essential to improve the health status of the community.

The objectives of this study were to determine if Kuwaiti adolescents from government secondary schools are performing adequate physical activity according to WHO guidelines, investigate the perceived barriers and evaluate the relationship of socio-demographic characteristics with physical activity among Kuwaiti adolescents.

SUBJECTS AND METHODS

A cross-sectional study was conducted among Kuwaiti adolescents aged 15-18 years old from both genders studying in Kuwait government secondary schools during the period from September 2019 to December 2019. A multistage stratified random sampling technique was used to obtain the sample. In the first stage, schools were selected using a systematic random sampling procedure. We used stratified sampling in order to get a good mix of adolescents. The schools were stratified on the basis of gender i.e., secondary schools for boys' and girls. Four schools (two schools for boys and two for girls) were selected from each of the six governorates: Capital, Farwaniya, Hawalli, Jahra, Ahmadi and Mubarak Al Kabeer. At the second stage, two classes from each school were selected using a simple random sampling technique from grades 10, 11 and 12. Therefore, at least 48 classes were selected (24 each from boys' and girls' schools). The average number of students in each class of the government secondary schools was approximately 25 students. All students in the selected classes aged 15-18 years, from both sexes and free from any physical deformities or physical health problems participated in the study. All students with any mobility impairment were excluded from the study. The sample size was calculated according to the ministry of education census of both boys and girls of Kuwait government secondary schools. Estimating the number of adolescents' citizens to be around 59644 persons and considering a confidence level of 95% and a confidence interval of 5%, it was found that the sample must not be less than 382. From those who met the study criteria, 1050 Kuwaiti adolescents were asked to fill the questionnaire out of which 827 participated with a response rate of 78.7%. The final sample comprised of 827 adolescents (423 boys and 404 girls). Since a larger sample size gives greater significance, we chose to oversample.

Instrument

An interview questionnaire was constructed to collect data about physical activity and interfering barriers. The questionnaire consisted of four parts. First part collected data about socio-demographic characteristics and presence of chronic disease. Socio-demographic data included sex, age, level of education of parents and governorate of residence.

Second part of the questionnaire was designed to measure the Height and Weight of the participants. The standing height of the participants was measured without shoes using a calibrated portable stadiometer in centimeters and then recorded to the nearest 0.1cm. The weight of the participants was measured without shoes using a standardized balance scale in kilograms and recorded to the nearest 0.1kg. The body mass index (BMI) was calculated using the formula: BMI (kg/m2) = body weight (kg)/ (body height*body height) (m2). BMI for participants 15 to 17 years was categorized obese and overweight according to The International Obesity Task Force (IOTF) age-and sex specific BMI cut-off reference standards [12] and for participants 18 years and above, the World Health Organization (WHO) cut-points for adults were used [13]. Third part of the questionnaire assessed the level of physical activity among the participants using the Arab Teens Lifestyle Study (ATLS) [14]. This instrument has been validated and used by several studies among adolescents in Gulf countries. ATLS consists of 30 items relating to patterns of PA that help in estimating PA levels based on frequency, duration, and intensity of a variety of light,

moderate and vigorous intensity physical activities during a typical week. The questions include physical activity at school, home and during leisure time. Metabolic equivalents of physical activity level (MET) were calculated and level of physical activity was classified according to MET scores as the following: Moderate intensity physical activity includes activities such as normal pace of walking, brisk walking, household activities, recreational swimming, and moderate intensity recreational sports such as table tennis, volleyball, and badminton. Moderate intensity physical activities were assigned metabolic equivalent (MET) values based on the compendium of physical activity and the compendium of physical activity for youth. Household activities were given a mean MET value of 3. This is because they include some items that may require less than 3 METs such as washing dishes (2.5METs), cooking (2.5METs), cleaning the bathroom (2.5METs), and ironing(2.3METs), as well as other household activities that require 3 METs or more such as car washing (3METs), gardening (3.5METs) vacuuming(3.5METs), and mopping (3.5METs). Slow walking, normal walking pace walking and brisk walking were assigned MET values of 2.8, 3.5 and 4.5 METs, respectively, based on modified METs values from the compendium of physical activity for youth. Moderate intensity recreational sports were assigned an average MET value equivalent to 4 METs [14, 15].

Vigorous intensity physical activity and sports included activities such as stair climbing, cycling, running, jogging, weight training, self-defense, and vigorous- intensity sports such as handball, basketball, singles tennis and soccer. Vigorous- intensity sports were assigned an average MET value equivalent to 8METs. WHO states that adolescents should participate in moderate to vigorous intensity activities for at least 1 hour/day to ensure health benefits moderate to vigorous intensity sports were assigned an average MET value equivalent to 6METs?

Physical activity levels were measured according to ATLS as following: First, measure of physical activity levels is the total number of minutes spent in physical activity per week as well as the number of minutes spent in moderate and vigorous intensity physical activity per week [1,4]. The minimal activity level based on time spent on physical activity per week was calculated according to the minimal recommended physical activity for children and youth, which is 1 hour of at least moderate-intensity activity per day. This is an equivalent of 420 minutes per week (60 minutes multiplied by 7 days per week). The second, measure of physical activity that is used in ATLS considers both time and intensity of physical activity. This includes the total METs minutes per week as well as the METs minutes per week resulting from each moderate and vigorous intensity physical activity. This is an equivalent of the sum of time spent in specific activity per week multiplied by the MET value of that activity. Two different cut-off scores are usually used to define physical activity of the participants. The first is the lower cut-off score of 1680 MET-min/week (equivalent to moderate activities of 1hour/day), considered to be performing recommended physical activity. The second cut-off score is the WHO recommended moderate to vigorous intensity physical activity for at least 1 hr./day (≥2520 MET min/week) to ensure health benefits.

For the current study, participants were divided into physically active or inactive based on total physical activity cut –off scores of 2520 METs minutes per week (60 minutes per day x 7 days per week x 6 METs) corresponding to 1 hour of daily moderate to vigorous intensity physical activity.

Fourth part of the questionnaire investigated barriers to physical activity. After review of the literature, barriers were selected and categorized into Personal barriers (12 items), Social barriers (4 items) and Environmental barriers (4 items) [6, 8, 10, 16-19]. Participants could choose more than one item in every category and the percent of each barrier was calculated according to the number of participants who selected it. This part of the questionnaire was tested for face and content validity. Reliability was assessed using test-retest method and yielded a Cronbach's alpha value of 0.811 for the 20 items. Doctors and Health educators from Health Promotion Department, Ministry of Health, were trained to instruct and guide the students on answering the interview questionnaire and taking the measurement for height and weight of the participants. A pilot study was conducted in two government secondary schools (one schools for boys and one for girls), one from Hawalli district, and other from Farwaniya district, for 55 Kuwaiti adolescents. The participants in the pilot study showed a good understanding with appropriate response to the questionnaire. Therefore, the same questionnaire was used in the final study. The participants filled the questionnaire in their classrooms under the supervision of their teachers and at least one of the research assistants.

Statistical analysis

Data analyses were undertaken using Statistical Package for the Social Science 20. The data was checked and the total MET was measured according to ATLS. Summary statistics as numbers and percentage, mean and standard deviation were used to describe data. Chi square test was used to assess the association between categorical variables and independent t-test for quantitative data. Calculation of barriers to physical activity was done by summing the score of each item in the category and the total score of barriers calculated by summing the total score of all three categories. Independent t-test and one- way ANOVA were then used to calculate the mean of individual barriers and of the total barriers. Physical activity levels – the dependent variable- were grouped as “up to moderate physical activity” and “moderate to vigorous physical activity”. The included independent variables were socio-demographic factors, BMI and all the barriers to physical activity. A two-sided p-value of 0.05 or less was considered as the cut-off level for statistical significance.

Ethical Considerations:

Permission to conduct the study was obtained from both the Standing Committee for Coordination of Health and Medical research, Ministry of Health, Kuwait and Ministry of Education. A written informed consent was obtained from the parents of each participant before administering the questionnaire.

RESULTS

Table 1: There were significant differences between boys and girls in mean age (p ≤000) and there were slightly more boy participants (51.1%) than girls (48.9%). Regarding weight and height, boys were significantly taller and heavier than girls (both p ≤ 0.000). The combined prevalence of overweight and obesity was 47.7% for boys and 33.9% for girls. The table shows a significant relation between gender and BMI (p≤0.001). Only 6.5% of the total sample size suffered from chronic disease.

Variable	Boys (423)			Girls (404)			Total(827)	P-value
	Mean ± SD	N.	%	Mean + SD	N.	%		
Age (yr.)	16.03+1.03	423	51.1	16.56+.793	404	48.9	-	.000
Weight (kg)	71.57+17.84	399		60.85+15.56	402			.000
Height (cm)	168.6+ 10.21	399		158.7+6.33	403			.000
BMI(wt./ht2)								
Overweight (%)	-	109	27.5		71	17.7	180(22.6%)	
Obese (%)	-	80	20.5		65		145(18.2%)	.001
Overweight + Obese (%)	-	189	47.7		136	33.9	-	
Chronic Disease								
H No chronic disease		392	47.4		381	46.1	54(6.5%)	.399
Chronic disease		31	3.7		23	2.8		

** P≤0.05

Table-1: Relationship between socio-demographic of Kuwaiti adolescents by gender.

Table 2: shows there is no significant differences between boys and girls regarding hours of moderate activity (P= 0.447) and MET–mint/week of moderate physical activity (p=.462). On the other hand, boys had a significantly higher level of vigorous activity (p< 0.000) and Met –mint /week vigorous activity than girls. The Total Met- mint score per week was significantly (p<0.000) higher in boys than in girls. Regarding the recommended MET for moderate to vigorous- intensity physical activity level of 1 h/d, A significantly (p=0.00) higher proportion of boys (51.1%) than girls (20.8%) met the recommended moderate to vigorous intensity physical activity level of 1hr/d (≥2520 MET-min/week).

Level of physical activity	Boys (423)			Girls (404)			P-value
	Mean	95 % CI	%	Mean	95 % CI	%	
Moderate activity (h/ week)	2.7	2.4, 3.1	-	2.9	2.6, 3.4	-	.447
Moderate activity (MET-mint/week)	668.07	584.8, 751.2	-	713.8	623.9, 803.7	-	.462
Vigorous activity (h/week)	2.87	2.5, 3.3	-	1.3	1.0, 1.5		.000
Vigorous activity(MET-mint/week)	1379.7	1184.6, 1574.8	-	609.7	501.3, 718.0		.000
Total MET-min/ week	2031.2	1787.1, 2275		1321.7	1152.9, 1837		.000
1680 MET-min/ week (%)			53.7		-	46.3	.467
2520MET-min/week (%)			51.1		-	20.8	.000

a Chi square Test P<0.05**

Table-2: Level of Physical Activity in relation to gender

Table 3: shows Barriers to Physical activity in relation to gender: The most common Personal barriers were: lot of homework (41.1%), do not have time (39.4%), prefer other hobbies (24.9%) and no motivation to exercise (21.3%). The most common social barriers were social habits discouraging from exercise (16.6%) and no encouragement from parents (16.3%). Of the Environmental barriers, the most common ones were weather (52.8%), no near place to exercise (19.2%) and no affordable place to exercise (17.7%). The personal barriers that had a significant effect on not performing sufficient physical activity were: no motivation to exercise (p≤ 0.002), don't like to exercise (p≤0.048), Do not have time (p≤0.000), Lots of homework to do (p≤0.000), Afraid of injury (p≤0.010), Preferring other hobbies (p≤0.008) and have some disease (p≤0.024) The social barrier which had a significant impact on physical activity were: No encouragement from parents (p≤0.039), No encouragement from friends p≤ (0.000*) and Social habits discourage from exercise (p≤0.038) Two environmental barriers had a significant effect on performing physical activity: Weather (p≤0.004) and No affordable place to exercise (p≤0.000).

Barriers	Boys		Girls		Total	P-value
Personal Barriers	N=0	%	N=0	%	N (%)	
No motives to exercise	108	61.4%	68	38.6%	176(21.3%)	.002**a
Don't like to exercise	56	60.9%	36	39.1%	92(11.1)	.048
Don't have skills to exercise/sports	43	60.6%	28	39.4%	71 (8.6%)	.097
Don't have time	140	42.9%	186	57.1%	326 (39.4%)	.000**a
Feels ashamed to exercise	34	59.6%	23	40.4%	57 (6.9%)	.183
Lot of home work to do	131	38.5%	209	61.5%	340 (41.1%)	.000**a
Afraid of injury	42	66.7%	21	33.3%	63 (7.6%)	.010**a
Feeling tired	61	52.6%	55	47.4%	116 (14.0%)	.738
No information	35	56.5%	27	43.5%	62 (7.5%)	.385
Don't have enough body strength	37	59.7%	25	40.3%	62 (7.5)	.162
Prefer other hobbies	89	43.2%	117	56.8%	206 (24.9%)	.008**a
Have some disease	28	68.3%	13	31.7%	41 (5.0%)	.024
Social Barriers	Social Barriers					
No encouragement from parents	80	59.3%	55	40.7%	135 (16.3)	.039
No encouragement from friends	71	68.3%	33	31.7%	104 (12.6%)	.000**a
No encouragement from teacher	56	47.9%	61	52.1%	117 (14.1%)	.443
Social habits discourage from exercise	59	43.1%	78	56.9%	137 (16.6%)	.038
Environmental Barriers						
Weather as barriers	244	55.8%	193	44.2%	437 (52.8%)	.004**a
No affordable place to exercise	100	68.5%	46	31.5%	146 (17.7%)	.000**a
No near place to exercise	77	48.4%	82	51.6%	159 (19.2%)	.445
No safe place to exercise	49	57.0%	37	43.0%	86 (10.4%)	.253

a Chi square Test P<0.05**

Table-3: Barriers to Physical Activity in relation to Gender

Table 4: shows the relation between up to Moderate and Moderate to Vigorous Physical activity levels with socio-demographic variables & BMI. Year 12 students performed the highest level of moderate physical activity, 34.8% but they also performed the least amount of moderate to vigorous physical activity, 30.6%. There was no significant relation between year of study and physical activity levels. Students from Hawalli governorate performed the highest level of moderate (43.2%) and moderate to vigorous (37.5%) of physical activity. Students from Ahmadi governorate performed the least (8.4%) moderate physical activities while students from both Ahmadi and Farwaniya governorate performed the least amount of vigorous activity (11.1%). There was a significant relation (p value≤0.024) between moderate level of physical activity and the Kuwait governorates. Students with fathers and mothers having graduate level education had the highest level of moderate (54.8% & 53.7% respectively) and moderate to vigorous level (41.7% & 55.6% respectively) of physical activity. Students of diploma educated fathers had lowest moderate (6.3%) and moderate to vigorous (8.3%) level physical activity. There was a significant relation between father's education and moderate level physical activity (p≤.0.038). On the other hand, students of less than secondary school educated mothers performed the least moderate to vigorous physical activity (11.1%) and there was a significant relation between mother's level of education and performing moderate to vigorous physical activity (p value≤0.001) Students without chronic diseases performed a significantly higher % of moderate physical activity (93.7%) and moderate to vigorous physical activity (95.8%). BMI categories did not have any significant relation with physical activity level but obese students performed the least amount of both moderate physical activity (16%) and moderate to vigorous physical activity (11.9%). Normal weight students performed the most amounts of both moderate (51%) and moderate to vigorous (44.8%) physical activity.

Variable	Up to Moderate physical activity %	P-Value	Moderate to vigorous physical activity %	P-Value
Sociodemographic				
Year of study				
Year 10	32.6%		34.7%	
Year 11	32.6%	.200	34.7%	.126
Year 12	34.8%		30.6%	
Governorate				
Capital	12.6%		13.9%	
Hawalli	43.2%		37.5%	
Farwaniya	10.5%	.024	11.1%	.156
Jahra	13.7%		13.9%	
Mubarak Alkabeer	11.6%		12.5%	
Ahmadi	8.4%		11.1%	
Level of education of Father				
Less than secondary	24.2%		27.8%	
Diploma	6.3%	.038	8.3%	.104
Graduate	54.8%		41.7%	
Post Graduate	14.7%		22.2%	
Level of education of Mother				
Less than secondary	23.2%		11.1%	
Diploma	12.6%		18.1%	
Graduate	53.7%	.244	55.6%	.001**
Post Graduate	10.5%		15.3%	
Existence of chronic disease				
No chronic disease	93.7%		95.8%	
Chronic disease	6.3%	.253	4.2%	.288
BMI Categories				
Under weight	11.7%		19.4%	

Normal weight	51.0		44.8%	
Over weight	21.3%	.857	23.9%	.257
Obese	16.0%		11.9%	

a Chi square test **P<0.05

Table-4: Relation between physical Activity (up to Moderate, Moderate to vigorous) with Socio- Demographic variable & BMI.

Table 5: demonstrates that there was a significant relationship between the mean number of personal barriers, environmental barriers and total barriers with gender (p=0.014, p=0.001, p=0.00 respectively). There was also a significant relationship between BMI and mean of personal and total barriers (p=0.015, p=0.011 respectively). Overweight category had the highest mean number of personal and total barriers while underweight category had the lowest mean.

Variable	Personal Barriers	Social Barriers	Environmental Barriers	Total Barriers
Gender				
Boys	1.9007±1.711	0.62±0.79	1.11±0.92	3.67±2.71
Girls	2.00±1.54	0.63±0.79	0.88±0.79	3.44±2.12
P-Valuea	0.014**	0.093	0.001**	0.00**
Year of Study				
10	2.01±1.75	0.573±0.79	1.05±0.90	3.64±2.77
11	1.92±1.51	0.60±0.75	1.01±0.900	3.54±2.22
12	1.92±1.63	0.60±0.77	1.01±0.868	3.47±2.36
P-Valueb	0.212	0.68	0.08	0.06
Level of Father Education				
Less than secondary	1.92±1.73	0.65±0.78	1.05±0.85	3.62±2.46
Diploma	2.12±1.53	0.65±0.77	1.10±0.86	3.87±2.10
Graduate	1.86±1.50	0.54±0.73	0.96±0.87	3.37±2.36
Post Graduate	2.10±1.90	0.59±0.81	0.91±0.88	3.62±2.92
P-Valueb	0.523	0.898	0.613	0.185
Level of Mother education				
Less than secondary	2.11±1.70	0.64±0.76	1.08±0.88	3.83±2.51
Diploma	1.94±1.71	0.67±0.89	1.02±0.85	3.64±2.62
Graduate	1.87±1.58	0.56±0.73	0.95±0.86	3.38±2.36
Post Graduate	1.82±1.49	0.47±0.68	0.96±0.84	3.26±2.16
P-Valueb	0.234	0.153	0.345	0.529
BMI				
Underweight	1.76±1.62	0.56±0.84	1.01±0.97	3.33±2.20
Normal	1.82±1.47	0.60±0.74	0.93±0.82	3.36±2.25
Overweight	2.23±1.80	0.71±0.82	1.13±0.86	4.07±2.73
Obese	1.96±1.63	0.53±0.70	1.08±0.91	3.77±2.58
P-Valueb	0,015**	0.188	0.061	0.011**

Table-5: Relation between mean number of barriers and socio-demographic variables & BMI

DISCUSSION

According to WHO, physical inactivity was ranked fourth as a risk factor for mortality worldwide and a major contributor to occurrence of NCDs. Insufficient physical activity is considered as a key risk factor for non-communicable diseases (NCD). The present study found that only half of the boys (51.1%) and approximately one fifth of the girls (20.8%) from the sample met the recommended daily physical activity levels (≥ 2520 MET min/week, moderate to vigorous physical activity). These findings were similar to other studies which reported low levels of physical activity in Kuwait. Contrary to results of previous research done in Saudi-Arabia [16], the present study had more percentage of boys in the overweight & obese (47.7%) category compared to females which was at 33.9% but was similar to another study on adolescents in Kuwait and the National Nutrition Surveillance Report which both had more overweight and obese boys than girls [7,17]. Using the lower cut-off score of 1680 MET-min/week, Moderate level of physical activity (equivalent to moderate activities of 1h/d), considered to be performing recommended physical activity [1], about 53.7% of the boys and 46.3% of the girls were found to be physically active. There is some similarity of the results of this study to an earlier study done in Kuwait where about 70% of the boys and 39% of the girls were found to be physically active [17]. In a similar study in Saudi Arabia, over half the boys and less than a quarter of the girls met this recommendation. Based on average MET min/week of both moderate and vigorous activities, Kuwaiti boys performed more physical activity than the girls [18]. For the present study, the WHO recommended that adolescents should participate in moderate to vigorous intensity activities for at least 1 hr/day (≥2520 MET min/week) to ensure health benefits.[4] Using the WHO recommended higher cut-off, nearly 50% of the boys and approximately 20% of the girls were found to be physically active. In a similar study in Kuwait, slightly over half the boys and less than a quarter of the girls met this recommendation. [17]. The findings from this study provide evidence on the low levels of physical inactivity among Kuwait adolescents, especially among females. Majority of the risk factors associated with several chronic diseases in Arab countries among both children and adults is associated with Physical inactivity [19]. Performing regular physical activity is influenced by several social, personal and environmental factors [20]. The difference in physical activity level among Kuwaiti children could be due to cultural reasons, families' not encouraging girls to take part in physical activities and also the various barriers to physical activity as found out by the present study. Also compared with boys, girls generally have limited opportunities and indoor/outdoor facilities for physical activities [21]. However, differences in gender to physical activity among adolescents were also noted in many other countries [22, 23, 24,16]. In a study conducted in Europe including 24 countries, the percentage of young adolescents who were engaging in different type of physical activities for a least 1hr/day ranged from 27% to 49% in boys and from 11% to 37% in girls [11]. The present study shows that there are many prevalent barriers to physical activity for adolescents in Kuwait. Variable proportion of students stated various barriers to physical activity. Regarding personal barriers to performing physical activity, having lot of homework to do (41.1%), lack of time (39.4%) and prefer other hobbies (24.9%) were the most common cited barriers. These findings are similar to a study conducted in Muscat among adolescent children [24] Regarding social barriers to physical activity, a high percentage of females in our study felt that social habits discouraged them from exercise (56.9%). In a study conducted in Europe, social image/habits were found to be a major barrier for adolescent girls to physical activity with messed up make-up and hair being stated as a barrier [21]. There was also the idea from adolescent girls as being perceived as masculine and being bullied if taking active part in sports [25].

A high percentage of males felt that there was no encouragement from friends (68.3%) and no encouragement from their parents (59.3%). In a similar study conducted in Kuwait, nearly 60% stated they had no encouragement from friends and nearly 50% stated that they had no encouragement from parents. [10] The most prevalent barrier to physical activity in the present study was found to be the weather (52.8%). This finding was expected as hot weather was reported as a major barrier to physical activity in other countries in the Gulf region [6, 26]. More females than males perceived unavailability of nearby facilities to exercise as a barrier while more males had mentioned not having an affordable place to exercise as a major barrier to physical activity. Also, more males felt not having a safe place to exercise as a barrier to physical activity than females (57% to 43%). Unavailability of safe recreational places was considered a major obstacle to physical activity in USA and Europe [25-28]. Obesity was not significantly related to number of barriers but the obese category performed the least level of moderate and moderate to vigorous physical activity (11.9%). Earlier research on adults estimated that the relation between low level of physical activity and obesity may be bidirectional; obesity was considered as a cognitive barrier to physical activity due to shyness, embarrassment, decreased self-efficacy and higher perception of barriers [29, 30]. The present study has limitations. The data on physical activity and barriers were collected using a self-reported questionnaire and this may have caused some errors in estimation. However, the study used a validated and comprehensive physical activity questionnaire and used MET to calculate energy expenditure from physical activity, which adds to the strength of the study. Furthermore, use of a representative sample from public school children in Kuwait adds to the strength of the study.

CONCLUSION

The benefits of physical activity are obvious and it is essential that individuals are encouraged to take part and enjoy physical activity. The present study has generated valuable information that can be used as a basis to form new policy. The data on physical activity also indicates that a large proportion of Kuwaiti adolescents especially girls, do not perform adequate physical activity. Taking into account the high prevalence of overweight and obesity, the present study findings need to be taken into account and there should be a combined effort from school and health authorities to provide adequate safe facilities like indoor play area, fitness s=centers and parks with shaded areas to perform physical activity to combat the harsh weather conditions prevalent in the region. The importance of physical

activity should be emphasized in schools and adequate time should be allotted for the same by the school authorities. Health education is a corner stone to change lifestyle behavior and can have a positive impact on physical activity levels and general wellbeing.

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Conflicts of interest

A.K.B and A.N conceived the study design. H.S and J.K.P supervised data collection, data entry, conducted the data analysis and wrote the manuscript. All authors read, edited and approved the manuscript.

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