Physical activity and life style among Male Adolescents in Jeddah, Saudi Arabia

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Abstract: The physical activity among adolescents varies greatly around the world according to the habits, cultures and environmental conditions. Therefore, the present study aimed to investigate the different physical activities among adolescent students in areas Jeddah, Saudi Arabia. **Methods:** This cross-sectional study was conducted during fall 2010 including 10 schools from four geographical areas. The participants were 530 male students from secondary-school Their ages ranged between 16-17 years. Measurements included anthropometric measures (weight, height, and waist circumference), physical activity (walking, jogging/running, biking, swimming, self-defense, etc.) using a validated questionnaire. **Results:** Time in minutes spent per week in different types of physical activity by adolescents revealed non-significant difference in walking weekly, stairs use per day, jogging/running, biking and swimming, where as it was significant in minutes walking per time (p=0.013) and minutes biking(p=0.006). The P-value for the one-way ANOVA tests (according to school area) for the sum of all moderate-intensity physical activity p=0.002; for the sum of all vigorous-intensity physical activity p=0.026, and for the total physical activity p=0.001. The P-value for the independent sample t-tests (according to clusters) for the sum of all moderate-intensity physical activity, p=0.000; for the sum of all vigorous-intensity physical activity, p=0.000, and for the total physical activity, p=0.000. **Conclusions**: It is concluded that the physical activity among student adolescents differ significantly from geographical area to another in Jeddah and the youth are suffering from inadequate physical activity.

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1. Introduction

Recently there have some concerns over the change in the diets and health of adolescence. Historically, the focus has been on the provision of sufficient nutrients and energy in relation to current and future needs, but providing dietary balance and encouraging less sedentary lifestyles are now viewed as the main priorities. These issues are worthy of attention because poor eating and physical activity habits in childhood may increase the risk of health problems in later life (Collison, *et al*. 2010).

Regular physical activity and proper dietary habits can maintain and improve the individuals' physical and mental health and well-being. Furthermore, physical activity participation in youth can be an important way to boost energy expenditure and reduces weight gain.

Some investigators recommended that children and adolescents should accumulate at least 60 minutes of moderate to vigorous physical activity (MVPA) per day (Biddle *et al*., 2004), but many studies revealed that no more than one third of the adolescents seemed to achieve this physical activity recommendations (Currie *et al*., 2004; Nilsson *et al*., 2009). Also, a decline in physical activity from childhood to adolescence has previously been shown (Armstrong & Welsman, 2006, De Cocker *et al*., 2011). In addition, the American Academy of Pediatricshas recommended that children spend no longer than two hours per day on sedentary activities (American Academy of Pediatrics, 2001). Improper feeding habits and physical activity in childhood may increase the risk of health problems in later life (Collison *et al*., 2010).

Recently, many cities in Saudi Arabia have observed visible lifestyle changes. This is mainly due to rapid growth in major cities, increased use of technology, availability of high-fats and dense-caloric foods, and reduced occupational-work demands (Al-Hazzaa *et al*., 2011).

Major risk factors of non-infectious diseases are prevalent in Saudi Arabia including hypertension, hypercholesterolemia, inadequate intake of fruit and vegetables, overweight or obesity, physical inactivity and tobacco use. Most of these risks are closely related to improper diet and physical inactivity (WHO, 2010). Therefor, the present study presents the levels of physical activity and lifestyle habits of Saudi male adolescents from Jeddah.

2. Material and Methods:

Study sample

A total of 530 adolescent students were invited to participate in this study from different schools in

geographic localities (South, East, West and North) from Jeddah one of the major cities in Saudi Arabia. A random sample with multistage stratified cluster technique was used to select the sample. The final number of sample size included 106, 105,161 and 158 school students from the four geographic areas (South, East, West and North) of the city of Jeddah, respectively.

The selected participants were free of any physical health problems. The data were collected during fall 2010. The study protocol and procedures were approved by the Deanship of Scientific Research (DSR), King Abdulaziz University.

Anthropometric measurements

Anthropometric data included body weight and height. Measurements were performed in the morning by a trained researcher. Body weight was measured to the nearest 100 g using calibrated portable scales. Measurements were done with minimal clothing and without shoes. Height was measured to the nearest centimeter using a calibrated measuring bar while the subject was standing without shoes. Body mass index (BMI) was calculated as the ratio of weight in kilograms by the height squared in meters.

Physical activity questionnaires

The questionnaire that was used for the assessment of physical activity was previously found to be valid (Al-Hazzaa *et al.,* 2011b). The questionnaire collect information on frequency, duration and intensity of many light-, moderate- and vigorous-intensity physical activities during a typical week, covering as transport and household, fitness and sports activities domains. Activities include walking, jogging/running, swimming, cycling, self-defense, weight training, households, as well as many sports activities such as volleyball, badminton, table tennis, basketball and soccer.

Physical activities were classified into light-, moderate and vigorous-intensity activities based on metabolic equivalent (MET) values according to the compendium of physical activity 21 and the compendium of physical activity for youth.22 Moderate-intensity physical activity includes activities such as normal-pace walking, brisk walking, recreational swimming, household activities and moderate-intensity recreational sports such as. Most household activities were given a mean MET value of 3 (moderate-intensity activity). Vigorous-intensity physical activity and sports (MET value > 6) included such activities as stair-climbing, jogging and running etc. Physical activity levels were classified into three categories based on the total time per week spent in total physical activity, moderate- and vigorous-intensity physical activities.

Data and statistical analysis

Data were checked and entered into a computer using an SPSS (SPSS, Inc, Chicago, IL) data file. The maximum total time spent on physical activity per week was made 4 hours for each physical activity per day. Data were then analyzed using SPSS, version 15. Descriptive statistics were presented as means, standard deviations (or standard error) and proportions.

A one-way ANOVA was used to test the differences in physical activity variables across different geographic areas (South, North, West, and East). Cluster Analysis is an exploratory tool designed to reveal natural groupings (or clusters) within our data. It can identify different groups based on various demographic and purchasing characteristics.

3. Results:

This study included 530 samples from schools from different geographical areas in Jeddah as follows: The numbers of students participating in the study from South, East, West and North were 106, 105, 161 and 158, respectively (Table 1). Their ages ranged between 16.84 and16.91years with an average of 16.88±0.99 years, without a significant differences (p=0.929) between the four geographical areas in Jeddah.

The standard waist/age ranged from 97.41 to 97.55 cm, with an average of 97.50±2.83 cm, without a significant variation (p=0.978, F=0.067) among students from four areas in Jeddah. The 3rd parameter studied was body weight, which ranged from 96.83 to 73.61, with an average 71.49±21.03 kg, without a significant difference between adolescents from different areas. Concerning the height and BMI it averaged 168.46±6.54 cm and 25.08±6.79kg/m^2, respectively, without significant differences as shown in table (1)

Table 1. Anthropometric characteristics of the participants. One way ANOVA tests were used to compare the mean values according to the school area (total n = 530).

	Area	N	Mean	±SD	F	*P*-value	Significance
Age (Year)	South	106	16.84	1.00	0.151	0.929	NS
	East	105	16.85	0.92			
	West	161	16.90	0.99			
	North	158	16.91	1.05			
	Total	530	16.88	0.99			
Standard waist/age	South	106	97.41	2.89	0.067	0.978	NS
	East	105	97.47	2.72			
	West	161	97.53	2.75			
	North	158	97.55	2.97			
	Total	530	97.50	2.83			
Weight (Kg)	South	106	73.61	22.28	0.634	0.594	NS
	East	105	69.83	22.34			
	West	161	70.88	19.78			
	North	158	71.80	20.60			
	Total	530	71.49	21.03			
Height (Cm)	South	106	168.23	7.03	0.975	0.404	NS
	East	105	167.61	6.28			
	West	161	168.76	6.52			
	North	158	168.89	6.41			
	Total	530	168.46	6.54			
BMI (kg/m^2)	South	106	25.86	7.03	0.626	0.598	NS
	East	105	24.76	7.47			
	West	161	24.82	6.42			
	North	158	25.05	6.53			
	Total	530	25.08	6.79			

The *p*-value for the one-way ANOVA tests (according to school area) for age was *p*=0.929; for standard waist/age was*p*=0.978, for weight *p*=0.594, for height *p*=0,404and for BMI *p*=0.598. Since the *p*-value > 0.05 in all cases, this means that there is no significant difference for the following parameters: age, standard waist/age, weight, height and BMI according to the school area.

Comparing the physical activity of adolescent students from the four different geographical areas were studied. As shown in tables (2, 3) walking per week ranged from 2.72 to 3.1, with a total average of 2.98±2.5 without a significant difference between students from the four different areas (F=0.89, *p*=0.446), whereas the minutes walking per time was varied significantly (F= 3.64, *p*= 0.013) according to the area, and ranged from 25.29 to 33.08, with an average of 30.94±34.81. Other parameters such as, stairs use per day, Jogging/running, minutes jogging, biking, swimming and minutes swimming were non significantly varied among students from the four geographical areas, it averaged 6.91±5.69; 2.12±2.18; 24.71±33.68;1.08±3.56 ; 0.98±5.36 and 27.98±44.42, respectively.

Table 2. Time in minutes spent in different types of moderate activity. One way ANOVA tests were used to compare the mean values according to the school area (total n = 530)

	Area	N	Mean	±SD	F	*P*-value	Significance
Walking frequency per week	South	106	3.05	2.34	0.890	0.446	NS
	East	105	3.10	2.50			
	West	161	2.72	2.47			
	North	158	3.13	2.63			

	Total	530	2.98	2.50			
Minutes walking per time	South	106	27.97	31.10	3.640	0.013	Sig
	East	105	33.08	41.81			
	West	161	25.29	28.04			
	North	158	37.28	36.81			
	Total	530	30.94	34.64			
Swimming	South	106	0.76	1.31	1.456	0.226	NS
	East	105	1.95	11.73			
	West	161	0.71	1.36			
	North	158	0.74	1.36			
	Total	530	0.98	5.36			
Minutes Swimming	South	106	30.75	42.17	1.888	0.131	NS
	East	105	35.75	53.81			
	West	161	23.98	46.20			
	North	158	25.02	35.97			
	Total	530	27.98	44.42			
Household Activity	South	106	1.27	2.03	4.897	0.002	Sig
	East	105	1.50	1.99			
	West	161	0.82	1.54			
	North	158	0.84	1.40			
	Total	530	1.05	1.73			
Min household Activity	South	106	12.99	22.87	5.310	0.001	Sig
	East	105	17.26	27.71			
	West	161	6.53	12.16			
	North	158	13.46	26.59			
	Total	530	12.01	22.91			

In addition, household activity and min household activity recorded a significant variations (p=0.002; p=0.001, respect.) among adolescents in different geographical areas in KSA, the values averaged 1.05±1.73 and 12.01±22.91, respectively (Table 2).

Table 3. Time in minutes spent in different types of vigorous activity. One way ANOVA tests were used to compare the mean values according to the school area (total n = 530)

	Area	**N**	**Mean**	**±SD**	**F**	***P*-value**	**Significance**
Stairs use per day	South	106	6.92	5.86	2.009	0.112	NS
	East	105	6.69	4.47			
	West	161	6.23	4.83			
	North	158	7.76	6.92			
	Total	530	6.91	5.69			
Jogging/Running	South	106	2.04	2.03	0.516	0.672	NS
	East	105	2.05	2.19			
	West	161	2.05	2.18			
	North	158	2.30	2.28			
	Total	530	2.12	2.18			
Minutes jogging	South	106	24.41	37.96	1.620	0.184	NS
	East	105	27.10	44.85			
	West	161	20.20	23.24			
	North	158	27.91	30.68			
	Total	530	24.71	33.68			
Biking	South	106	1.02	1.78	2.444	0.063	NS
	East	105	1.88	7.31			
	West	161	0.65	1.57			
	North	158	1.03	2.05			

	Total	530	1.08	3.65			
Minutes biking	South	106	13.08	25.81	4.227	0.006	Sig
	East	105	18.94	53.82			
	West	161	5.54	13.20			
	North	158	10.99	24.12			
	Total	530	11.33	30.81			
Self-defense	South	106	0.27	1.06	0.300	0.826	NS
	East	105	0.36	1.13			
	West	161	0.24	0.93			
	North	158	0.28	1.00			
	Total	530	0.28	1.02			
Minutes self Defense	South	106	5.42	17.21	0.072	0.975	NS
	East	105	5.21	21.21			
	West	161	4.96	19.85			
	North	158	5.95	19.39			
	Total	530	5.40	19.45			
Weight Training	South	106	1.24	1.99	0.902	0.440	NS
	East	105	1.46	2.35			
	West	161	1.03	1.85			
	North	158	1.25	2.20			
	Total	530	1.22	2.09			
Min weight Training	South	106	16.94	31.49	0.436	0.727	NS
	East	105	12.48	23.93			
	West	161	14.41	30.50			
	North	158	15.55	31.53			
	Total	530	14.87	29.80			

Moreover, the frequency of moderate activity, min moderate activity, frequency of vigorous activity, min vigorous activity, self-defense Min self-defense , weight training and minute weight training were also recorded a non-significant differences among the four areas, it averaged, 1.41±1.83; 25.64±32.88; 2.24±2.21; 45.90±47.40; 0.28±1.02; 5.40±19.45; 1.22±2.09 and 14.87±29.80, respectively.

Table 4. Time in minutes spent in different types of physical activity. One way ANOVA tests were used to compare the mean values according to the school area (total n = 530)

	Area	**N**	**Mean**	**±SD**	**F**	***P*-value**	**Significance**
Moderate Activity	South	106	1.26	1.63	1.511	0.211	NS
	East	105	1.35	1.72			
	West	161	1.29	1.68			
	North	158	1.66	2.13			
	Total	530	1.41	1.83			
Min Moderate Activity	South	106	28.68	32.82	1.432	0.232	NS
	East	105	23.21	31.83			
	West	161	22.39	27.69			
	North	158	28.54	37.96			
	Total	530	25.64	32.88			
Vigorous Activity	South	106	2.29	2.03	0.504	0.680	NS
	East	105	2.43	2.47			
	West	161	2.22	2.21			
	North	158	2.09	2.17			
	Total	530	2.24	2.21			
Min Vigorous Activity	South	106	47.57	48.69	2.510	0.058	NS
	East	105	42.42	53.41			
	West	161	39.67	38.46			
	North	158	53.43	49.82			
	Total	530	45.90	47.40			

Figure 1: The sum of all moderate, vigorous intensity and total physical activity according to the school area.

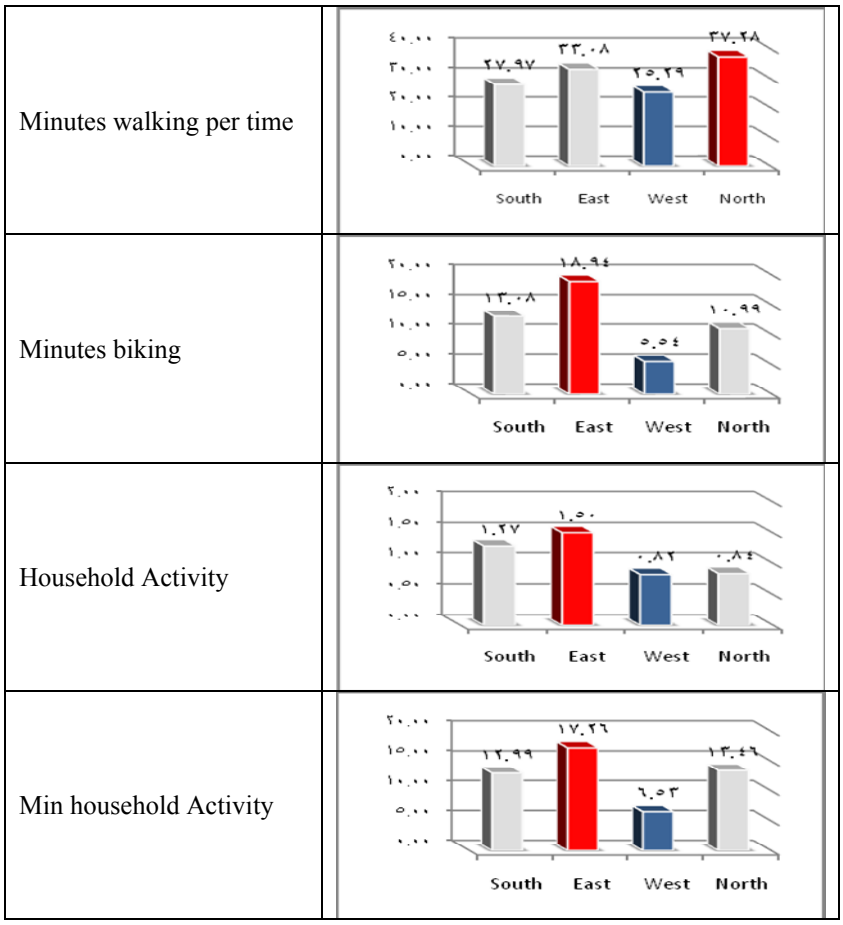
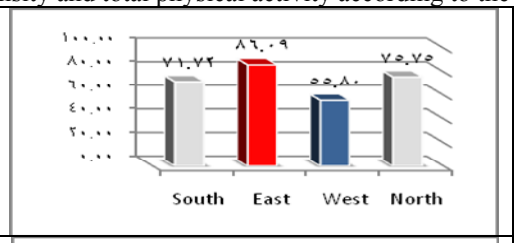
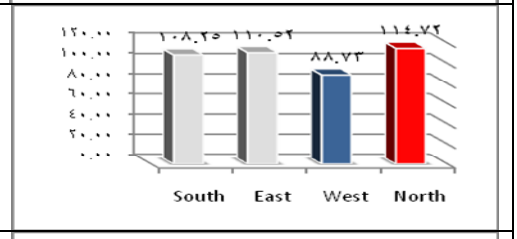
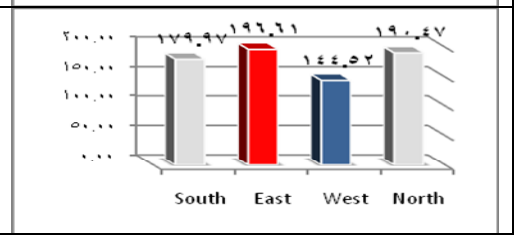


Table 5: The sum of all moderate, vigorous intensity and total physical activity.

	Area	N	Mean	±SD	F	*P*-value	Significance
Sum of all moderate-intensity physical activity (min/week)	South	106	71.72	63.75	5.013	0.002	Sig.
	East	105	86.09	70.73			
	West	161	55.80	66.32			
	North	158	75.75	62.51			
	Total	530	70.93	66.35			
Sum of all vigorous-intensity physical activity (min/week)	South	106	108.25	79.04	3.107	0.026	Sig.
	East	105	110.52	103.67			
	West	161	88.73	67.46			
	North	158	114.72	79.29			
	Total	530	104.70	81.93			
Total physical activity (min/week)	South	106	179.97	116.47	5.305	0.001	H. Sig.
	East	105	196.61	147.27			
	West	161	144.52	108.70			
	North	158	190.47	121.60			
	Total	530	175.63	123.98			

The *P*-value for the one-way ANOVA tests (according to school area) for the sum of all moderate-intensity physical activity p=0.002; for the sum of all vigorous-intensity physical activity p=0.026, and for the total physical activity p=0.001. Since the *P*-value < 0.05 in all cases, this means that there is a significant difference for the sum of all moderate-intensity physical activity; for the sum of all vigorous-intensity physical activity, and for the total physical activity according to the school area. In all variables, the West area seem to have the lowest values, and the following figures reflect the results.

Figure 2: The sum of all moderate, vigorous intensity and total physical activity according to the school area.

Sum of all moderate-intensity physical activity (min/week)	
Sum of all vigorous-intensity physical activity (min/week)	
Total physical activity (min/week)	

The cluster analysis was done and yields two groups. It is noted that the first group has high mean values for each of the sum of all moderate-intensity physical activity; the sum of all vigorous-intensity physical activity, and the total physical activity (table 6).

Table 6: The independent sample t-tests were done to test for the mean difference according to the two clusters. The results are summarized in the following table:

	Cluster Number of Case	N	Mean	SD	t	*P*-value	Significance
Sum of all moderate-intensity physical activity	High Level	126	145.02	82.18	18.359	0.000	H. Sig
	Low Level	404	47.82	37.85			
Sum of all vigorous-intensity physical activity	High Level	126	205.71	97.14	21.859	0.000	H. Sig
	Low Level	404	73.19	41.21			
Total physical activity	High Level	126	350.74	114.80	29.563	0.000	H. Sig
	Low Level	404	121.01	59.25			

The *P*-value for the independent sample t-tests (according to clusters) for the sum of all moderate-intensity physical activity, p=0.000; for the sum of all vigorous-intensity physical activity, p=0.000, and for the total physical activity, p=0.000. Since the *P*-value < 0.001 in all cases, this means that there is a highly significant difference for the sum of all moderate-intensity physical activity; for the sum of all vigorous-intensity physical activity, and for the total physical activity according to the clusters and towards the high level and the following figures reflect the results.

Figure 3: Testing the relation between the two clusters (High and low) and the school area.

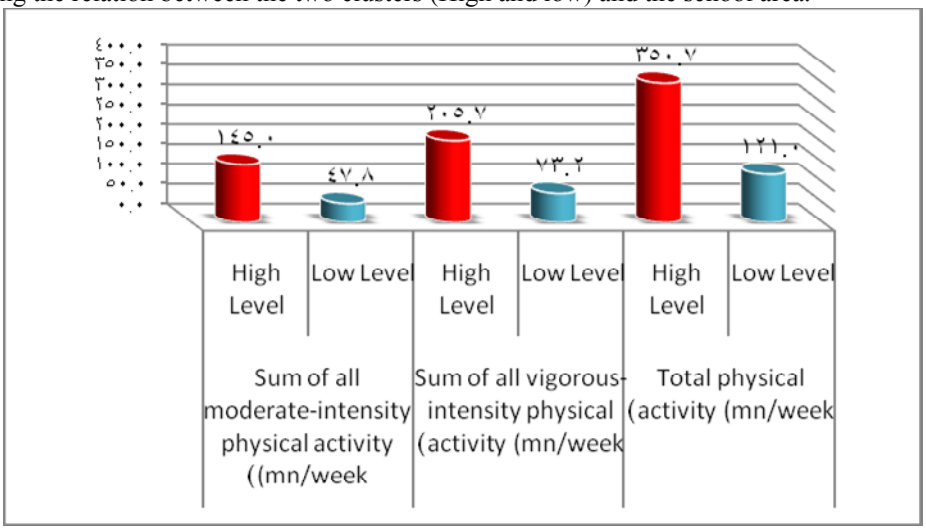
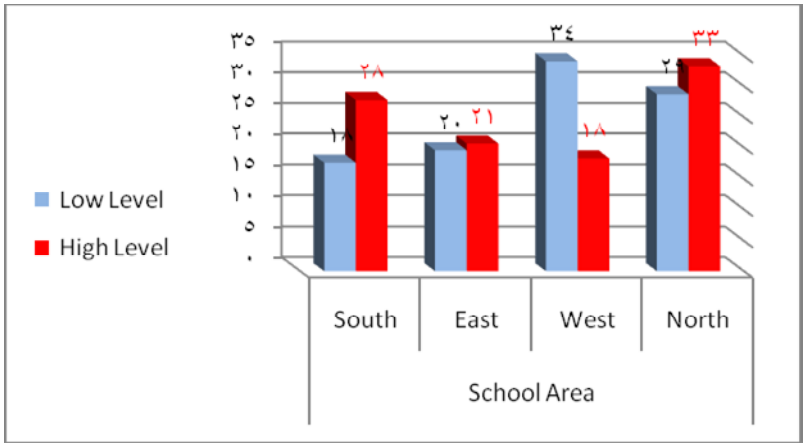


Table 7: Testing the relation between the two clusters (High and low) and the school area.

		Cluster Number of Cases				Total
		Low Level		High Level		
		n	%	n	%	
School Area	South	71	18	35	28	106
	East	79	20	26	21	105
	West	138	34	23	18	161
	North	116	29	42	33	158
Total		404	100	126	100	530

For testing the relation between the two clusters and the school area, the Chi-Square test was done and gives the value of $\chi 2 = 13.472$, with p-value = 0.003 . This means that there is a significant relationship between the two clusters and the school area, especially in the west area, were the percentage of the low level is higher than that of the high level, and the following figures reflect the results.

Figure 4: Testing the relation between the two clusters (High and low) and the school area.



4. Discussion:

Our data of this investigation generally indicate high prevalence of physical inactivity among Saudi adolescent. This result agrees with previous studies conducted in Saudi Arabia which showed that physical inactivity is becoming more prevalent among the Saudi population (Al-Refaee& Al-Hazzaa, 2001; Al-Hazzaa, 2002; Al-Hazzaa, 2004a). In addition, In Saudi Arabia, there is increasing in prevalence of overweight and obesity among children and adolescents (Abalkhail, &Shawky, 2002; Al-Hazzaa, 2007). At the same time, the proportion of inactive children and youth is high due to inability to engage most of youth in physical activity for enough duration and frequency (Al-Hazzaa, 2002; 2004a).

The decrease in the physical activity among adolescents from different areas in KSA may be attributed to changes in the life style of adolescents, which is common problem around the world. This is more so in enclosed communities specially in Arabic countries particularly Gulf region due to changes in the traffic means, increased tools of entertainments such as electronic games, videos, TV, internet etc.. All the above mentioned reasons, the adolescents spend several hours in sitting without movements which lead to obesity with different degrees and appearance of diseases not seen before in Arabic countries by this degree such as hypertension, heart diseases, diabetes mellitus among adolescents (Reilly *et al*., 2003; Speiser*et al*., 2005; WHO, 2010). Other investigators reported that major factors that contribute to youth inactivity in Saudi Arabia include on the use of cars rather than walking for short trip, including those to and from school (Al-Hazzaa, 2006), and the poor quality physical education programs in schools. It is well known that a comparison between physical-activity studies from different population and settings is not without reservation.

This phenomena of obesity in youth is a world health problem (Speiser*et al*., 2005) not only during youth stage but the obesity may extend to adulthood (Guo*et al*., 2002). Although the recommendation for physical activity in children and youth is 60 minutes of moderate to vigorous intensity per day (Strong *et al*., 2005; Tremblay *et al*., 2011) some health benefits can happen with 30 minutes of physical activity per day (Janssen & Leblanc, 2010).

It is believed that the high prevalence of inactivity in Saudi Arabia represents a major public health burden, as evident by the high population-attributable risk of physical inactivity compared with many industrial countries (Al-Hazzaa, 2004b). The present study reported on the prevalence of the above lifestyle factors among adolescents from different areas in the city of Jeddah. Such findings of this study add to the existing evidence of high prevalence of physical inactivity among Saudi youth.

Findings from the European Youth Heart Study using an accelerometer for physical-activity measurements showed that the great majority of 16-year-old boys (81.9%) achieved current health enhancing physical-activity recommendations (Riddoch *et al*., 2004). In the United States, results from the Youth Risk Behavior Surveillance indicated that only 18.4% of adolescents met these physical activity guidelines (Eston *et al*., 2010). Furthermore, more than 52% of Greek-Cypriot children and adolescents met the physical-activity guidelines (Loucaides *et al*., 2011). In Finland, almost half of 15-16 year old adolescents reported 60 minutes or more of total physical activity per day; however, when daily moderate- to vigorous-intensity physical activity was considered, lower proportions of the boys (23%) and girls (10%) were able to meet the recommended amount of daily physical activity (Tammelin *et al*., 2007).

5.Conclusions and Recommendations

Results from the present study confirm that low level of physical activity among Saudi adolescents, which is significantly affected by the schools areas. Programs designed to encourage increase physical activity and reduce sedentary lifestyle have been shown to improve health outcomes. A National strategy for physical activity should be developed and a preventive program should be initiated. Future researches are needed for further evaluation of other causative factors of sedentary behavior. Interventions providing knowledge, increasing consciousness of healthy benefits of physical activity and, lastly, supporting the adolescents in the adoption of healthy lifestyle.

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