

WCES 2012

Investigation of physical activity levels of male students during school time: does participation in regular sport activities affect on physical activity levels of students?

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Abstract

Physical activity (PA) is an important factor to promote and maintain a healthy lifestyle along the whole life cycle. However, it is not clear whether it is due to the PA itself or sports team participation for elementary school students. Purpose of the study; to make comparison between the PA levels of students attending regular sport activities (Sa) and students not attending regular sports activities (Sb) during school days. The study included 30 male public elementary school students (Sa:9.57±0.78 and Sb:9.15±0.38 years old) PA data were obtained by using both objective and subjective measurement methods. Two objective methods (accelerometer-RT3; Heart Rate Monitor, Polar 610i,) were simultaneously used during the 3 school days except for physical education (PE) class. PA Questionnaire ($r=.93$) was applied one week before the objective measurements. Descriptive data were calculated for all variables. BMI was computed as kg/m^2 . Independent t test was used for comparing the variables of two groups. There were significant differences between two groups in terms of heart rate and vector magnitude ($VM=\sqrt{x^2+y^2+z^2}$). However, there was no significant difference by means of BMI between two groups ($p<.05$). The Sb group showed higher PA level on school days compared with the Sa group when PE class and regular sport activities are disregarded. That means, children may satisfy daily PA needs during these activities. On the other hand, the amount of PA accumulating during school time seemed inadequate to achieve the current recommendations for health-promotion in all children.

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Keywords: RT3, Physical Activity, BMI;

1. Introduction

Immobility is growing into a serious health problem in all ages. Formal and informal physical educations play an important role in promoting activity level of students. Physical activity has the potential for positively affecting physiological sub-systems during certain critical growth period and also reducing risk factors for health (Carter, 1983). Sport and physical activity programs present children with certain abilities like team work, discipline, sportsmanship, leadership and socialization (Pinar, 2003). Studies implemented on physical activity and sport reported that men are more active than women, and the activity decreases with age. In addition, this decrease was more evident in women (Kosma et al, 2002).

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Disease prevention and control Centre (1999) indicated that participation in regular physical activity is quite helpful for people and provides both psychological and psychological advantages. Regular physical activity (≥ 3 days a week and ≥ 20 min) improves health-related physical conformity components, cardiovascular endurance, muscle strength and resistance. Physical activity could help minimize the risks including weight control, obesity, cardiovascular disorders, diabetes, colon cancer, hypertension, osteoporosis and arthritis. Participation in physical activity makes positive improvements in certain emotions like self-reliance, self-respect etc. and provides psychological benefits by reducing depression. Practice and sport reduce the negativities in external evaluation of body and thus strengthen sportsman identity and self-respect of individuals (Koçak et al, 2002, Graham et al, 2001).

The questionnaire forms used to evaluate physical activity of children have some limitations; therefore, it is recommended to use motion detectors for the sake of objectivity (Prochaska et al, 2001, Welk, 1999, Fairweather et al, 1999, Westerterp, 1999, Trost et al, 2002). In many laboratory researches, Caltrac device is reported to yield accurate and valid measurements. Tritrac R3D and RT3 activity monitors used in more recent studies provides even more accurate results compared to Caltrac device and has demonstrated improvement. RT3 is more preferred in recent studies as it can take measurements in three dimensions, has a smaller size than R3D, takes measurements every minute, and easy transfer to computer (Welk, 1999, Westerterp, 1999). Heart Rate (HR) Monitor is another device preferred for children (Powel and Rowlands, 2004). Although it doesn't directly measure the activity, it is generally used with motion detectors and has a close relation with these devices. In many studies, moderate and high relations were obtained between accelerometer data and especially VM (vector magnitude) and heart rate (Powel and Rowlands, 2004).

This is a preliminary study organized to make contribution to the study "Evaluation of pre-puberty (aged 9-10 years) Children's Physical Activity Levels in School, heart rate monitor, motion sensor and physical activity questionnaire forms" planned in Antalya.

The aim of this study is to determine and compare physical activity levels of 9-10 years of age male students (3rd grade primary education) not participating in regular physical activities and attending sport events through subjective and objective physical activity measurement methods.

2. Material Method

The study included a total of 30 students from Faruk Tugay Primary School in Antalya city center with the permission of teachers. The students are aged 9-10 years and separated into two equal groups, 15 of whom participate in regular physical activities (basketball practices) and 15 of whom do not participate in any sport activity.

2.1. Measurements

Height: it was measured by wall scale as the distance between ground and vertex point of head with head in perpendicular position, heels adjacent and head in Frankfort position. Weight: it was measured by balance of 0.1 precision with subjects having light clothes and bare feet. Body mass index was calculated by the equation: Body Mass Index (BMI) = Weight/ Height (m^2).

Physical Activity: Firstly, physical activity questionnaire forms were applied to participant students and their families (retest study made for reliability and correlation coefficient were calculated [0.92 and 0.93]). Polar S610i (Polar inc Fi) heart rate monitor and RT3 accelerometer (RT3 Tri-axial Research Tracker, Stay Healthy Inc., USA) which can take motion records in x, y and z axis were used in synchronization for calculating PA level of students. Devices were operated starting with the first class of a full-time school in the morning until 15 minutes to the end of last class (08.30-12.00). Devices were adjusted to provide minute data for four days except for the day with physical education class. The obtained data was transferred to computer by Docking Station tool and stay healthy assist program.

2.1.1. Statistics

Descriptive statistics and distributions of both groups were investigated. Groups were separated into two groups based on the participation status in regular physical activities and the difference between groups was investigated by descriptive statistics and independent t-test. Frequency distribution of questionnaire results was evaluated considering percentage values. All statistical processes were made by SPSS 10.01 packet software.

3. Tables

Table 1. Arithmetic Mean, Standard Deviation, Minimum and Maximum Values of Age, Height, Weight (Wgt) and Body Mass Index Data of Study Groups Participating and not Participating in Physical Activities

		A.M.	S.D.	MIN	MAX
AGE (yıl)	Control	9,15	0,38	9	10
	Sportive	9,57	0,78	9	11
HGT (cm)	Control	141,29	4,85	135	147
	Sportive	142,00	7,30	130	152
WGT(kg)	Control	36,86	5,66	30	44,9
	Sportive	35,03	10,69	23,2	54,9
BMI(kg/m ²)	Control	18,47	2,80	15,31	23,16
	Sportive	17,08	3,62	13,72	23,76

Age, height, weight, and body mass index values of groups participating and not participating in physical activities are seen in the previous table (table1). BMI values of sportive group are lower than those of control group, while they are taller than control group (table 1).

Table 2. Heart Rate (HR), Total Calorie (Tot. Cal.), Activity Calorie (Act Cal.), Vector Magnitude (VM), and Arithmetic Mean (A.M.), Standard Deviation (S.D.), Minimum, Maximum and p Values of Motions in x-y-z Axes of Study Groups Participating and not Participating in Physical Activities

		A.M.	S.D.	MAX.	MIN.	p
HR(unit/min)	Control	144.49	9.70	159.05	132.32	0.00
	Sportive	116.83	10.02	134.07	100.66	
TOT.CAL (cal/min)	Control	2.12	0.41	2.69	1.56	0.31
	Sportive	1.92	0.34	2.37	1.36	
ACT.CAL(cal/min)	Control	1.19	0.38	1.73	0.68	0.33
	Sportive	1.02	0.24	1.43	0.63	
VM	Control	949.86	325.54	1525.14	608.46	0.03
	Sportive	810.46	204.90	1104.61	559.08	
ActCntsX	Control	548.90	125.83	721.34	411.86	0.35
	Sportive	484.38	115.28	657.84	350.07	
ActCntsY	Control	501.18	107.32	631.97	356.69	0.69
	Sportive	473.85	148.75	734.15	319.81	
ActCntsZ	Control	393.50	133.39	616.87	232.31	0.75
	Sportive	414.22	104.50	601.77	275.30	

Heart rate (HR), total calorie (Tot Cal.), activity calorie (Act Cal.), and the number of motions in x-y-z axes of study groups participating and not participating in physical activities are seen in the previous table. In the comparison of children's data participating and not participating in physical activities demonstrated, there was only a difference between heart rates per minute (table 2).

An important part of sportive children's parents (S) answered yes to the question if their children like physical activity or sports, while a slightly lower part (71.4%) of control group parents answered partly yes to the same question. Half (50%) of sportive children's parents answered yes to the question whether they regularly encourage their children to be physically active, and a lower part (42.9%) of control group parents answered yes. In addition, the rate of control group parents responding no to this question was 28.6%. A smaller part (28.6%) of control group

parents answered no to the question whether they regularly participate in physical activities. However, more than half (62.5%) of sportive group parents and slightly smaller part (42.9%) of control group parents responded yes to this question (table 3).

Table 3. Answers of Sportive (S) and Control Group (C) Children’ Parents to the Questions Related to Their Physical Activity Levels; Frequency Distribution Percentages of These Answers.

	Absolutely no		Partly no		Don’t know		Partly yes		Absolutely yes	
	S	C	S	C	S	C	S	C	S	C
Question 1							25.0	71.4	75.0	28.6
Question 2		14.3	14.3				50.0	42.9	50.0	28.6
Question 3	12.5	14.3	42.9		12.5	14.3	37.5	28.6	37.5	
Question 4			28.6				50.0	28.6	50.0	42.9
Question 5		28.6	14.3				37.5	14.3	62.5	42.9

Question 1;My child likes physical activity or sport, Question 2;My child participates in moderate physical activities for almost 30 minutes every day, Question 3;My child has the opportunity for a good quality of physical education for almost every day, Question 4;I regularly encourage my child to be physically active, Question 5;I like to participate in physical activity.

Table 4. Sportive (S) and Control (C) Group Children’s Answers to Questions About Physical Activity Levels.

	Absolutely no		Partly no		Don’t know		Partly yes		Absolutely yes	
	K	S	K	S	K	S	S	S	K	S
Question 1	14.3		28.6		42.9		14.3	37.5	0	62.5
Question 2	42.9		57.1		0		0	50.0	0	50.0
Question 3		37.5	42.9	62.5			57.1			
Question 4			28.6	37.5	14.3		28.6	62.5	28.6	
Question 5	14.3	25.0	14.3	62.5			28.6	12.5	42.9	
Question 6	14.3	62.5	14.3	37.5			42.9		28.6	
Question 7		37.5	42.9	25.0			42.9	25.0	14.3	12.5
Question 8	14.3	12.5					28.6	12.5	57.1	75
Question 9	14.3		28.6	37.5			28.6	62.5	28.6	
Question 10		75	14.3	25	14.3		42.9		28.6	
Question 11		100	14.3		14.3		42.9		28.6	
Question 12		75	14.3	12.5		12.5	85.7			
Question 13	14.3	75	28.6	25	14.3		28.6		14.3	
Question 14	71.4	62.5	28.6	28.6						

Question 1;I am quite involved in physical activities, Question 2; I like participating in physical activities, Question 3; I do not have enough time for physical activities, Question 4; I prefer watching TV or playing electronic games, Question 5; I do not have a situation to be physically active, Question 6; I do not like physical activities, Question 7; There is no park or sport field near my home, Question 8; I like spending time with my friends in physical activities, Question 9; I find myself quite successful at physical activities, Question 10; I cannot participate in physical activities due to my health problem, Question 11; I cannot participate in physical activities due to my injury, Question 12; I am afraid of being injured during physical activity, Question 13; I do not have suitable sports shoes and clothes, Question 14; I do not like conditions like sweating, gasping etc. during physical activities.

Frequency percentages of children’s answers to questions about physical activity levels are given in the previous table (table 4). A big majority (75%) of sportive group answered no to the 12th question, while a smaller part (28.6%) of control group answered yes the same question.

4. Discussion

The sportive group with a mean age of 9.57 ±0.78 years was found taller and lighter than the control group with a mean age of 9.15±0.38 years. Their body mass index was also lower. These findings indicate that the group participating in physical activities had more suitable body characteristics. Study findings are compatible with literature. The benefits of regular physical exercises are reported in all literature: (Carter, 1983) they increase the physical fitness level (Pinar, 2003), they reduce risk factors for serious chronic diseases (Kosma et al, 2002), and even low level physical activities are negatively related to factors contributing to mortality. Among the aims of public health, it should be given more priority to increase children’s physical activity levels than those of adult individuals (Stratton, 1996, Schmitz et al, 2005).

Children’s activities in schools demonstrate that control groups had higher scores than sportive group except for the activity amount in z axis and heart rates per minute (table 2). A statistically significant difference was

only between two groups only in terms of heart rate and vector magnitude ($VM = \sqrt{x^2 + y^2 + z^2}$) ($p < 0.05$), and there was no statistically significant difference considering total calorie and activity calorie ($p > 0.05$). It is considered that children satisfy their needs for regular physical activity with basketball exercises. Study findings are partly compatible with literature in this regard. The number of studies implemented on this age group is quite inadequate. In the study of Valhsnet et al. (2010), RT3 accelerometer threshold values were determined as follows; sedentary level 0-20 number/min., light level 41-950 number/min., moderate level 951 – 3410 number/min, and advanced level >3410 number/min. Accordingly, both control and sportive groups were found in light level concerning the number of activities per minute.

The data obtained through questionnaire forms: Answers of participant students and their parents were evaluated in terms of frequency and percentage values. A considerable part (75%) of sportive children's parents answered yes to the question if their child likes physical activity or sport, while slightly lower part (71.4%) of control group parents responded partly yes to the same question. Half (50%) of sportive children's parents answered yes to the question whether they regularly encourage their children to be physically active, while less than half (42.9%) of control group parents answered yes to the same question. The rate of control group parents responding no to this question was 28.6%. On the other hand, small part of control group parents responded no to the question whether they regularly participate in physical activities. However, more than half (62.5%) of sportive group parents and slightly smaller part (42.9%) of control group parents responded yes to this question.

The Sb group showed higher PA level on school days compared with the Sa group when PE class and regular sport activities are disregarded. That means, children may satisfy daily PA needs during these activities. On the other hand, the amount of PA accumulating during school time seemed inadequate to achieve the current recommendations for health-promotion in all children.

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