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Differences in physical activity levels in 8-10 year-old girls who attend physical education classes only and those who also regularly perform extracurricular sports activities

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Abstract

The aim of this study is to determine the differences in physical activity levels (PAL) of 8-10 year-old girls, who attend physical education (PE) classes only and those who also regularly perform extracurricular sports activities, and to study the relationship between PAL and body composition. 35 primary school girls of 8-10 years of age have participated this study. Control group (n=17) consisted of girls who attended physical education classes 2 hours per week, experimental group (n=18) consisted of girls who, in addition to physical education classes, participated in volleyball training. Extracurricular Sports activities must be supplement PE classes.

Keywords: Physical Education, Physical Activity, Pedometry, Girl

1. Introduction

Physical activity provides a number of health benefits, both physical and psychological (Cragg & Cameron, 2006). In addition to prevention and reduction of childhood overweight and obesity (WHO, 2008), physical activity has been associated with cardiovascular health and fitness, muscular strength and endurance, reduction in depression and anxiety, and a positive association with academic achievement (Strong et al., 2005).

Despite the well established links between physical activity and physical and psychological health, alarming declines in levels of adult physical activity have been observed. This trend has also been noted in children and adolescents, drop in physical activity apparent in children aged 9–14 years (Barnett, O'Loughlin, & Paradis, 2002). Physical activity is important to integrate into the lives of children and adolescents (Tucker, P. 2008). Adolescents physical activity levels are lower in girls than boys (Cardon & De Bourdeaudhuij, 2004).

Schools are important life-style area for physical activity promotion, and have been called on to expand their efforts to increase activity-related opportunities for youth (Pate et al., 2006).

Physical education is the primary form of activity students receive at school, and physical education programs provide up to a student's daily physical activity (Tudor-Locke, Lee, Morgan, Beighle, & Pangrazi, 2006). After-

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school programs can be used to supplement physical activity time for youth. These programs develop lifelong physical activity habits (Huberty, Balluff, Berg, Beighle, & Sun, 2009).

The aim of this study is to determine the differences in physical activity levels (PAL) of 8-10 year-old girls, who attend physical education (PE) classes only and those who also regularly perform extracurricular sports activities, and to study the relationship between PAL and body composition.

2. Material and Methods

35 primary school girls of 8-10 years of age have participated this study from Istanbul with parental consent. Control group (n=17) consisted of girls who only attended the physical education classes 2 hours per week, while the experimental group (n=18) consisted of girls who, in addition to physical education class attendance, participated in volleyball training 1,5 hours per day, 3 times a week, for two months. The criteria for inclusion in this study was to be free of any health obstacles, non-mensturating and have a BMI of less than 22 kg/m^2.

Groups were assessed anthropometrically. Body mass was assessed to the nearest 0,1 kg (Seca) and the standing height was measured to nearest 0,5 cm using a Seca Stadiometer (Seca, Hamburg, Germany) with the subject's shoes off and head in Frankfort line, horizontal plane. BMI was calculated from weight and height (BMI (kg/m^2)=Weight (kg)/$(Height)^2$(m)). Subjects % fat measurements were conducted by Holtain, Skinfold caliper and Slaughter Formula % fat calculations.

Activity level was measured using a pedometer for one-week period. Physical activity was measured with New Lifestyles Digi-Walker pedometer 25, model number SW-701. The pedometer was worn on the hip and measured vertical acceleration, recording a step each time the hip moved up and down. Pedometers have a suspended arm mechanism inside the counter (similar to a clock pendulum), which detects steps and other movements. The Digi-Walker pedometer, manufactured by Yamax Inc., Tokyo, Japan, was chosen for its accuracy and reliability in calculating daily steps taken. Daily pedometer values were recorded upon wake up, at sleep time and at the end of the day. Total daily energy consumption (kcal), steps taken and distance covered (meter) were considered.

Statistical analysis; Mann-Whitney U test was applied in order to make within group and within gender. SPSS 14. Packet programme was used.

3. Results

Findings of this study are indicated in the following tables:

Table 1. Demographic features of Extracurricular Sports Activity Participants and Non-Participants

Groups	Age (Year)	Height (cm)	Weight (kg)	BMI (kg/m^2)
PE Class with Extracurricular Sports Activity Participants (n=18)	10.67±.77	49.11±7.31	159.09±6.67	19.32±1.92
PE Class (n=17)	9.95±.85	42.07±8.05	146.77±7.2	19.36±2.45

Table 2. % Fat, free fat mass, fat mass, waist/hip ratios, standart deviations and inter-group comparisons

Groups	Slaughter Fat %	Slaughter Free Fat Mass	Slaughter Fat Mass	Waist to hip Ratio (cm)
PE Class with Extracurricular Sports Activity Participants (n=18)	28.49±2.78	35.03±4.75	14.08±2.94	.75±.03
PE Class (n=17)	29.14±4.86	29.51±4.38	12.56±4	.79±.04
p	.362	.002*	.302	.001*

Table 3. Step count, distance, energy expenditure, standart deviation and inter-group comparisons

	Step Count		Distance (Meter)		Energy Expendature(kcal)	
Groups	Week Days	Weekend Day	Week Days	Weekend Day	Week Days	Weekend Day
PE Class with Extracurricular Sports Activity Participants (n=18)	10894.2667± 1927.81111	9916.8820± 1836.45697	3270.1852± 531.94618	3325.2667± 1178.34980	326.3889± 97.52586	310.8889± 79.92488
PE Class (n=17)	9666.2105± 2555.87024	8864.6316± 3240.24964	3376.5288± 1403.32510	3088.4332± 1565.59020	268.1326± 108.46569	237.4684± 98.21597
p	.083	.248	.191	.157	.048*	.015*

Participants in Extracurricular Sports Activity (n=18) and non-participants displayed the following data respectively: BMI ($kg/m^{2)}$ 19.36 ± 2.45 / 19.32 ± 1.92, fat mass 12.56 ± 4.01 / 14.08 ± 2.94, week days step count 9666.21 ± 2555.87 / 10894.27 ± 1927.81, weekend days step count 8864.63 ± 3240.25 / 9916.88 ± 1836.46, average step count 74306 ± 10729.02 / 66060.32 ± 18098.4.

Statistically significant values were: Inter-group Slaughter fat mass (kg) p=0.002*, week days energy expenditure (kcal) p=0.48*, weekend days energy expenditure (kcal) p=0.15*. Correlations of free fat mass and weekend day energy expenditure (kcal) were r=.236, p=.331, and r=.597**, p=.009, respectively.

4. Discussion

In a study on 11-15 year old boys, the daily life style activity (moderate), fast walks (moderate-vigorous intensity) and running (vigorous intensity) activities were not measured directly but gave an idea about physical activity (Jago et al., 2006). In another study, the relation between step count and activity period were determined, where both step count and duration could give an idea about relative information about PAL (Beighle & Pangrazi, 2006). They reported that 5,000 steps/day was equivalent to 64.5 minutes of activity, 10,000 steps/day equals 114.5 minutes, 12,000 steps/day equals 134.5 minutes, and 15,000 steps/day equals 164.5 minutes. Girls and boys had

different activity levels; girls' activity levels were lower than boys. PAL determined with a pedometer concluded that 13,000 steps/day (boys) and 12,000 steps/day (girls) provided the most reasonable estimation of attainment of 60 minutes of MVPA by way of accumulating a total volume of daily steps (Rowlands & Eston 2005).

Sixty minutes of MVPA in primary/elementary school children appears to be achieved, on the average, within a total volume of 13,000 to 15,000 steps/day in boys and 11,000 to 12,000 steps/day in girls; although these ranges reflect findings based on both self-report and in MVPA (Rowlands & Eston, 2005, Beighle & Pangrazi, 2006). In another study conducted on the older age group, the adolescents, based primarily on overweight adolescent girls, it was concluded that 10,000 to 11,700 steps/day may be associated with 60 minutes of MVPA (Adams, Caparosa, Thompson, & Norman, 2009).

PAL combined pedometer data collected from 6-12 year olds from three countries (Australia, Sweden, USA) was evaluated using a contrasting groups method to identify criterion-referenced steps/day cut points related to BMI-defined normal weight vs. overweight/obese. The median value for 6-12 year olds was 15,000 steps/ day for boys and 12,000 steps/day for girls (Tudor-Locke et al., 2004). In another study, using percent body fat obtained through bioelectric impedance in 5-12 year old New Zealanders, overweight was defined as >85th percentile and compared with nonoverweight (<85th percentile). The authors reported that 16,000 steps/ day (boys) and 13,000 steps/day (girls) were the best predictors of body fat percent-defined weight status (Duncan, Schofield, & Duncan, 2007). In another study conducted on children, to identify the optimized cut point (which minimized misclassification error for normal weight vs overweight/obese children) in a sample of U.S. children, the optimized cut points were approximated at 13,500 steps/day (boys) and 10,000 steps/day (girls) (Laurson et al., 2008). These the two studies that have applied the contrasting groups method applied to different weight status criteria (BMI and percent body fat) have produced consistently high values for steps/day: 15,000-16,000 steps/day for boys and 12,000-13,000 steps/day for girls.

In a study conducted with 2,071 5-16 year old Australian children, cut points for discriminating between normal weight and overweight/obese children were 12,000 steps/day for 5-12 year old boys, 10,000 steps/day for 5-12 year old girls, and 11,000 steps/day for 13-16 year old boys. The optimized cut point for 13-16 year old girls (14,000 steps) did not significantly discriminate between those who were classified as normal weight versus overweight (Dollman, Old, Esterman, & Kupke, 2010).

Comprehensive studies on afterschool programs designed to promote physical activity and/or fitness conclude that physical activity-based interventions delivered within afterschool programs result in numerous health benefits, including improvements in physical activity fitness, blood lipids profiles, and measures of body composition (Beets, Beighle, Erwin, White, 2009, Pate, & O'Neill, 2009).

Given these findings, incorporating physical activity within the afterschool setting is another strategy to promote physical activity that can have immediate (eg, increased physical activity) and potentially lasting benefits (eg, weight reduction) (Lee, Burgeson, Fulton, & Spain, 2007).

After school programs can serve as an important behavior setting to help children meet recommendations for health enhancing physical activity and sport activity (U.S. Department of Health and Human Services, 2008). The study found that youth attending afterschool programs can receive up to a third of the recommended 60 minutes of daily moderate-to-vigorous physical activity (Trost, Rosenkranz, & Dzewaltowski, 2008).

PAL for both groups was lower than the World Health Organization (WHO) criteria; however, Extracurricular Sport Activity participants had lower fat mass and a higher PAL than the non-participating group, indicating health enhancement for the participants. PE class attendance only was not sufficient to increase PAL to meet the WHO criteria. The education programme must be supplemented with after-school sports activity. Weekend sports activities must be adopted as a lifestyle.

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