Short Communication

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The Effects of SPARK Physical Education Program on Fundamental Motor Skills in 4-6 Year-Old Children

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Abstract

Objective: The purpose of this study was to investigate the effect of SPARK Physical Education (PE) program on fundamental motor skills in 4-6 year children. SPARK (Sports, Play, and Active Recreation for Kids) is an evidence based PE program designed in order to promote the lifelong wellbeing.

Methods: In total, 90 children aged 4 to 6 years were selected randomly. The children were allocated into 3 groups with separate PE programs: 1-SPARK, 2-Gymnastics and 3-Routine activity. Using the Test of Gross Motor Development (TGMD-2), a pretest was done in all groups. Afterwards, SPARK and Gym PE programs were performed for 8 weeks and 3 sessions each week. The third group used to do the routine physical education program in their daycare. After 8 weeks (24 sessions), the post tests were done for all groups with the same scoring system as the pretest.

Findings: The results showed that the SPARK program had a higher efficacy on the promotion of the fundamental motor skills comparing to the routine physical education programs or gymnastics PE group.

Conclusion: SPARK can be used as an appropriate alternative in order to promote the children's motor skills.

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Key Words: Gross Motor; Routine Activity; Gymnastics; Wellness

Introduction

Childhood is the most beautiful age span of the life. Under normal circumstances, childhood is the trouble free period of life and a normal child has no worries except playing. A child's physical performance is dependent on age, sex, socioeconomic class and the level of sports activities in kindergarten and elementary school[1]. There is a widely assumed relationship between habitual physical activities and motor skills in young children. Fisher et al and Cooley et al showed that the time allocated sedentary into light intensity physical activities has a statistically meaningful relation with the fundamental motor skills[2,3]. In another hand, employing specialists and the need for extensive professional development for classroom teachers responsible for physical education seems quite rational[2,4].

SPARK (Sports, Play, and Active Recreation for Kids) is a research based physical education discipline designed in order to promote the lifelong wellbeing without sacrificing the enjoyment of physical activities or academic achievements. The program is aligned to the NASPE (National Association of Sport and Physical

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Education) guidelines. The self management curriculum of the program makes it flexible enough and increases the adherence of the participants[5-7].

There are 2 types of SPARK PE programs: Elementary PE (1.K-2 PE 2. 3-6 PE) and Secondary PE (1. Middle School PE 2. High School PE).

Gross motor skills (like walking, balancing, crawling) are developed during early childhood and are considered as an essential item of motor development. The large muscle groups are mainly responsible for gross motor movements. Fine motor skills are those attributed to the coordination of smaller groups of muscles for example involved in playing piano. Test of Gross Motor Development-edition 2 (TGMD-2) is a norm-reference measurement of gross motor development[8]. The test is scored according to defined performance criteria.

In this study we tried to evaluate the effectiveness of SPARK physical education on fundamental motor skills in comparison with gymnastic and routine physical activities in kindergartens. We tried to understand if SPARK PE has any added value compared to gymnastics and current PE in preschools using TGMD-2 test.

Subjects and Methods

Ninety cases were chosen randomly among the children aged 4-6 years from 6 kindergartens in Tehran district 6. Those attending a sport coarse or their parents had Master of Science or higher degrees or used to earn more than 1000$/month were excluded from the study. The participants' age (months) was asked from their parents and documented. Their height and weight were measured by standard metric bands and scales. Afterwards, TGMD-2 was taken as a pretest. TGMD-2 is divided into 2 loco motor (including running, galloping, hopping, leaping, jumping and sliding) and object control (including striking a stationary ball, stationary dribble, cash, kick and overhand throw) subtests. The norm-referenced test used for assessment of preschool children was used. The validity and reliability of this test has been already studied[9,10]. Persian version of this test has been validated by authors in a previous study[11]. After the pretest, the children were randomly allocated into three arms and each arm of the study sustained one of the following programs: SPARK, Gymnastics and routine physical education program.

The routine PE group continued their current PE as routine during the study while the SPARK and gymnastic program were held for 8 weeks and three times per week in groups. The SPARK program was held according to early childhood curriculum. Appropriate equipments, classrooms and training techniques were provided according to SPARK PE standards.

Analysis of covariance (Ancova) was exploited to analyze the data with baseline variables included as covariates in the model. Provided that the *P*-value of Ancova test became significant with adopted criterion for meaningfulness of .05, each pair of study arms were analyzed separately. In order to correct alpha errors, "Bonferroni" method was used. The *P*-value derived from comparing the study arm pairs were multiplied by the number of study arms.

Findings

There is no difference in age, weight and height of participants in different program (Table 1). As demonstrated in table 2, t-test was exploited to compare three arms of the study. The *P*-value of t-

Table 1: Demographic characteristics of participants in different groups

Parameter *	SPARK group	Gym group	Routine activity group	*P*. value
Age (months)	59.7 (9.0)	58.1 (7.8)	59.0 (7.9)	NS ‡
Weight (kg)	19.73 (3.7)	20.23 (3.81)	18.87 (3.09)	NS
Height (cm)	110.35 (8.09)	106.17 (8.68)	109.72 (8.94)	NS

* All parameter are presented as Mean (Standard Deviation); ‡: Non-significant

Table 2: Comparison between cahnges in TGMD-2 skills before and after study in different programs (t-test)

Program	TGMD-2		Locomotor skills		Object control skills	
	Mean (SD)	*P*-value	Mean (SD)	*P*-value	Mean (SD)	*P*-value
SPARK group	14.2 (7.1)	<0.001	2.5 (2.0)	<0.001	2.2 (1.7)	<0.001
Gymnastics group	3.1 (0.9)	0.1	0.4 (0.1)	1	0.8 (0.3)	0.07
Routine activity group	2.9 (0.11)	0.8	0.8 (0)	0.3	0.9 (0.1)	0.8

TGMD-2: Test of Gross Motor Development-edition 2; SD: Standard Deviation; SPARK: Sports, Play, and Active Recreation for Kids

test became statistically significant just in SPARK by TGMD-2 and other programs didn't show significant changes in TGMD-2 results. The next step was to analyze the study arms 2 by 2 (pair comparison). Table 3 shows the results of the pair comparison between the TGMD-2 results. SPARK PE was more effective than Current or Gymnastic PE in TGMD-2. The *P*-value of the comparison between the SPARK PE group and Current or Gym PE groups were statistically significant while it was not significant between Gym and Current PE group. As discussed earlier, the *P*-values were multiplied by 3 (the number of study arms). Like the results of TGMD-tests, the results of the subtests (Locomotor and Objective Control skills) were statistically significant between SPARK and Gym or Current PE groups while the *P*-value was not significant between Gym and Current PE groups.

Discussion

The aim of this study was comparing SPARK PE to gymnastics and current PE that was focused on gross motor skills development in Iranian children. The results of TDMD-2 test and subtypes are significantly better in SPARK group compared with gymnastic and current PE groups. Physical activity program conducted by trained nursery physical activity instructors or traditional game program have been shown effective and practical way of increasing levels of fundamental movement skills of preschool and elementary school children in a previous study in Iran[11-13]. In this study, we found gymnastic program had significant effect on locomotor and object control skills but SPARK was more effective on these skills in comparison to gymnastic and/or current programs. SPARK PE program provide the preschool and school children with an appropriate evidence based discipline without interfering with the enjoyment of the activities or academic achievements. The time spent with this program is comparable with the time allocated to routine PE activities. As stated earlier, the academic achievement is not disturbed by this program[5].

Various aspects of SPARK physical education program have been studied. In one study, the adiposity of the children sustaining this program was compared with the control group[14]. It is documented that SPARK physical education program has favorable effects on students' academic achievement[5]. The effect of SPARK

Table 3: TGMD-2 results in pair comparison programs after intervention

Program		Gymnastic and SPARK	Current and SPARK	Gymnastics and Current
TGMD-2	Mean	-12.93	-13.85	0.99
	P-value	<0.001	<0.001	0.4
	95% CI	-15.57_-10.29	-16.44_-11.26	-1.45_3.29
Locomotor	Mean	1.89	-2.28	-0.38
	P-value	<0.001	<0.001	0.6
	95% CI	-2.56_-1.24	-2.93_-1.63	-0.98_0.23
Objective control	Mean	-2.44	-2.39	-0.56
	P-value	<0.001	<0.001	1
	95% CI	-3.17_-1.72	-3.1_1.68	-0.68_0.56

TGMD-2: Test of Gross Motor Development-edition 2; SPARK: Sports, Play, and Active Recreation for Kids
CI: Confidence interval; Current: Routine activity

program on physical activity and fitness level including abdominal strength and endurance and cardio respiratory endurance has been studied in some studies[9,15]. SPARK has been useful for improvement of physical activity program in elementary schools specially if teachers has not have a specific PE program or has not have recent training[6].

One of the limitations of our study was that the economic aspect of the SPARK PE program is not considered. Cost versus benefit studies of this PE program would evaluate the feasibility and sustainability of this program. Further economical researches are recommended.

Conclusion

Both, gymnastic program and SPARK are effective on increasing levels of locomotor and object control skills in preschool children, but the effect of SPARK was better than gymnastic program. So, SPARK can be taken into consideration not only as an alternative to our routine PE programs, but also as a substitute for the current or gymnastic PE activities and it seems quite rational to revise our Physical Education curricula. We recommend SPARK to increase motor skills as well as physical activity in Iranian nursery schools.

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Conflict of Interest: None

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