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Original Article

Investigation of the Effect of Eight Weeks Gymnastic Training on Biomotor Skills of Children

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Abstract

The aim of this study was to research the effect on biomotor skills of adding gymnastic work to training of children receiving ice-skating education. The mean age in the study was 5.1±0.8 years, a total of 18 children volunteered to participate. The experiment group had gymnastic training in addition to ice-skating training, while the control group only participated in ice-skating training. Before and after the study, the leg strength, explosive strength, balance and flexibility skills of sportspeople were observed. The results of the study found the experimental group had significant variation in long jump, flexibility, balance and vertical jump pretest and posttest measurements (89.5±19.6 cm-100.0±13.3 cm, 7.7±4.7 cm-10.2±3.6 cm, 15.6±5.2 times-10.7±5.7 times, 15.3±6.8 cm-21.8±6.4 cm, respectively), while the control group only showed significant change for flexibility performance. In light of these results, 8-week gymnastic training can be said to be an effective method to develop explosive strength and flexibility performance.

1. Introduction

In recent years, there are many health problems related to sedentary lifestyle such as obesity especially in children (Bleich et al. 2018; Holub, 2008; Lobstein Baur, & Uauy, 2004; Uluöz, 2016a; Reinehr et al. 2018; Skinner, Ravanbakht. Skelton, Perrin, & Armstrong, 2018) This situation causes serious physical, psychological and sociological problems especially in children and adolescents (Chambliss, Greenleaf, Rhea, Martin, & Morrow, 1997; Uluöz, 2016b; Yılmaz, & Dinç, 2010). However, participation in regular physical activity is reported to have many psychological and physiological benefits according to scientist (Oberg, 2007; Debate, Gabriel, Zwald, Huberty, & Zhang 2009; Trost, & Lorpinzi, 2008). In order to prevent health problems caused by reduced physical activity duration as

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age advances, gaining regular exercise habits beginning at an early age may be an effective strategy. Early ages of 3 to 6 years which are belong preschool ages are described as critical to developing basic biomotor skills such as walking, running, jumping, throwing, catching and kicking (Gallahue, & Ozmun, 2006; Stodden et al., 2008; Gagen, & Getchell, 2006). Researcher reported that developing the children's basic biomotor skills, adding skill specific experiences to time spent in physical activity is more effective, therefore lots of parents prefer these activities (Dinç Uluöz, & Sevimli, 2011; Fisher et al., 2005; Sääkslahti et al., 1999; Deli Bakle, & Zachopoulou, 2006; Zachopoulou, Tsapakidou, & Derri, 2004). However, when the type of activity is considered, it does not appear possible to practice every type of exercise at all ages. Especially when resistance exercises are not well-planned, practice at very early ages may cause muscle-joint discomfort and developmental problems (Holly, Benjamin, Kimberly & Glow, 2003). Considered from this aspect, gymnastic exercises, with features that can be practiced at early ages and movement models like flexibility, coordination and object control, are accepted as an appropriate exercise type for children (Sloan, 2007; Donham, 2007; Coelho 2010).

While physical education lessons on the school curriculum generally include play-based development of basic biomotor skills, gymnastic activities are included in the curriculum at older ages. While the effects of gymnastic activities on adolescents and young individual have been researched in the literature, there is a need for study findings about the effect of this type of activity on biomotor skills in children. As a result, the aim of this study was to research the effect of eight weeks of gymnastic training on the biomotor skills in children.

2. Material and methods

Research Group; In this research, a total of 18 child volunteers participated with mean age of 5.1±0.8 years attending training at Kocaeli Olympic Ice Sports Salon. Children were randomly separated into two groups as experiment (n:9) and control (n:9). The experimental group performed gymnastic training (8 weeks/2 days/1 hour) in addition to ice-skating studies, while the control group only participated in ice-skating studies.

Data collection techniques; Before and after the study the leg strength, balance and flexibility skills of participants were observed.

Flamingo balance test; In this test, the candidate attempts to keep their balance on one leg on a piece of metal or wood with 3 cm width set at 4 cm height and 50 cm length. The number of balance disruptions within 1 minute is counted. The best score is recorded after two attempts.

Sit-reach test; Subjects were seated on the floor with their bare feet against the sit-and-reach box. The subjects then slowly reached forward towards their toes while keeping their legs straight and their hands together. The distance from the toes (zero point) was measured. After standard 10-second warm-up stretches, 2 trials were performed. Best scores of two attempt was recorded.

Standing long jump; Participants jump at the back of the line with the double feet without speed. Participants performed two jumps and the best was measured to the back heel mark and recorded as cantimeter.

Vertical jump test: Participants stands side on to a wall and reaches up with the hand closest to the wall. Point of the fingertips is marked or recorded. Participants stands away from the wall, and jumps vertically as high as possible. Attempt to touch the wall at the highest point of the jump. The difference in distance between the reach height and the jump height is the score. The best score of two performs is recorded as cantimeter.

Ethical Permission; This study received permission from Regional Human Research Ethics Committee. Also all participants and their families signed a voluntary participation form before the study.

Training program; The gymnastic program was completed by a licensed gymnastic trainer on Tuesdays and Thursdays when there was no ice-skating training. The program comprised 55 minutes of exercises including movements to develop balance, strength and flexibility.

Table 1. *Gymnastic program*

Stages /min	**Movements**
Warm-up (15 min)	Slow jog, stretching and flexibility work
Main stage (25 min)	Balance ball work, jumping and rolling movements, gymnastic vault jumping work, strengthening movement for back and abdominals on the mat.
Finish (15 min)	Static and dynamic stretching movements

Statistical Analysis; Data analysis in the study used the SPSS program. The non-parametric test of the Wilcoxon signed ranks test was used to compare pretest-posttest measurements within each group. The non-parametric Mann Whitney U test was used to compare the differences in pretest-posttest measurements between the groups. Findings were accepted as significant at $p<0.05$ level.

3. Results and Discussions

Table 2. *Descriptive variables of participants*

Variables	**Experiment (n:9)**	**Control (n:9)**	**Total (n:18)**
Age (years)	5.5±0.8	5.1±0.6	5.3±0.6
Height (cm)	113.5±6.1	109.4±4.9	111.4±5.7
Weight (kg)	20.4±3.8	21.3±4.5	20.9±4.1
BMI (kg/m^2)	15.7±7.2	17.7±8.8	16,7±2,4

The descriptive variables of the participants in the research is shown in Table 2. Accordingly, the mean age of participants was 5.1±0.8 years, with experiment and control groups determined to have similar descriptive features.

Table 3. *Pretest-posttest performance values for participants*

	Experiment		**Control**	
	Pretest	**Posttest**	**Pretest**	**Posttest**
Standing jump (cm)	89.5±19.6*	100.0±13.3**	70.1±18.4	69.7±18.7
Vertical jump (cm)	15.3±6.8*	21.8±6.4**	13.2±3.1	12.2±3.3
Flexibility (cm)	7.7±4.7	10.2±3.6**	6.9±4.2*	6.1±3.8
Balance (repeat)	15.6±5.2*	10.7±5.7	9.5±13.2	4.4±7.1

*Significant difference between pretest-posttest measures $p<0.05$
** Significant difference between posttest measures in groups $p<0.05$

Comparison of the pretest-posttest points for motor skills observed in participants is shown in Table 3. At the end of the study, the experimental group had positive significant variation for all variables apart from flexibility performance. Contrary to this, there was no significant variation observed in the control group, apart from flexibility performance. The results of comparison of the the difference between pretest-posttest measurements in the group found the experimental group had significantly more change in terms of long jump and flexibility points compared to the control group.

Discussions

The aim of this study was to investigate the effect of eight weeks of gymnastic exercises on the biomotor skills of children. As a result, ice-skating and gymnastic exercises were practiced for 8 weeks/2 days by a total of eighteen children with mean age of 5.1±0.8 years involved in the sport of ice-skating. At the end of the study, the children's standing long jump and flexibility skills were shown to have significantly developed compared to before the study.

Play-based basic education applied to children in the preschool period especially is known to positively affect the basic motor skills of children (Yarımkaya, & Ulucan, 2015; Saygin, Polat, & Karacabey, 2005; Kerkez, 2012). Basic motor skills which begin to develop in the school period may affect quality of daily life of individuals and ability to perform movements specific to the sport in the branch period. Physical activity development curriculum with different forms may develop the biomotor skills of children, and there is a need for more research about the effect on preparing for a particular sports branch. In parallel with this, there were developments observed in the biomotor skills of children at the end of this study, supporting the findings in the literature.

When studies researching the effects of gymnastics on children, it appears most studies focus on adolescent individuals. Researchers identified that at the end

of different durations of gymnastic studies, there were significant variations in the endurance, flexibility, explosive strength and flexibility skills of young sportspeople (Trajković, Madić, Sporiš, Aleksić-Veljković, & Živčić-Marković, 2016; Boraczyński, Boraczyński, Boraczyńska, & Michels, 2013; Mertashl, Rohani, Farzaneh, & Nasiri, 2015). Additionally, when studies investigating the effect of regular gymnastic exercise on biomotor skills of children are examined, it is reported that this type of exercise has positive effects on strength, flexibility, postural control, dynamic and static balance performance (Garcia, Barela, Viana, & Barela, 2011; Alpkaya, 2013; Fallah, Nourbakhsh, & Bagherly, 2015; Akın, 2013). The repetition of movements requiring coordinative skills like changing location, balancing, jumping, and body control included in gymnastic exercises contributes to development of basic biomotor skills. The findings of this study support previous studies showing that at the end of 8 weeks of gymnastic training, sportspeople had significantly developed explosive strength and balance performance.

Sports skills and successfully completing movements in daily life displays variation according to the biomotor skills an individual has. Considering all sports branches, biomotor characteristics observed in sportspeople may be listed as balance, flexibility, agility, speed, strength and endurance. Due to the dynamic and static exercises and body control movements included in gymnastics exercises, it may be helpful to develop biomotor skills of children required for all branches (Pajek, Cuk, Kovac, & Jakse, 2010). Although the findings of the effectiveness of gymnastics studies added to the branch studies on the sporting skills are not clear but, this study showed that it was determined that the gymnastic exercises had a positive effect on the slalom skills according to base line measurements. Therefore, it can be thought that because of the development of balance skill required for slalom skill may be effective.

4. Conclusions

At the end of this study, children receiving gymnastic training had development of biomotor skills, similar to previous studies. In light of the results of this study, gymnastic training for children at the 5-year old level alone or in addition to branch training can be said to be an effective method to develop their biomotor skills.

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