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The Effect of 6-Week Basic Gymnastics Training on the Flexibility Parameters of Preschool Children

Müge Ünal^{1*}, Erdem Çakan¹

¹ Institute of Health Sciences, Ankara University, Ankara, Turkey

Abstract

The aim of this study is to examine the effects of a six-week basic gymnastics training program on the parameter of flexibility in preschool children aged 6, as determined by conducted tests. The developmental changes in flexibility parameters, which are components of physical fitness in children due to early basic gymnastics training, were investigated. This research was conducted with a total of 21 participants. Measurements were determined as initial measurement - final measurement to understand the participants' status before the education. Measurements after six weeks of basic gymnastics training, conducted twice a week for one hour, were compared with the initial measurements. As a result of the examination, it was seen that gymnastics training contributed positively to the parameters of flexibility, balance, and strength.

Key Words: Flexibility, preschool, basic gymnastic training

INTRODUCTION

Gymnastics

Gymnastics is one of the special sports branches that want high levels of mixed movements, advanced performance where multiple motor skills are used at the same time. One of the subjects that makes gymnastics special is that it is a sport that constantly renews itself in terms of movements even though there are countless movements. It contributes to the development of various motor skills such as knowing how to use the body, maintaining balance in body positions, and improving strength and flexibility (27).

In itself, it is divided into artistic gymnastics, rhythmic gymnastics, trampoline gymnastics, aerobic gymnastics, general gymnastics, step, step-aerobics and pilates (27).

Gymnastics is a sport that dates to the ancient Greek civilization. At that time, a special physical education such as Gymnastics belonged only to the “noble class” children. It was later adopted in Roman civilization. Subsequently, after the Renaissance and Reform periods, it was put as a course in schools in various European countries. Gymnastics, which was not truly seen as an educational tool from around 1450 to 1800, began to gain popularity in the mid-19th century. In 1811, the first open-air gymnastics area was opened in the meadow called Hasenherde in Berlin, laying the foundation of German folk gymnastics. German Friedrich Ludwing Jahn is considered the person who shaped the artistic gymnastics used today (1).

Preschool Period and Developmental Characteristics in Children

It is known that the education implemented in the pre-school period has a great impact on determining the future lives of children. Environmental and hereditary interactions are determining factors for development (16).

Development and developmental characteristics are directly related to the environment and heredity, as well as the evaluation of developmental stages over time. Important time periods in terms of development are called "critical periods". If the organism has the necessary genetic potential during critical periods, it is possible to develop at the highest level in terms of some behaviors or some organs and their functions when it encounters sufficient stimuli. A child's development follows a certain path, but each child progresses along this path in a peculiar way. Although every normal child is ahead of others in some aspects and behind in others, the timely and inevitable sequence of developments in every period of childhood is a definitive sign of normality (16).

In a child who is six years old, the movements of the trunk, arms and legs are in harmony. In the gymnastics branch, these ages have an important place in terms of specialization (6).

Gymnastics Practices in Preschool Period

Gymnastics activities to be carried out in the preschool period should be chosen primarily in accordance with the development level of the child. It is appropriate to start at the game level and then move on to regular actions. Movements should be arranged from simple to difficult. Starting with a movement that children are accustomed to and enjoy increases their interest. Movements that require strength, challenging and a high degree of coordination movements should not be included in the program. Movements that require attention and have complex

rules should be avoided (17).

The Effect of Gymnastics Branch on Motor Development in Children

Motor development includes movement skills, especially under the influence of physical and biological changes, as well as interacting with all other areas of development (21). Gymnastics helps children to develop cognitive and social skills, relax emotionally, develop self-development, develop a sense of independence, entertain themselves (17). The most important benefits of gymnastics sport are its contribution to children's physical and motor development. Activities such as running, jumping and hopping during warm-ups, climbing on the gymnastics equipment during exercises, running on it, jumping, moving using one's own body, and getting off the equipment, all movements that constitute gymnastics, contribute to the child's cardiorespiratory system and muscle strength and endurance. During all these movements, different muscle groups in the body work and thus ensure their development. Gymnastics contributes to the development of the body's flexibility with bridges made using body parts, leaps made by opening the legs, stretching and stretching movements to cool the body at the end of the workout.

While gymnastics helps children develop skills from simple to more complex skills, it also supports their motor development (9).

Flexibility

The term flexibility in English-based literature has been adapted as (flexibility) in our sports literature. Flexibility, physical harmony is defined as a component of the ability to function within the framework of the normal opening of the joints. In other words, it can be said that it is the angle at which the joint moves freely within the normal width of movement (19).

Flexibility measurement can be easily performed with tools such as goniometer, flexiometer, tape measure, anthropometer, measuring sticks and caliper. Electrogoniometers, autogoniometers are also used. The most widely used flexibility test in mass measurements, health-related physical fitness test batteries and as a rough indicator of flexibility is the sit-access test (12).

METHODS

Research model

The study was designed with a single-group pretest-posttest design. Since the subjects were underage before starting the study, approval was obtained from the subjects' parents. The subjects participated in the measurement before the study in a random order. Measurements were taken at 17.00 before training in the Sinav College Gymnastics Hall; It was taken with v-sit test, reach-out test and split test. The study was applied for 6 weeks. The working order is mainly designed for flexibility, balance and strength. Working 2 days a week, 1 hour; 5 min warm-up, 20 min gymnastics-specific line work, 15 min gymnastics-specific work, 15 min specially prepared training for one of the flexibility-strength-balance parameters and the last 5 min cooling-down training program was applied. At the end of 6 weeks, the students were subjected to the v-sit test, reach-out test and split test for the second time, and the measurements were again taken in the Sinav College Gymnastics Hall.

Table 1. Weekly Exercise Schedule

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
5-minute Warm Up Exercise	5-minute Warm Up Exercise	5-minute Warm Up Exercise	5-minute Warm Up Exercise	5-minute Warm Up Exercise	5-minute Warm Up Exercise
20-minute Gymnastics-Specific Line Exercise	20-minute Gymnastics-Specific Line Exercise	20-minute Gymnastics-Specific Line Exercise	20-minute Gymnastics-Specific Line Exercise	20-minute Gymnastics-Specific Line Exercise	20-minute Gymnastics-Specific Line Exercise
15-minute Gymnastics-Specific Exercise	15-minute Gymnastics-Specific Exercise	15-minute Gymnastics-Specific Exercise	15-minute Gymnastics-Specific Exercise	15-minute Gymnastics-Specific Exercise	15-minute Gymnastics-Specific Exercise
15-minute Flexibility Exercise	15-minute Flexibility Exercise	15-minute Flexibility Exercise	15-minute Flexibility Exercise	15-minute Flexibility Exercise	15-minute Flexibility Exercise
5-minute Cool Down	5-minute Cool Down	5-minute Cool Down	5-minute Cool Down	5-minute Cool Down	5-minute Cool Down

Research Group

A total of 21 volunteer pre-school children, 11 girls and 10 boys, who had just started gymnastics, participated in the research. Approval was obtained from the parents of the participants whose age was determined as 6 years old, height ($114,00 \pm 9,10$ cm), body weight ($20,11 \pm 3,39$ kg), body mass index ($15,25 \pm 1,26$ kg/m²). The limitations of the study were that the children did not engage in any other sports in their daily routine before the measurements, that they fully participated in the organized program, and that they had experienced a serious injury and/or illness in the last month.

Data Collection Tools

Anthropometric measurements: Participants' body compositions were determined using the Avis 333 Plus analyzer (Korea) while individuals were in a standing position, wearing only gymnastics leotards. Heights were measured using the Holtain stadiometer with a 1 mm interval (Holtain, U.K.). To avoid affecting reliability, measurements were taken without shoes, and participants wore only leotards. Height, body weight, and body mass index parameters were recorded.

Sit-and-Reach Flexibility Test: This test is used to measure the flexibility of the lower extremities, lumbar region, and hamstring muscle groups. The participant was instructed to sit on the reach box with bare feet, fully supported on the ground. During the measurement, legs and arms were kept straight, palms facing down on the reach box, and participants were asked to slowly reach forward until they could stretch their bodies to the furthest point. They were then held at the stretched position for at least 2 seconds. The measurement was performed twice, and the highest value was recorded. The Baseline Sit and Reach flexibility measuring box (New York, USA) was used for flexibility.

V-Sit and Reach Test: No material was used for the V-sit and reach test. This test, which has high reliability coefficients, was employed to measure flexibility. The participant's heels were considered the zero point, marked on the ground. Participants were instructed to sit on the floor with legs stretched and feet toes up, heels in contact with the ground, and 30 cm between the two feet. The point where the heels touched the ground marked the zero point, and a straight line was drawn over two points from this point. Participants were then asked to stretch their upper bodies forward without bending their knees. The reached point was measured with a ruler

and recorded.

Splits Test: The splits flexibility test is performed to determine the flexibility of athletes' lower extremities. In sports where lower extremity flexibility is crucial, such as gymnastics and taekwondo, this test is easily applicable. Participants were asked to perform the splits position with the body upright, facing forward, knees in extension, and legs spread as far apart as possible. The distance between the pubic point of the participant and the floor was measured with a ruler, and the result was recorded in centimeters.

Data Analysis

To determine whether there is a significant difference in the data obtained from the measurements, paired-sample t-tests were conducted on pre- and post-test values. IBM SPSS Statistics 25 (IBM, Armonk, NY) was utilized for all statistical analyses. The significance level was set at 0.05.

FINDINGS

This section contains the statistical comparisons of the data obtained regarding the changes in flexibility parameters between the initial and final measurements after a 6-week gymnastics training.

Table 2. Tests Measurements Results

Tests	Pre-test	Post-test	t	p
Reach-Out	22.47 ± 2.83	23.30 ± 3.26	-1.87	.076
V- Sit	8.09 ± 3.03	8.92 ± 3.48	-5.22	.000
Split	14.23 ± 4.13	12.95 ± 4.44	5.92	.000

As a result of the conducted study, improvement was observed in the v-sit test and split test with a significance level of 0,000, indicating a significant difference. However, in the sit-and-reach test, where a p-value of 0,076 was obtained, no significant difference was found, suggesting insufficient improvement based on the measurements.

DISCUSSION

The aim of this research was to examine whether fundamental gymnastics training positively affects flexibility parameters in preschool children by comparing measurements of flexibility parameters before and after a 6-week gymnastics training program. Different muscle groups of the body work during movements, leading to variations in their developments. Body parts, for example, contribute to the development of body flexibility through stretching and lengthening movements performed to cool down the body after exercises such as jumps made from the legs (11). It is understood from the measurements in the v-sit and split tests that lower extremity exercises were more efficient. No improvement was observed in the sit-and-reach test due to the slower progress of upper extremity exercises. In another gymnastics study, the Sit-and-Reach Test showed improvement in the measurements, with an initial test of $8,62\pm 4,52$ and a final test of $11,85\pm 4,77$ (15). Similarly, the Split Test showed improvement with an initial test of $9,38\pm 4,90$ and a final test of $4,83\pm 3,78$ (15).

In a study by Kalyoncuoğlu and Şentürk (2016), an 8-week gymnastics program resulted in significant differences, with the Sit-and-Reach pre-test being $8,62\pm 4,52$ and the post-test being $11,85\pm 4,77$, the Split pre-test being $9,38\pm 4,90$ and the post-test being $4,83\pm 3,78$, the Bridge pre-test being $49,40\pm 17,43$ and the post-test being $43,72\pm 15,65$, the Flamingo Balance pre-test being $15,29\pm 6,43$ and the post-test being $21,25\pm 9,22$, and the Coordination pre-test being $16,20\pm 2,68$ and the post-test being $12,55\pm 2,64$.

In a study by Yavuz N. & Özyürek A. (2018), they implemented an exercise program for 14 weeks, twice a week, for a group of 4-6-year-old children. After the exercise program, the Sit-and-Reach test scores for the exercise group increased from an average of 21,40 cm to 23,05 cm.

Koyuncuoğlu and Şentürk (2015) found significant differences in the measurements of preschool children after a 10-week basic gymnastics training program. The pre-test and post-test measurements for the Sit-and-Reach test were $8,62\pm 4,52$ and $11,85\pm 4,77$, respectively, and for the Split test, they were $9,38\pm 4,90$ and $4,83\pm 3,78$, respectively.

Addressing the importance of gymnastics in child development, Tanasa et al. (2020) emphasize that most teachers agree on its significant role in promoting the healthy growth of children. The preschool period is recognized as a crucial time for making positive and lasting contributions to motor skills, guiding developmental stages that extend throughout life (17). Studies in motor

development highlight the influential role of environmental factors and activities on early brain development in children (2). Recent research underlines the pivotal impact of activities on children's development, reinforcing the importance of appropriate training programs during sensitive age periods (17). Gymnastics, known for its rich movement combinations, demands a high level of coordinative performance and flexibility from participants, making it particularly relevant in the preschool period for developing essential flexibility skills (9).

Building upon the positive impact identified by previous research, a study conducted by Irfannuddin et al. (2018) revealed that individuals engaged in regular gymnastics exercises demonstrated superior flexibility, agility, reaction speed, and coordination abilities compared to a control group. These findings resonate with the conclusions drawn by Bressel et al. (2007), who emphasized the beneficial effects of gymnastics on the development of coordination, flexibility, and balance in children. Atilgan et al. (2012) further supported this perspective, asserting that gymnastics training not only stimulates balance development but also facilitates nearly perfect stability, even under extreme conditions. The results of our study align with these insights, providing additional substantiation to the existing body of research. This consistent evidence underscores the significant role of gymnastics in enhancing coordination, flexibility, and balance parameters in preschool children.

Our study, along with similar studies, showed that the "Gymnastics Training Program" contributed to the development of flexibility parameters and led to significant changes in parameters such as balance and coordination. The implementation of the preschool "Gymnastics Training Program" is considered significant for flexibility, healthy motor development, and balance.

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