Journal of Education and Learning; Vol. 8, No. 5; 2019
ISSN 1927-5250 E-ISSN 1927-5269
Published by Canadian Center of Science and Education

The Effects of Specific Stretching Exercises on Flexibility and Balance Parameters in Gymnastics

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Received: July 24, 2019 Accepted: August 16, 2019 Online Published: September 20, 2019

doi:10.5539/jel.v8n5p136 URL: https://doi.org/10.5539/jel.v8n5p136

Abstract

This study was planned to examine the effect of Gymnastics-specific stretching exercises on flexibility and balance parameters. A total of 28 (16 males, 12 females) volunteer students were involved in the study, who were educated at the School of Physical Education and Sports. For 12 Weeks, 2 days a week and 90 min. stretching exercises specific to the gymnastics branch were applied and flexibility (sit-lie down) and Y balance tests were applied before the study. Anova test analysis was used to determine the difference between pre-test and post-test. Although the SA (right foot anterior), SPL (right foot posterolateral), SPM (right foot posteromedial), SLA (left foot anterior), SLPL (left foot posterolateral), SLPM (left foot posteromedial) scores of male and female students in the study showed a positive increase compared to the preliminary test scores, there was no statistically significant difference ($p > .05$). As a result, gymnastic branch-specific stretching exercises increase the balance and flexibility parameters in a positive way; it is thought that the longer duration of training programs will have a positive effect on the athlete's performance.

Keywords: gymnastics, stretching exercises, flexibility, balance

1. Introduction

Gymnastics is a sports branch that provides the complex technical movements necessary for each sports branch and contains many motoric features (Atılgan & Pınar, 2005). As with most sports branches, gymnastics requires high physical technical skill physiological performance (Tatlici & Cakmakci, 2019). It consists of many movements and movement groups such as Jump, capriole, turn, armstand dvies, leg and arm tossing, flight, static and dynamic posture (Akdogan, 2008). These movement groups consist of various combination repeats and are performed at the limits of the athletes' anatomical joint angle range (Savucu et al., 2018). Skills require that the area of movement of the joints from a biomechanical point of view be made at the most efficient angles, with muscle, tendon, and joint capsules having enough flexibility (Pope et al., 2000; Karataş, 2017). Connective tissue flexibility improves musculoskeletal sensitivity, joint movement width, and muscular performance (Polloc et al., 1998). Stretching exercises to increase flexibility are routinely included in both the training program and warm-up activities of many athletes. As stated at the basic level, the whole body should be considered as a whole in flexibility studies and should be developed on the basis of general mobility, especially in the specific mobility required for gymnasts.

When gymnasts perform acrobatic movements, they must constantly move their body from one position to the other. They, therefore, have to maintain their dynamic and static balance in the best way (Asseman, 2004). Because the smallest loss of balance will negatively affect the score the athlete will receive, balance in gymnastics is an important factor and one of the most important features that need to be developed (Atılgan et al., 2012). Balance is the ability to control the body with minimal muscle activity in static and dynamic positions against changes in the body's center of gravity (Akyüz, 2017). It suggests that age and maturation may have an effect on the amalgamation of selected balance components and lower limb muscle strength (Akyüz et al., 2017). The common view is that balance ability is a different indicator of sportive performance in sports requiring static and dynamic performance and that different methods and evaluation protocols are applied in assessing balance (Ateş et al., 2017). The balance is divided into two types: static and dynamic. Static balance is the ability of the body to maintain balance in a certain place or position, while the dynamic balance is the ability to maintain the balance of the whole or part of the body in motion (Kuşakoğlu, 2012; Aslan et al., 2018).

Stretching exercises are used in gymnastics branch where balance and flexibility are very important, but when the literature is examined, there are not enough studies about the training programs of stretching exercises. From this point of view, our study is planned to determine the effect of flexibility and balance parameters of gymnastic stretching exercises for 12 weeks.

2. Method

2.1 Sample and Procedure

A total of 28 (16 males, 12 females) volunteer students from the School of Physical Education and Sports of Karamanoğlu Mehmetbey University participated in the study. The age, length, weight and leg lengths of the male and female students in the study group are shown in table1, respectively.

Table1. Age, height, weight and leg length values of male and female students

Gender	Old (year)	Size (cm)	Weight (kg)	Leg Length (cm)
Man	20.5 ± 3.01	176 ± 5.53	68.37 ± 9.15	95.06 ± 7.94
Woman	19.75 ± 1.06	153.14 ± 47.98	56.25 ± 6.96	91.88 ± 4.76

The mean age of male students was 20.5 ± 3.01 years, mean age of female students was 19.75 ± 1.06 years, mean length of male students was 176 ± 5.53 cm, mean length of female students was 153.14 ± 47.98 cm, mean body weight of male students was 68.37 ± 9.15 kg, mean body weight of female students was 56.25 ± 6.96 kg, mean leg length of male students was 95.06 ± 7.94 cm and mean leg length of female students was 91.88 ± 4.76 cm.

2.2 Exercise Protocol

Stretching exercise program was applied to the study group for 12 weeks, 2 days a week and 90 minutes. Movements in unit training were completed in 4 sets. In order to correct movements and correct errors before the application, a 1-Week adaptation program was applied before the start of the program and flexibility and balance tests were applied to the Working Group before and after the 12-week stretching exercise program.

Table 2. 12-week stretching exercise program

Exercises	1.Rep	2.Rep	3.Rep	4.Rep
All fours walk	20 m	20 m	20 m	20 m
Right Hand Right Foot Walk	20 m	20 m	20 m	20 m
Left Hand Left Foot Walk				
Caterpillar Walk	20 m	20 m	20 m	20 m
Little Bear Walk	20 m	20 m	20 m	20 m
Bear Walk	20 m	20 m	20 m	20 m
Little Rabbit Walk	20 m	20 m	20 m	20 m
Rabbit Walk	20 m	20 m	20 m	20 m

2.3 Data Collection Tool

2.3.1. Flexibility (Sit-Lie Down) Test

Sit-lie test was used to determine their flexibility. The top of a 32 cm high and 35 cm long table was measured by dividing it into cm. The research group sat on the floor, stretched out their legs and, without shoes, rested their soles on the coffee table. The group was then asked to extend from the trunk (waist and hips) as far as possible on the stand without bending the knees. The most extreme point of the fingers was measured in cm. The research group repeated this three times and the best grade was obtained (Özer & Kilinc, 2012; Bakırcı & Kilinc, 2014; Güvern et al., 2017).

2.3.2 Y-Balance Test

Y dynamic balance test is used to measure dynamic balance. The test is applied without shoes. The athlete stands on one foot in the center of balance and extends in the anterior, posteromedial and posterolateral directions with the free foot on one foot 3 access attempts in each direction while standing on the right foot and then 3 access attempts while standing on the left foot. The specific order of the Test (right anterior, left anterior, right posteromedial, left posteromedial, right posterolateral, left posterolateral) is followed. The maximal access distance reached is measured by reading the Strip measurement at the edge of the access indicator. The most successful result reached

for each direction is used for analysis (Fusco et al., 2019; Yam & Fong, 2019)

2.4 Data Analyses

For statistical calculations of the data obtained, the assumptions of normality, homogeneity of variance and independent observation were checked first with the SPSS 25 computer package program. ANOVA test was used to determine the difference in the pre and post-test for repeated measurements.

3. Results

Table 2. Flexibility and Y balance values of male students

Variables	N	Flexibility	SA	SPL	SPM	SLA	SLPL	SLPM
Pre-test	16	30.03 ± 8.5	69.83 ± 10	90.72 ± 10.2	87.28 ± 14.4	69.58 ± 9.4	89.81 ± 11.3	89.47 ±14.5
Post-test		37.13 ± 13.2	73.25 ±10.6	91.47 ± 9.4	91.44 ± 10.1	74.69 ± 8.5	95.94 ± 8.3	90.47 ±10

Note. SA: (right foot antrerior), SPL: (right foot posterolateral), SPM: (right foot posteromedial), SLA: (left foot anterior), SLPL: (left foot posterolateral), SLPM: (left foot posteromedial).

When Table 2 was examined, the post-test of male students showed a positive increase in SA (right foot anterior), SPL (right foot posterolateral), SPM (right foot posteromedial), SLA (left foot anterior), SLPL (left foot posterolateral), SLPM (left foot posteromedial) scores compared to the preliminary test scores, there was no statistically significant difference ($p > .05$).

Table 3. Flexibility and Y balance values of female students

Variables	N	Flexibility	SA	SPL	SPM	SLA	SLPL	SLPM
Pre-test	12	33.58 ± 8.14	71.54 ± 9.54	91.09 ± 8.85	89.36 ± 8.12	72.13 ± 8.12	92.88 ± 8.33	89.97 ± 6.84
Post-test		35.35 ± 8.55	72.39 ± 3.84	91.28 ± 8.06	90.40 ± 5.48	73.41 ± 4.28	94.41 ± 7.58	90.22 ± 7.05

Table 3 is examined; although the SA (right foot anterior), SPL (right foot posterolateral), SPM (right foot posteromedial), SLA (left foot anterior), SLPL (left foot posterolateral), SLPM (left foot posteromedial) scores of the female students showed a positive increase compared to the preliminary test scores, there was no statistically significant difference ($p > .05$).

4. Discussion

4.1 Study Limitations and Implications for Future Assessment

Physical and mental activities to achieve the highest performance required by competition or training are called warming up integrity (Arslan et al., 2011). When the literature is examined, it is thought that the different types, intensities and periods of warming are caused by the different warming methods used in these studies (Devries & Housh, 1994; Colak & Çetin, 2010; Turan & Çilli, 2016; Harmanci et al., 2017). Siatras et al. (2003) compared 3 different warming methods (warming, static stretching, and dynamic stretching) on Gymnasts and found a statistically significant difference in warming and dynamic stretching methods while finding no significant difference in static stretching method. Çoknaz et al. (2008) they found that the group performing 15-second, 10-repeat, and 30-second static stretching exercises on non-consecutive days with 15-second, 10-repeat stretching exercises with two different programs applied on 15-second, 10-repeat stretching exercises had more significant increases in flexibility values. Guidetti et al. (2009) the study of pre-competition warm-up times of Elit and Subelit gymnasts found a statistically significant difference between pre-competition warm-up times of elite and Subelit gymnasts. Çoknaz et al. (2010) in 3 groups of 18 gymnasts who had Joggin and stretching for only 5 minutes examined the effect of acoustic and optical reaction times of gymnasts and no statistically significant difference was detected as a result of the study. Özengin et al. (2011) they applied 2 different static stretching methods on 27 rhythmic gymnasts. They found no statistically significant difference between the pre and post-test results. Siatras (2014) 14 Gymnast on his 3 different warm-up methods respectively a) General warming without stretching b) static stretching with synergist muscles c) Static stretching with antagonist muscles found a > b and c > b statistically significant difference between pre-test and post-test values. The warming model we applied in our study parallels the effect of participants on flexibility parameters with the literature. Especially post-warming gait studies are considered to have a positive effect in terms of preservation of the joint space angle.

Gymnastics branch is a sports branch that requires extensive locomotor movement, balance, flexibility, and body control movements (Ballı & Gürsoy, 2012). Balance skill is a very important factor in gaining skills such as

walking, running, jumping (Durukan et al., 2016). Coordination of movements requires a certain balance system (Yüksel & Akın, 2017; Ünlü & Tatlıcı, 2018). Ahmadabadi et al. (2015) applied two different protocols consisting of acute and chronic dynamic warming after 10 minutes of running on 16 elite gymnasts and found that the dynamic warming protocol had a statistically significant effect on static and dynamic equilibrium parameters. Belkhiria et al. (2014) conducted two different dynamic and static stretching exercises in 4, 8 and 12 sets on the students who studied Physical Education and Sports Teaching, before and after balance parameters. As a result of their studies, they found that static and dynamic stretching exercises improved the anterior, posterior lateral and posterior medial balance parameters numerically but were not statistically significant. Dallas and Kirialanis (2013) found that there was a statistically significant difference between the balance parameters of the pre-and post-test values of full-body vibration and static stretching methods after full-body vibration on 12 elite gymnasts. Atılgan (2013) ensured that there was a statistically significant difference in static and dynamic balance parameters following his mini-trampoline studies on 28 gymnasts. Di Cagno et al. (2010) in their study on rhythmic gymnasts, they examined 3 different bounce and referee scoring values of the warm-up run and static stretching exercises. As a result of their study, they found that the static stretching Spiers after the warm-up did not have any statistically significant effect on the bounce and referee evaluation scores. Donti et al. (2014) they applied 2 different warming protocols on Elite gymnasts which included short-term and long-term post-stretching bounce studies, and they found that there was a statistically significant difference in the protocol which included long-term post-stretching bounce studies. The warming model we applied in our study parallels the effect of participants on balance parameters with the literature. It is thought that some balance parameters have a positive effect, especially after warm-up walking.

4.2 Conclusion

As a result, gymnastic branch-specific stretching exercises increase the balance and flexibility parameters in a positive way; it is thought that the longer duration of training programs will have a positive effect on the athlete's performance.

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