

The relationship between stretching and jumping in artistic gymnastics

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Abstract

The champion of this study is composed of 15 gymnasts, with the aim of investigating the effect of two types of stretching, static and dynamic, on the ability to jump in the gymnasts. The gymnasts were divided into three groups: the first group of gymnasts performed static stretching exercises, the second group of dynamic stretching and the third group is the control group, which was abstained from various stretching. The first and second groups did their stretching three times a week.

The study lasted six weeks. All groups performed the sargent jump test before the start of the protocol and at the end. This test is carried out to understand the differential from the ground and therefore the possibility of a greater amplitude in the opening of the legs in the enjambè. The results analyzed showed that there is a significant differential increase after dynamic stretching than in static stretching. It was concluded that dynamic stretching, even if only minimally, tends to improve the performance of the height jump compared to static stretching.

Keywords: stretching, jump, test, artistic gymnastics.

Introduction

Gymnasts do not have a very high stature; they are usually around one and a half feet tall, as their thin body is a significant advantage. Athletes in this discipline must have great qualities of elasticity and articular mobility, and they find themselves performing a very long workout because of the many elements of coordination (Raiola et al., 2013). Gymnasts have strong, powerful muscles. Their muscles are mainly composed of fast, white fibres, which guarantee a good level of muscle power (Senatore et al., 2019). Although the most developed muscle groups are in the shoulders and upper limbs, the body still has a harmonious and balanced shape. The ability to automate is very useful to be able to perform with attention and precision the small details of the motor act, but it should not be total, as this would make the gesture too rigid. For a gymnast it is very important to reach the maximum joint excursion, thanks to the three types of training to which he must submit:

- Stretching
- Aerobic training
- Strength training

Stretching (Altavilla, 2014) is defined as fundamental for the safety and joint mobility of the gymnast himself.

The main objective of the training (Tiziana et al., 2017; Raiola et al. 2013; Raiola et al., 2018) is to improve the technique and consequently the performance of the gymnast (Di Tore & Raiola, 2012). The performance can be influenced by different factors including heating practices, which allow the athlete to change their state, from rest to preparation (D'Elia et al., 2018; D'Isanto et al., 2018, 2019). According to the Italian Gymnastics Federation, passive static stretching is probably the best compromise between effectiveness and safety and is certainly the one on which, at least initially, it is convenient to base a flexibility training program.

Method

Fifteen gymnasts took part in the study in three groups (static, n = 5; dynamic, n = 5; control, n = 5). It should be noted that the level of gymnasts is non-professional and competes at regional level. Various parameters such as age, weight, height (Table 1.) were collected and included in this analysis (Altavilla et al. 2017, 2018; Forte D., Altavilla, 2018).

Table 1 parametric measures

	SS	SD	GC
	M - DS	M - DS	M - DS
N	5	5	5
AGE	9,4 ± 1,14	10,4 ± 1,67	10,2 ± 1,64
HEIGHT (cm)	135,5 ± 7,45	144,1 ± 9,65	142,1 ± 11,19
WEIGHT (KG)	30,6 ± 4,51	36 ± 6,44	34,4 ± 7,50

SS= STATIC STRETCHING; SD= DYNAMIC Stretching; GC= CONTROL GROUP.

The study was conducted from January 2019 to mid-February 2019. The gymnasts have been divided into three groups, each group has a different protocol, for a total duration of six weeks (Gaetano 2012, 2016; Raiola 2012, 2017). The athletes have not changed their nutrition and physical activity regulations.

All three groups participated in the initial and final tests. The jump tests were carried out near a centimetre wall for a number of 3 tests, and taking into account the best score. The first group did static stretching exercises,

The second performed dynamic stretching exercises, while the control group did not perform any kind of stretching for a duration of three weeks.

There are three protocols and they are divided into groups. The first protocol concerns static stretching (SS) lasting 10 minutes, influencing specific muscular districts, such as gastrocnemius and quadriceps.

The gymnasts through static stretching were able to obtain a stretching of the muscle gradually, up to the maximum point of the athlete himself, and maintaining this position for 15 seconds. The duration of the pause between one exercise and the next is 10 seconds, but it is absent if you work on alternate legs. The exercises carried out respected the maximum articular ROM, avoiding muscle pain. The dynamic stretching protocol (DS) had the same duration as the static one, affecting the same muscle districts as the previous protocol.

The duration of this protocol is the same as the static one, that is, 15 seconds per exercise with a break of 10 second if you work on both limbs, otherwise without pauses.

The last group, the control group, abstained from any kind of stretching for six weeks and carried out tests immediately after warm-up without stretching. Before the test, the gymnasts carried out a usual warm-up, while in the final test, they stretched for 10 minutes inherent to their experimental group. The gymnast is placed near the wall with hands, arms and legs completely extended. The assistant traces a mark at the height reached by the athlete with his fingertips (M1). The athlete, flexing his knees and keeping his feet together, makes an upward leap, keeping his arms and hands extended upwards. The assistant detects the measurement reached by the athlete with the fingertips (M2) and calculates the difference between the two heights (M2-M1). After recovery, the athlete will repeat the test twice more.

Results

	M1 (height reached with feet on the ground)	Start- test M ± DS	Final - test M ± DS
Control Group			
M2 (height achieved in jump)	185 ± 13,39	212,9 ± 10,84	212,7 ± 9,20
M2-M1		28,2 ± 3,27	28 ± 4,85
Dynamic Stretching Group			
M2 (height achieved in jump)	188 ± 11,52	214,5 ± 10,45	216,1 ± 9,37
M2-M1		26,6 ± 5,08	28,2 ± 4,97
Static Stretching Group			
M2 (height achieved in jump)	179 ± 10,16	205,7 ± 8,26	204,5 ± 6,20
M2-M1		27,2 ± 7,16	26 ± 6,52

Discussion and conclusion

In the present paper only two different types of stretching, static and dynamic, were examined on the ability to jump in artistic gymnastics for a duration of 6 weeks, comparing them, using a sample of 15 gymnasts

divided into 3 groups equally divided. The results obtained show that there is no significant difference between the three groups, but at the same time there is an improvement in gymnasts that are part of the group of dynamic stretching and therefore has a greater positive effect than static stretching (D'Isanto et al., 2019). Static stretching is an ideal muscle stretching to be carried out at the end of the training to return the muscle to rest. Dynamic stretching, on the other hand, is a gradual increase in joint extension and allows you to reach your limit to warm up the muscle and increase flexibility. Stretching is important and the reason lies in the physiology as the synovial fluid contained in the joints, dense when it is cold, needs to be heated so that it flows quickly and without trauma. But it has other benefits, for example: slight increase in body temperature, speeding up blood flow with a consequent improvement in sports performance.

This type of stretching is ideal before training or in the relevant phases of the activity.

References

- Altavilla, G. (2014) Effects of the practice of muscle stretching [Učinci vježbanja stretchinga muskulature] Sport Science, 7 (1), 66-67.
- Altavilla, G., Di Tore, P.A., Riela, L., D'Isanto, T. (2017) Anthropometric, physiological and psychopedagogical summary. Journal of Physical Education and Sport, 16 (2), 340-344.
- Altavilla, G., D'Isanto, T., Di Tore, P.A. (2018) Anthropometrics characteristics and jumping ability in basketball Journal of Human Sport and Exercise, 13, 385-392.
- D'Elia, F., Mazzeo, F., Raiola, G. (2018). The core curriculum in the university training of the teacher of physical education in Italy, Journal of Human Sport and Exercise, 13, 413-420.
- D'Isanto, T. (2016) Pedagogical value of the body and physical activity in childhood [Pedagoškavrijednosttijelaitjelesneaktivnosti u djetinjstvu] Sport Science, 9, 13-18.
- D'Isanto, T., Di Tore, P.A., Altavilla, G. (2018). Correlation of the anthropometric characteristics and the ability to jump in volleyball Journal of Human Sport and Exercise, 13, 393-400.
- D'Isanto, T., D'Elia, F., Raiola, G., & Altavilla, G. (2019). Assessment of sport performance: theoretical aspects and practical indications. Sport Mont, 17(1), 79-82.
- Di Tore, P.A., Raiola, G. (2012) Case study on physical education and sport in Naples, Italy, Mediterranean Journal of Social Sciences, 3 (11), 471-476.
- Forte D., Altavilla G., (2018) Preliminary correlation between anthropometric and performance data in volleyball about the transition period, Journal of Physical Education and Sport (JPES)
- Gaetano, R. (2012) Motor learning and didactics into physical education and sport documents in middle school-first cycle of education in Italy, Journal of Physical Education and Sport, 12 (2), 157-163.
- Gaetano, R. (2012) Didactics of volleyball into the educate program for coaches/trainers/technicians of Italian Federation of Volleyball (FIPAV). (JPES), 12 (1), pp. 25-29.
- Gaetano, A. (2016) Relationship between physical inactivity and effects on individual health status, Journal of Physical Education and Sport, 16, 1069-1074.
- Raiola, G., Giugno, Y., Scassillo, I., Di Tore, P.A. (2013) An experimental study on Aerobic Gymnastic: Performance analysis as an effective evaluation for technique and teaching of motor gestures, Journal of Human Sport and Exercise, 8 (2 SUPPL), pp. 297-306.
- Raiola, G., Scassillo, I., Parisi, F., Di Tore, P.A. (2013) Motor imagery as a tool to enhance the didactics in physical education and artistic gymnastic, Journal of Human Sport and Exercise, 8 (2 PROC), pp. 93-97.
- Raiola, G. (2017) Motor learning and teaching method, Journal of Physical Education and Sport, 17, 2239-2243.
- Raiola, G., D'Elia, F., Altavilla, G. (2018) Physical activity and sports sciences between European Research Council and academic disciplines in Italy, (JHSE), 13, 283-295.
- Senatore, B., Valentini, M., Federici, A., D'Elia, F. (2019) Pilot case study on rhythmic gymnastics and dyslexia, Journal of Human Sport and Exercise, 14 (Proc2), pp. S198-S205.
- Senatore B., Valentini M., Federici A., Morsanuto S., D'Elia F., (2019) Rhythmic gymnastics and dyslexia, JHSE, 14(3proc)
- Tiziana, D., Antonetta, M., Gaetano, A. (2017) Health and physical activity [Zdravlje i tjelesna aktivnost] Sport Science, 10 (1), 100-105.