

## Relationship between types of stretching and jumping in volleyball

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### Abstract:

This study aims to investigate the effect of two stretching programs, one dynamic and one static, on the jumping ability of volleyball players. The champion is made up of 30 volleyball players. The participants were randomly divided into three groups: the first group performed dynamic stretching exercises three times a week, the second static stretching and the third is the control group, refraining from any kind of stretching. The duration of the research protocol was 6 weeks. All groups performed the seargent jump test before the start of the protocol and at the end. The results analyzed showed that there is a significant differential increase after dynamic stretching vs. static stretching. It was concluded that static stretching under a warm-up can decrease the performance of the jumping capacity, while dynamic stretching seems to increase the performance of the jump.

**Keyword:** Jump, volley, stretching, test, warm-up

### Introduction

Even more than in football and basketball during a volleyball game, vertical high jump (Bazett-Jones et al 2008) and explosive movements performed are considered of utmost importance.

For a volleyball player jumping is a habit. Each athlete, at least once, wanted to improve their jumping skills. There are different types of jumping: long, vertical, one-legged, etc..

In volleyball, a vertical jump (Forte et al 2019) is adopted, whether or not preceded by a movement (run-up), generally aimed at increasing its effectiveness. The aim is to express the necessary power in order to gain an advantage over the opponent (steal time or acquire a space, a position), overcome or contain it.

The main objective of athletic training (Gaetano R 2014) and sports participation has always been to improve the performance of athletes (D'Isanto et al 2019).

Performance, however, depends on various factors, including warming up (Rosenbaum, D. et al 1995) practices whose purpose is to prepare the athlete, moving from the state of rest to the state of preparation needed.

It is believed that the use of stretching as part of a warm-up routine can improve performance and reduce the possibility of injury and muscle pain.

In volleyball, stretching is typically incorporated into the warmup. The aims of this study was to investigate the effect of two stretching programs, one dynamic (Dalrymple, K. Jet al 2010) and one static (Egan, A.D. et al 2006), lasting 6 weeks on the jumping ability of volleyball players.

### Methods

A total of 30 volleyball players participated in the study. The participants were randomly assigned in three groups (static, n = 10; dynamic, n = 10; control, n = 10). It should be noted that the level of the players is semi-professional, belonging to teams that compete at regional level.

Various parameters such as age, weight and height (Table 1) have been collected and included in this analysis.

**Table 1 Antropometric data**

	SS	SD	GC
N	10	10	10
AGE	20.70 ± 2.90	21.3 ± 3.19	20.4 ± 3.07
HEIGHT (cm)	170 ± 4.75	167 ± 6.94	169 ± 4.38
WEIGHT (KG)	62 ± 6.51	58.7 ± 5.72	60.6 ± 4.27

SS= Static Stretching; SD= Dynamic Stretching; GC= Control Group.

The study was conducted from November 2018 to mid-December 2018.

During the 6-week period of the study (Gaetano R. 2012,Raiola G.,2014,2017), participants were rigorously instructed to maintain their regular physical (Cirillo et al 2016,D'Elia et al 2018,D'Isanto et al 2016, Gaetano R et al 2012 Gaetano A. 2016, Raiola et al 2018)and nutritional activity habitually. Participants were randomized into three groups, each following a different protocol, with each protocol lasting a total of 6 weeks.

The basic characteristics (Altavilla et al, 2018, Mielgo-Ayuso, J et al 2014) of the participants were presented in Table 1. The first group adhered to a static stretching protocol, performed three times a week, the second followed a dynamic stretching protocol performed with the same frequency, and the last one forming the control group abstained from any stretching exercise for the duration of the research period. All three groups participated in the initial and final tests.

All subjects were familiar with stretching protocols and performance tests. However, a group session was carried out before the research protocol.

The static stretching protocol (SS) it was a 11-minute static stretching, including the muscle groups of the lower extremity: gastrocnemius, quadriceps, hip flexors, adductors. The technique of static stretching required subjects to slowly assume the stretching of the muscle to the point of tension and slight discomfort and maintain it for a period of 15 seconds with a break of 10 between exercises that use both limbs simultaneously and without breaks for exercises that use one limb at a time. All exercises were performed in the maximum articular ROM, avoiding muscle pain.

The Dynamic Stretching Protocol (SS) it was a 11 minutes of dynamic stretching comprising the same muscle groups as those included in the SS protocol. The intensity of dynamic movements has gone from moderate to high intensity and the duration of each exercise is the same as static stretching exercises, i.e. 15 seconds of exercise with a 10-second break if working on both limbs, otherwise without breaks.

Finally, the third protocol involved abstaining from stretching exercises for the entire duration of the study (6 weeks) and carried out tests immediately after warm-up without stretching.

The jump tests were carried out near a centimetre wall using the Seargent test. Three tests were carried out, and the one with the best result was maintained for each participant.

In the initial test the participants made the usual warm-up excluding any form of stretching, for a total duration of 11 minutes, in the final test the participants also added the 11 minutes of stretching performed during this period of work related to their experimental group.

After that, the athlete placed himself near the wall with his hands, arms and legs completely outstretched. The assistant traces a sign with a plaster 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 a proper recovery, the athlete will repeat the test twice more.  
In the final evaluation, the highest measurement will be used.  
Each participant started the test alone, without receiving any signal from the examiners.

## Results

**Table2 Average results**

	<b>M1 (height reached with feet on the ground)</b>	<b>Initial test M ± DS</b>	<b>Final Test M ± DS</b>
Control group			
M2 (height reached in jump)	213,2 ± 5,15	243,3 ± 8,65	244,6 ± 9,11
M2-M1		30,1 ± 7,89	31,4 ± 8,2
Dynamic Stretching Group			
M2 (height reached in jump)	211,7 ± 5,53	243,9 ± 9,06	250 ± 8,74
M2-M1		32,2 ± 8,36	38,3 ± 8,28
Static Stretching Group			
M2 (height reached in jump)	216,1 ± 3,86	242,5 ± 7,5	242 ± 7,91
M2-M1		26,4 ± 8,30	25,9 ± 9,00

**Table 3 T-test (Control group)**

Coupled T-test (Control group)									
		Coupleddifferences					t	gl	Sign. (with two tails)
		Average	Deviationstd.	Standard erroraverage	differenceconfidenceinterval 95%				
					Lower	Upper			
Couple 1	VAR00001 - VAR00002	-1,30000	2,71006	,85700	-3,23866	,63866	-1,517	9	<b>,164</b>

**Table 4 T-test (Dynamic Stretching)**

Coupled T-test (Dynamic Stretching)									
		Coupleddifferences					t	gl	Sign. (with two tails)
		Average	Deviationstd.	Standard erroraverage	differenceconfidenceinterval 95%				
					Lower	Upper			
Couple 1	VAR00001 - VAR00002	-6,10000	1,96921	,62272	-7,50869	-4,69131	-9,796	9	<b>,000</b>

**Table 5 T-test (Static Stretching)**

Coupled T-test (Static Stretching)									
		Coupleddifferences					t	gl	Sign. (with two tails)
		Average	Deviationstd.	Standard erroraverage	differenceconfidenceinterval 95%				
					Lower	Upper			
Couple 1	VAR00001 - VAR00002	,50000	3,43996	1,08781	-1,96080	2,96080	,460	9	<b>,657</b>

**Discussion**

This study examined the effects of 6-week static and dynamic stretching exercise protocols on the jumping ability of volleyball players. The main result of the study was that the jump height improved significantly after the implementation of dynamic stretching protocols.

Long-term dynamic stretching seems to improve jumping ability as a result of dynamic muscle stretching and improved coordination, reducing energy costs and paving the way for the reuse of the energy of elastic effort. Jumping capacity has not been improved in the static stretching protocol.

The current result, as shown in Table 2, showed a significant increase in the height jump after dynamic stretching (38.3±8.28) against static stretching (25.9±9.00) and control group (31.4±8.2).

Therefore, the improvement of jump tests could be attributed to an improvement in muscle fibre length. On the other hand, the control group failed to demonstrate any improvement. This was expected, since the participants in this group did not adhere to any muscle stretching exercise protocol during the 6-week trial.

The strength of the study is related to the relatively small number of research works in the literature on chronic adaptations of jumping capacity according to the type of stretching. Since stretching exercises are an important component of exercise programs, knowledge of their impact would be of great practical importance for professionals (e.g., doctors, sports scientists) who prescribe physical exercise.

**Conclusions**

The present study shows that dynamic stretching protocols have a positive effect on jumping ability when implemented for a total of 6 weeks, three times a week.

In conclusion, the warm-up with dynamic stretching has led to a significant improvement in vertical stretching in jump performance. These changes may be due to increased muscle temperature, similar patterns of movement, increased muscle strength and the rate of strength development following active contraction. Dynamic stretching therefore has greater applicability to improve performance than static stretching.

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