Indian Journal of Youth and Adolescent Health
Volume 7, Issue 3 - 2020, Pg. No. 10-15
Peer Reviewed & Open Access Journal

Research Article

Comparative Effects of Dynamic Stretching and Cryotherapy on the Physical Performance in Recreational Football Players: A Randomised Crossover Study

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DOI: https://doi.org/10.24321/2349.2880.202012

I N F O

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How to cite this article:
Naz F, Zutshi K, Dhingra M, Kumar M. Comparative Effects of Dynamic Stretching and Cryotherapy on the Physical Performance in Recreational Football Players: A Randomised Crossover Study. *Ind J Youth Adol Health* 2020; 7(3): 10-15.

Date of Submission: 2020-07-28
Date of Acceptance: 2020-12-30

A B S T R A C T

Background: It has been seen that the effects of dynamic stretching and cryotherapy has good effects in the performance of the football players. There are enough evidences and literature on both individually but the comparison between the two was not found. So, with the same concept comparison has been taken out with some interventions in the recreational football players.

Purpose of Study: The purpose of this study was to check the comparative effects of both the interventions upon different variables like vertical jump height, agility and 20 meter sprint.

Methodology: 30 subjects were taken, who were divided into 2 groups. The first group received dynamic stretching first and then cryotherapy and the second group vice-versa. Further, after a period of 48 hours of flush out time the interventions were reversed to both the groups. Pre and post readings of variables were taken: vertical jump height, agility and 20 meter sprint.

Result: Vertical jump height test was significant for both the groups, after dynamic stretching. Vertical Jump height test had a significant p-value of 0.01 in group A and non-significant value for group B, after cryotherapy that is 0.531. T-test was significant for group A with a p value of 0.01 and non-significant for group B with a P value of 0.481. Significant for group B after cryotherapy with a p-value of 0.061.

Conclusion: It can be inferred from the result of the study that each Variable: vertical jump height increased significantly in Group A and B after stretching but there was no significance in group B in the vertical jump height test in which cryotherapy was given first. Cryotherapy significantly increased the 20 meter sprint. Agility increased with dynamic stretching. On comparing the two groups-A and B, it was found that the sequence of altered interventions given (dynamic stretching/ cryotherapy) do not give any significant difference in the results as a whole.

Keywords: Dynamic Stretching, Cryotherapy, Physical Performance, Recreational Football Players

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Introduction

Football is a multifaceted team sport that requires well-developed physical fitness to be played successfully.[1] Many authors have suggested that strength, power, agility, and speed are important characteristics for elite Football players.[2] As a consequence, anaerobic testing has been considered more important than aerobic assessment in evaluating fitness to play football.[3] Agility has been considered a physiological prerequisite in football,[4] because players are frequently involved in a variety of sudden directional changes during the game.[5] Further studies can be done using an electronic or manual thermometer to look for intramuscular and core temperature. We can go for another study like this after changing the surface because this one was conducted on hard surface of outdoor football court .Future studies can be done on other population group and after increasing the sample size. Future study can be done for checking the comparative effects of dynamic stretching and lower body cold water immersion (pre -cooling)associated with core temperature testing. Another one study can be performed with the three techniques, dynamic stretching ,ice bag application and cold water immersion. After results we can find the best method which can be used before the event.

Agility performance is determined by the speed in changing direction and has been reported to be influenced by explosive strength, balance, muscular coordination, and flexibility.[6]

The study aims to investigate the comparative effects of dynamic stretching and ice bag application on the components of physical performance .The study aims to quantify the changes in the physical performance after two different kinds of interventions in football athletes. The major goal of this study is that, which strategy is best to use before event for improving the physical performance.

The goal of physical testing program is to optimize the evaluation of an athlete by using relevant physical tests that are specific to the sport. Warm-up prior to physical activity is a common practice believed to reduce the risk of injury and enhance performance.[7] This is thought to be achieved by various mechanisms such as increased muscle temperature and associated effects, increased neural activation and joint Range of Motion (ROM) as well as reduced musculotendinous stiffness. Most warm-ups typically contain a relatively low intensity aerobic component that is general in nature such as jogging followed by stretching of specific muscles, and some rehearsal of the activity about to be performed at similar intensities.[8]

Use of stretching protocols in sport practice is widely adopted in many parts of sports. Muscular elongation is commonly accepted as a part of the warm-up and cool-down phases, as well as an important element for lowering the risk of injuries and improving the quality of performance.[9] While static stretching has been found to be effective for increasing the acute ROM at a particular joint, 6-8 recent research indicates that it can produce significant decrements in the strength and power production of the stretched muscle groups.[10,11]

Most athletes perform stretching during warm-up prior to athletic activity.[12] Static stretching is a technique that is often incorporated into many warm-up routines due to its effectiveness in the maintenance and improvement of joint range of motion, which is beneficial to athletes who require higher level of flexibility.[13]

Vertical jump height was significantly higher for the stretching treatment than the non-stretching treatment. Vertical jump power was also significantly higher in the stretch versus the non-stretch condition. The results of this study suggest that stretching the antagonist hamstrings prior to high speed isokinetic knee extension increases torque production.[14] It also demonstrated that stretching the hip flexors and dorsi flexors may enhance jump height and power. Practitioners may use this information to acutely enhance strength and power performance.

Cryotherapy is a commonly used modality in sports medicine and rehabilitation.[15] A typical clinical aim is to elicit an analgesic response in patients suffering from acute or persistent pain associated with musculoskeletal injury.[16] This is achieved by decreasing nociceptor afferent nerve conduction velocity, which is proposed to be correlated with depth of cold penetration.[17] Furthermore, cryotherapy depresses the excitability of free nerve endings and peripheral nerve fibers,which raises an individual's pain threshold and contributes to analgesia.[18]

Subjects and Study Design

Inclusion Criteria

- Who had not experienced knee surgery or debilitating knee injuries
- Who reported no hypersensitivity to cold will be recruited
- Who will be voluntarily ready to participate in the study
- Who had not sustained an injury to the lower extremity within the past 6 months
- Who recreationally participate in the football game. Age between 18-25 years
- No deformity (acquired or congenital)

Exclusion Criteria

- Involved in resistance training for at least 3 months prior to this investigation
- Using steroids, protein supplement or Ergogenic Aids
- That person who does not fit the inclusion criteria

ISSN: 2349-2880
DOI: https://doi.org/10.24321/2349.2880.202012

- General medical conditions e.g. Diabetes, Hypertension etc

Sample

30 recreational male Football athletes encompassing TWO groups participated in the current study. Before participating in the study, all subjects signed an informed consent form approved by the human subjects committee of Jamia Hamdard, New Delhi. The study consisted of TWO groups, Group A (dynamic stretching) and Group B (ice bag application).

Sampling

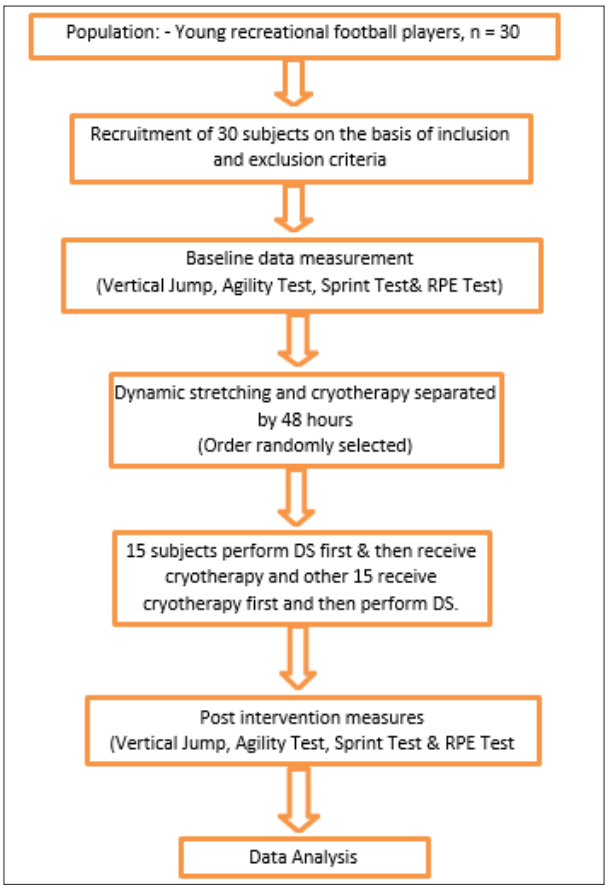
Subjects were assigned to Group A and Group B, using randomized sampling method. Male collegiate athletes without any lower limb injury recreationally participating in collegiate field-based team sport specifically Football.

Study Design

Pre-test- post-test experimental crossover design.

Procedure

Summary of Research Design



Protocol

The study was approved by the Jamia Hamdard, and subjects were gave their informed consent. Subjects wear T-shirts, short pants, socks, and sports shoes. Each candidate performed the 5 minute of jogging before taking intervention. All subjects performed three functional performance tests: Vertical Jump Test, Agility T-test, 20 meter sprint & RPE Test.

Each participant attended an orientation session to become familiar with the testing procedures. Measurements of height, weight and history will take during the orientation session. Subjects were randomly assigned into two groups and exposed to a crossover study design. The experiment was performed on two separate occasions whereby one group receives the dynamic stretching in the first session, while the other group uses the cryotherapy first. After 48 hours, on the next occasion, the groups were changed and the second group receives the cryotherapy, while the first group performs dynamic stretching. On both occasions, the dynamic stretching and Cryotherapy interventions were the same. Between the sessions, the subjects will not allow to participate in any kind of vigorous physical activity.

The subjects performed 3 practice trials of each of the 3 functional tests to ensure proper technique. Before and after each stretching and Cryotherapy protocol, participants performed 3 trials of Vertical Jump Test, 20 meter sprint test and Agility T-test. Three functional test trials were performed with 15 second rest interval between each trial. There was a one minute period before the subject performed the test. The time of stretching was measured by a handheld stopwatch. The order in which the muscle groups stretched was randomized.

Dynamic Stretching Exercises

Immediately after the warm-up, each participant assumed a standing upright position and began to perform the DS exercises under the verbal guidance of the experimenter. The exercises were demonstrated to the participants, who received verbal feedback while performing each DS. The exercises were performed in the order for 06 minutes. The dynamic stretching exercises were performed from low to high intensity, with a 15-s rest period between each set of exercises. We were involved the three groups of muscle in our study i.e. hamstring, quadriceps and calve muscles. Each group of muscle was dynamically stretch for one minute bilaterally so two minutes for every group totally 6 minutes protocol.

Ice Bag Application (Cryotherapy)

Each ice bag comprised 3 lb (1.36 kg) of crushed ice in a 1-gal (3.79-L) plastic bag 20 Subjects were in high sitting position and the ice bag was applied on anterior thigh, posterior thigh and on the calve for 05 minutes.

Statistical Analysis

Data were analyzed using SPSS 17 version. It was used

ISSN: 2349-2880
DOI: https://doi.org/10.24321/2349.2880.202012

to assess for normality of scores and distribution of all variables was found to be normal. Being a crossover design, the subjects were given both interventions in different order after wash out period of 48 hours. Group 1 received Dynamic Stretching followed by Ice bag application and group 2 received Ice Bag Application followed by dynamic stretching.

Results

Table 1, Vertical jump height test was significant for both the groups, after dynamic stretching. 20 metre sprint test was not significant, with a p-value of 0.24, after dynamic stretching. Vertical Jump height test had a significant p value of 0.01 in group A and non-significant value for group B, after cryotherapy that is 0.531. t-test was significant for group A with a p-value of 0.01 and non-significant for group B with a P-value of 0.481. Significant for group B after cryotherapy with a p-value of 0.011.

Table 1.Within group analysis for Vertical jump height after stretching

	Mean		SD		t	p
	Pre	Post	Pre	Post		
Group A	16.85	17.25	2.415	2.412	-4.929	0.00
Group B	17.66	18.17	2.371	2.354	7.304	.000

Statistics was done to obtain the within group analysis by the paired sample T-test among group A and B which showed that group A had a mean of 17.25 and SD of 2.412 and group B had a mean of 18.17 and SD of 2.354 .The P value was significant for both the groups (Table 1).

Table 2.Within group analysis for t-test after stretching

	Mean		SD		t	p
	Pre	Post	Pre	Post		
Group A	9.25	8.80	1.046	1.012	2.533	0.024
Group B	8.96	8.74	0.492	0.386	1.792	0.095

Within group analysis using paired sample t-test was done and it showed group A had mean value of 8.80 and SD of 1.012 and in group B mean value was 8.74 and SD was calculated to be 0.386. The P value was 0.024 for group A and group B was 0.095 and hence significant for group A but not for group B (Table 2).

Within group analysis using paired sample t-test was done and it showed group A had mean value of 2.76 and SD of 0.343 and in group B mean value was 2.72 and SD was calculated to be 0.165 .The P value was 0.087 for group A and for group B was 0.032 and hence not significant for group A but significant for group B (Table 3).

Table 3.Within group analysis using paired t-test for 20 m sprint after stretching

	Mean		SD		t	p
	Pre	Post	Pre	Post		
Group A	2.88	2.76	0.282	0.343	1.839	.087
Group B	2.86	2.72	0.213	0.165	2.379	.032

Within group analysis using paired sample t test was done that showed group A had mean value value of 8.60 and SD of 0.885 and in group B mean value was 8.86 and SD was calculated to be 0.556 .The p-value was 0.001 for group A and for group B was 0.481 and hence significant for group A but not significant for group B (Table 4).

Table 4.Within group analysis using t-test after cryotherapy

	Mean		SD		t	p
	Pre	Post	Pre	Post		
Group A	9.14	8.60	1.097	0.885	4.175	0.001
Group B	8.98	8.86	0.949	0.556	.724	0.481

Within group analysis using paired sample t-test was done that showed group A had mean value of 2.78 and SD of 0.226 and in group B mean value was 2.79 and SD was calculated to be 0.171 The p-value was 0.061 for group A and for group B was 0.011 and hence significant for group B but not significant for group A (Table 5).

Table 5.Within group analysis for 20 m sprint after cryotherapy

	Mean		SD		t	p
	Pre	Post	Pre	Post		
Group A	2.91	2.78	0.225	0.226	2.033	.061
Group B	2.90	2.79	0.266	0.171	2.937	.011

Discussion

Agility test value for group A was 0.01, which is significant and reveals that the dynamic stretching improves agility performance, supported by the article. DS significantly improves performance on closed agility skills involving a 180° change of direction.[9] Dynamic stretching during

ISSN: 2349-2880
DOI: https://doi.org/10.24321/2349.2880.202012

the warm-up was most effective as preparation for agility performance.

Other researches have completed many studies on dynamic stretching and ice bag Application, but all studies separately show the effect of dynamic stretching and ice bag application. Few studies are done till now which compare the effect of these techniques. However, they usually used dynamic stretching as a warm-up protocol prior to the events.[20] The purpose of this investigation was to find the comparative effects of dynamic stretching and ice bag application on physical performance of recreational football players.

Some researchers in earlier studies evaluated the performance of similar technical parameters after different type of stretching techniques and at different doses of dynamic stretching. Even though a game is a realistic setting, examining physical performance (i.e. determining performance on the basis of successful vertical jump, sprint or agility attempts) while playing against opponents is more subjective and create unwanted variables. Therefore, in order to eliminate those external variables, the subjects performance was measured individually against an electronics stop watch to measure the time to complete the 20 meter sprint, agility t-test and vertical jump height.[21]

Conclusion

It can be inferred from the result of the study that each variable: Vertical jump height, 20 meter sprint and agility t-test, on comparison between both the groups A and B it was found that Vertical jump height increased significantly in Group A and B after stretching but there was no significance in group B in the vertical jump height test in which cryotherapy was given first. Cryotherapy significantly increased the 20 meter sprint. Agility increased with dynamic stretching. On comparing the two groups, A and B, it was found that the sequence of altered interventions given (dynamic stretching/ cryotherapy) do not give any significant difference in the results as a whole, but show different effects on physical performance variables (vertical jump height, 20 meter sprint and agility), when observed individually.

Conflict of Interest: None

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ISSN: 2349-2880
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ISSN: 2349-2880
DOI: https://doi.org/10.24321/2349.2880.202012