Original Article

Physiotherapy and Occupational Therapy Journal
Volume 12 Number 2, April - June 2019
DOI: http://dx.doi.org/10.21088/potj.0974.5777.12219.2

Heating Modalities and Stretching on Hamstring Flexibility among Football Players: A Single Blinded, Randomized Controlled Trial

Sutantar Singh[1], Kavita Kaushal[2]

How to cite this article:
Sutantar Singh and Kavita Kaushal. Heating Modalities and Stretching on Hamstring Flexibility among Football Players: A Single Blinded, Randomized Controlled Trial. Physiotherapy and Occupational Therapy Journal, 2019;12(2): 81-84

Abstract

Background: The ability of an individual to move smoothly depends on his flexibility, an attribute that enhances both safety and optimal physical activities. The hamstrings are example of muscle groups that have a tendency to shorten.

Purpose: To compare the efficacy of superficial and deep heating modalities in the management of hamstring flexibility among football players

Methods: A total of 60 football players, aged 18-26 years were recruited by the simple random sampling to participate in this two group pretest-posttest, single blinded randomized clinical study. Recruited football players were randomly allocated into two groups, group A and group B. Group A received superficial heating for 20 minutes on hamstring muscles by hydrocollator packs (moist heat packs). While in group B received deep heating for hamstring muscles through the short wave diathermy for 20 minutes. Then both the groups received static stretching for 30 seconds duration x 5 repetition/session x 2 days. Difference in range of motion (ROM) in knee extension from 90-90 position, pre-post intervention were used for analysis.

Results: Both group A and Group B demonstrated significance difference ($p<0.05$) in ROM.

Conclusion: Two session of static stretching after the application of superficial and deep heating modalities to hamstring muscles have no difference in flexibility among the elite football players.

Keywords: Diathermy; Football; Hamstring Muscles; Heating; Pliability; Soccer.

Introduction

Poor extensibility is a predisposing factor to muscle injury, especially with regard to the hamstring muscle group. Hamstring muscle injuries are the one of the most common musculotendinous injury in the lower extremity. According to the National Collegiate Athletic Association Injury Surveillance System, upper leg muscle-tendon strains constituted 10% of the practice injuries in men's football and 11% of the game injuries in men's baseball. In women's field hockey, 26.9% of the practice injuries consisted of upper leg strains [1]. Probably the most widely used method for increasing joint range of motion is stretching. Static stretching is most commonly performed to increase muscle length. In some settings, clinicians use a combination of heat and stretch for increasing flexibility and decreasing joint stiffness. A wide variety of heating modalities, including moist heat packs, whirlpools, ultrasound, and diathermy have traditionally been used in an effort to promote greater increases in flexibility [2]. Heating has long been used clinically to increase tissue extensibility. Both deep and superficial methods of heating are used for this purpose. The main methods of producing deep heating are ultrasound and short-wave diathermy. An important difference between

Author Affiliation: [1]Assistant Professor, Department of Sports Physiotherapy [2]Professor & Principal, Department of Musculoskeletal and Sports Physiotherapy, College of Physiotherapy, Adesh University, Bathinda, Punjab 151109, India.

Corresponding Author: Sutantar Singh, Assistant Professor, Department of Sports Physiotherapy, College of physiotherapy, Adesh University, Bathinda, Punjab 151109, India.

E-mail: dr.sappalpreet@gmail.com

Received on: 07.02.2019, **Accepted on** 16.04.2019

these methods is that short-wave diathermy can heat a larger area and volume of tissue than Ultrasound in the same time period. By contrast, most methods of superficial heating can heat large areas but smaller volumes of tissue because the depth of penetration is less [3]. Our purpose in this study was to compare the effects of deep heating (short-wave diathermy) and superficial heating (hydro collator packs) on hamstring flexibility.

Methodology

The study protocol was approved by the university research and ethics committee (AU/PT/2016/17) and the study was done strictly in accordance with the guidelines of Helsinki declaration, revised 2013 [4]. The study was registered under prospective clinical trial registry recognized under World Health Organization (WHO) clinical trials registry and conducted between September, 2015 and March, 2017. A total of 60 elite male football players were recruited by the simple random sampling (random number tables from standard statistics book) to participate in this two group pretest-posttest, single blinded randomized clinical study. The participants were blinded to the study. After the demographics, recruited male football players were randomly

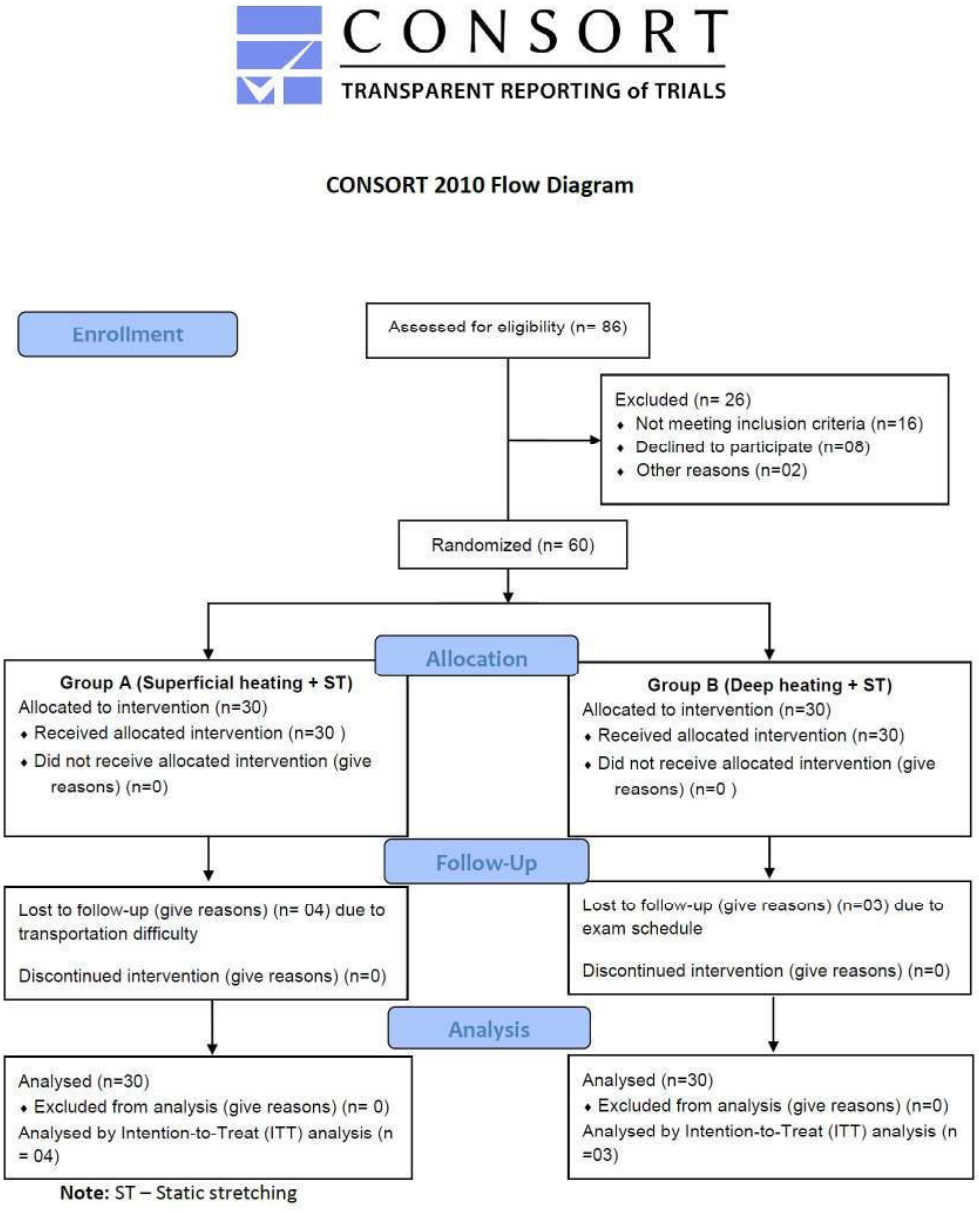

Fig. 1: Consort diagram describing the study flow

divided into two groups, group A and group B with by block randomization. There were five blocks, with the matrix design of 12 x 5, where 12 being rows. Each block contained 12 chits (6 chits for each group), totaling 60. The male football players were allotted to the group based on the randomly chosen chit. Once the block was allotted, next row block was opened. Thus, equal number of subjects were assigned to each group over time. Group A received superficial heating for 20 minutes on hamstring muscles by hydrocollator packs (moist heat packs) [1]. While in group B received deep heating for hamstring muscles through the short wave diathermy for 20 minutes. Both the groups received common intervention of single session static stretching to hamstring muscles which was given in 90-90 position for 30 seconds duration [5] x 5 repetition/session x 2 days. Difference in range of motion (ROM) in knee extension from 90-90 position, pre-post intervention were used for analysis. First session was performed under supervision, and other at their home without supervision. The Consolidated Standards of Reporting Trials (Consort) [6] flow chart describing the details of the study is displayed in Figure 1.

Data analysis

The collected demographic and outcome measures were assessed for their normality using Kolmogorov-Smirnov test. As the data follow normal distribution, all the descriptive were expressed in mean ± standard deviation. Paired t test was adopted to find out the differences within Group- A and group-B for pre-post intervention changes. While independent t- test was used to compare the changes in mean values of knee extension ROM between Group- A and Group- B at baseline and end of two days intervention. The data was analysed using statistical software, statistical package for social science (SPSS), IBM SPSS version 20.0 (Armonk, NY: IBM Corp.). The p-value ≤0.05 was considered to be statistically significant.

Results

Among sixty elite male football players were recruited for the study, seven were dropouts. The missing data was analysed using intention-to-treat analysis. The demographic characteristic of the elite male football players recruited were displayed in Table 1. The demographic characteristics were elaborated in Table 1. There exists no significance difference between the two groups. Between the session and group comparison at baseline and end of end of two days intervention for the outcome measures passive knee extension ROM (Fig. 2) were displayed. Both the groups demonstrated significant improvement in knee extension ROM when compared to baseline and post application of heating modalities with static stretching. No significant difference between groups were demosnstrated in their knee extension ROM.

Table 1: Demographic characteristics among the elite football players recruited

Demographic characteristic	Group A (Superficial heating)	Group B (Deep heating)	p- value
Age (Years)	22.1 ± 3.9	22.9 ± 3.1	0.8
Height (cm)	166.5 ± 3.7	168.1 ± 4.1	0.7
Weight (kg)	64.5 ± 6.1	66.9 ± 7.2	0.5
BMI (kg/m2)	22.2 ± 2.8	21.9 ± 3.6	0.9

Abbreviations: cm – centimeter; kg – kilogram; BMI – Body mass index.

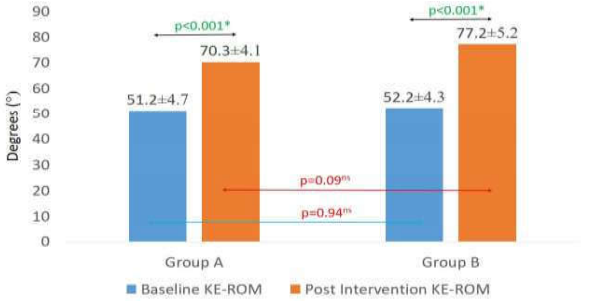

Figure 2: Mean knee extension range of motion (ROM) at baseline and end of 2 day intervention between group A and group B

Discussion

The purpose of the study was to compare the effectiveness of superficial heating and deep heating modalities on hamstring flexibility in football players. Both the groups group A and group B showed a significant increase in active knee extension ROM but the results were more significant for the group B. Thus the Deep heating following static stretching was more effective than superficial heat following static stretching.

The results of this study support the theory that when a soft tissue is heated then ROM is increased due to its elastic property. The results of our study are consistent with the result published by Robertson V.J et.al that the deep heat is more effective than superficial heat in increasing flexibility [3]. The previous studies showed that heating at 3-cm depth by using SWD identified the temperature increases of 4° to 4.6°C. The method of applying hot packs is, a silicate gel pack heated to 75° to 80°C in a water

hydro collator. At 3-cm tissue depth, the expected muscle temperature elevation is 1°C [3].

This study had few limitations. The generalizability of the results might be affected by the slightly less sample size and the sample size, n=60 used in this study was not estimated by sample size calculation. This was just an arbitrary value, which might affect the extrapolation of the results. Second, we have failed to measure the skin temperature of hamstring muscle, pre and post heating by both the method. Nevertheless, this was the first study to estimate the efficacy of hamistring flexibility by superficial and deep heating modality among the football players in India. Future studies should be drafted with adequate sample size (after sample size calculation) and maintaining power of the study >80% to minimize type-II error.

Conclusion

Two session of static stretching after the application of superficial and deep heating modalities to hamstring muscles have no difference in flexibility among the elite football players.

References

1. Lounsberry, Nicole Lee. Therapeutic Heat: Effects of Superficial and Deep Heating Modalities on Hamstring Flexibility. 2008;138. http://digitalcommons.unf.edu/ojii_volumes/138.
2. Draper DO, Castro JL, Feland B, Schulthies S, Eggett D. Shortwave diathermy and prolonged stretching increase hamstring flexibility more than prolonged stretching alone. J Orthop Sports Phys Ther. 2004;34:13–20. doi:10.2519/jospt.2004.34.1.13.
3. Robertson VJ, Ward AR, Jung P. The effect of heat on tissue extensibility: a comparison of deep and superficial heating. Arch Phys Med Rehabil. 2005;86:819–25. doi:10.1016/j.apmr.2004.07.353.
4. World Health Organisation. Declaration of Helsinki World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects. J Am Med Assoc. 2013;310:2191–4. doi:10.1001/jama.2013.281053.
5. Bandy WD, Irion JM. The effect of time on static stretch on the flexibility of the hamstring muscles. Phys Ther. 1994;74:842–5.
6. Consort - Welcome to the CONSORT Website 2010. http://www.consort-statement.org/ (accessed August 23, 2017).