International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Comparison between Immediate Effect of Cryotherapy and Stretching vs MFR and Stretching for Biceps Brachii Muscle in Exercise Induced Delayed Onset Muscle Soreness (DOMS)

Rutwij Gajageshwar[1], Virendra Meshram[2]

[1]Intern, LSFPEF's College of Physiotherapy, Nigdi, Pune, India

[2]Professor & HOD, LSFPEF's College of Physiotherapy, Nigdi, Pune, India
E-mail: *drvirubpth[at]gmail.com*

Abstract: ***Aim: To compare the effect of MFR and stretching vs. cryotherapy and stretching in exercise induced DOMS. Objective: 1.To study the immediate effect of MFR and stretching in exercise induced DOMS for biceps brachii by NPRS and ROM. 2.To study the immediate effect of cryotherapy and stretching in exercise induced DOMS for biceps brachii by NPRS and ROM.*** 3.***To compare the effects of MFR and stretching and effect of cryotherapy and stretching in exercise induced DOMS for biceps brachii by NPRS and ROM. Procedure: Experimental study was done on 60 normal healthy individuals, out of which 30 subjects were in group A I.e. of cryotherapy with stretching and group B i.e. MFR with stretching. Pre and post assessment of group A and group B was done on NPRS by using Wilcoxon-matched paired signed rank test and paired t-test was used for flexion range of motion and extension range of motion. Conclusion: After comparing both the groups i.e. group A and B, the effect of cryotherapy and stretching as well as MFR and stretching is seen significant.But there is a better increment of effect of cryotherapy and stretching then MFR and stretching in exercise induced DOMS.***

Keywords: Delayed onset muscle soreness (DOMS), Myofascial release, cryotherapy, stretching

1. Introduction

DOMS (delayed onset muscle soreness) occurs after vigorous and unaccustomed resistance training or any other form of muscular overexertion. DOMS are noticeable in the muscle belly or at any myotendinious junction [(1)]DOMS appear approximately after 12 to 24 hours after the cessation of exercise.There were following theories which resulted in etiology of DOMS. [(1)]Metabolic waste accumulation theory: It suggested that DOMS in this theory is because of lactic acid in muscle after exercise. But multiple studies have shown that it requires only about 1 hour of recovery after exercise to exhaustion to remove almost all lactic acid from skeletal muscle and blood[(1)].Muscle spasm theory: It also proposed as a cause of DOMS, suggesting that a feedback cycle of pain caused by ischemic and buildup of metabolic waste products during exercise led to muscle spasm. The muscle spasm theory has been discontinued because research showed that no increase in EMG activities and no evidence of spasm in muscles with delayed soreness[(1)].Micro trauma theory: DOMS is induced because of contraction induced mechanical disruption of muscle fibers/connective tissue and around the muscle that results in degeneration of tissue. Evidence of tissue damage such as elevated blood serum levels of creatine kinase is present for several days after exercise and is accompanied by inflammation and edema [(1)].Cryotherapy - The application of cold for the treatment of injury is called as cryotherapy. Various methods are there in this technique which includes ice towels, ice massage, ice packs and cold water immersion. The physiological and biological effects are due to the reduction in temperature in the various tissues and relaxation of the muscles produced by the application of cold [(1)].Myofascial Release - Myofascial release is a soft tissue therapy and is used for the treatment of skeletal muscle immobility and pain. It focuses primarily on the fascia and other connective tissues.Fascia is the biological fabric that holds us together. It is a thin, tough, but elastic type ofconnective tissue that wraps around most of the structures in our body, including our muscles, providing support. It is believed that our fascia can tighten; constricting our muscles, decreasing blood supply, causing pain and decreasing range of movement. It's not exactly known why fascia can tighten, but osteopathic theory suggests that tightness may be caused by overuse, disease, trauma, infection or inactivity. The aim of Myofascial release is to relax contracted muscles, improve lymphatic and blood circulation, and stimulate the 'stretch reflex', in our muscles. With Myofascial release, gentle, sustained pressure is applied to loosen and lengthen the constricting fascia. It may take several minutes for each specific area to be worked on for the tissues to be softened and re-aligned [(1)].Stretching-Stretching is a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissue thereby improving the flexibility and joint range of motion by elongating (lengthening) structures that have adaptively shortened and have become hypo mobile over time [(1)].

Need of Study

Delayed onset muscle soreness limits the functional range of motion in muscle. Application of MFR with STRETCHING and CRYOTHERAPY with STRETCHING is effective in reducing the effect of Delayed onset muscle soreness and regaining the functional range.So my need of study is to check whether MFR and STRETCHING is effective or

CRYOTHERAPY and STRETCHING is effective in DOMS.

Aim: To compare the effect of MFR and stretching vs. cryotherapy and stretching in exercise induced DOMS.

Objective: 1.To study the immediate effect of MFR and stretching in exercise induced DOMS for biceps brachii by NPRS and ROM. 2.To study the immediate effect of cryotherapy and stretching in exercise induced DOMS for biceps brachii by NPRS and ROM. 3.To compare the effects of MFR and stretching and effect of cryotherapy and stretching in exercise induced DOMS for biceps brachii by NPRS and ROM.

Hypothesis:
Null Hypothesis: There is no difference between effect of MFR and stretching vs. effect of cryotherapy and stretching for biceps brachii on NPRS & ROM in exercise induced DOMS.

Alternative Hypothesis: There is a difference between the effect of MFR and stretching vs. effect of cryotherapy and stretching for biceps brachii on NPRS & ROM in exercise induced DOMS.

Methodology: An experimental study was carried out on 60 subjects picked by random sampling with the age group of 18-25 years. Both males and females were included in the study. The study was carried out in Nigdi Pradhikaran, Pune. Subjects with regular exercise, musculoskeletal and neurological disorders, cardio-respiratory condition, non-willing population, athletes and semi-professional /daily sports players were excluded from this study.

Material Used: Universal goniometer, Ice pack, Dumbbell and evaluation sheet

Outcome Measures: Numerical pain rating scale and range of motion.

2. Procedure

Ethical clearance was taken from the committee. Samples were collected by random sampling method. Total 60 subjects (n-60) between the age group of 18-25 years participated in the study. The details of the treatment were explained to the subjects and written consent was taken. Simple random sampling via chit system was done and subjects were divided into two groups i.e. group A cryotherapy and stretching (n-30), and group B i.e. MFR and stretching (30). In both the groups DOMS was induced in the biceps muscle by concentration curls (10 RM of 3 sets of 10 repetition).Day 2: pre assessment of NPRS and ROM was done with universal goniometer by aligning the fulcrum over lateral epicondyle of humerus, proximal arm with lateral midline of humerus, distal arm with lateral midline of radius for group A and B. On the same day group A was treated with cryotherapy (10minutes) and static stretching (4 sets of 20 sec hold) followed by post readings of NPRS and ROM by universal goniometer. Group B was treated with MFR (4 minutes) and static stretching (4 sets of 20 sec hold) Followed by post readings of NPRS and ROM by universal goniometer. Data was analyzed using appropriate statistical test for results.

3. Data Analysis and Result

Pre and post data was collected and it is was analyzed using appropriate statistical test. Wilcoxon matched pairs signed rank test was performed within group A and B for NPRS.Paired t test was done in flexion ROM of group A and B.Paired t test was done in extension ROM of group A and B.Mann- Whitney test was performed to compare the values between two different groups i.e. NPRS of cryotherapy stretching and NPRS of MFR stretching.Unpaired t test was performed to compare the values between two different groups i.e. ROM of cryotherapy stretching and ROM of MFR stretching. Data was analyzed by using Wilcoxon matched pairs signed rank test, paired t test, unpaired t test and mann-whitney test.There was no drop out of patients from the study.

NPRS

Outcome Measure	Group	Training	Mean±Sd	Significance P Value	Mean Difference
NPRS	A (Cryotherapy Stretching)	Pre	6.267±1.285	<0.0001	1.223
		Post	2.5±0.6823		
NPRS	B(MFR Stretching)	Pre	6.200±1.349	<0.0001	0.08
		Post	4.1±1.269		

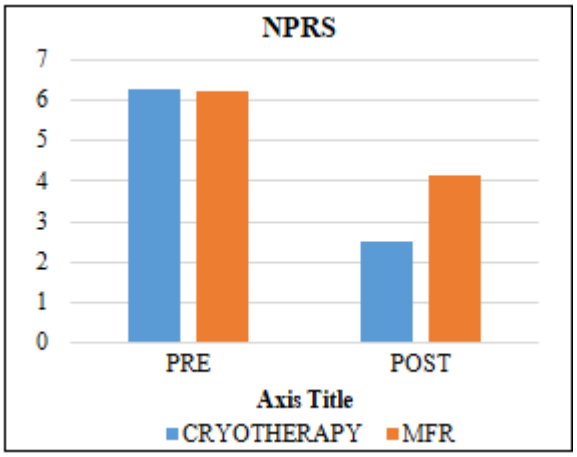

Table 1: Wilcoxon-matched pairs signed rank test used for pre and post values for NPRS of group A and group B.The data has passed normality test, Wilcoxon-matched pairs signed rank test was performed within group A i.e. pre and post NPRS of cryotherapy and stretching. P value is <0.0001, is considered extremely significant.In group B Wilcoxon matched pairs signed rank test was performed within the group B i.e. pre and post NPRS of MFR and stretching.

Flexion ROM

Outcome Measure	Group	Training	Mean±Sd	Significance P Value	Mean Difference	Paired T Value
Flexion ROM	A (Cryotherapy Stretching)	Pre	144.50±3.794	0	0.000	1.02
		Post	144.50±3.794		0.000	
Flexion ROM	B(MFR Stretching)	Pre	140.67±4.61	0	0.000	1.02
		Post	140.67±4.61		0.000	

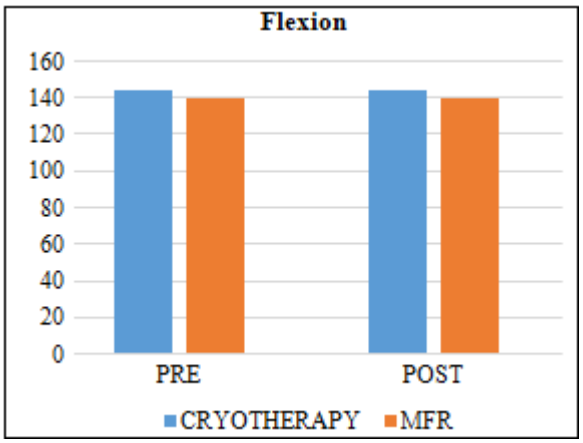

Table 2: Paired t test used for pre and post values for flexion ROM of group A and group B.The data has a performed normality test. In this paired t test was performed in group A and B. No results were found

Extension ROM

Outcome Measure	Group	Training	Mean±Sd	Significance P Value	Mean Difference	Paired T Value	Significance P Value
ROM Extension	A (Cryotherapy Stretching)	PRE	12.50±2.24	<0.0001	5.867	23.665	0.062
		POST	6.63±1.92				
ROM Extension	B(MFR Stretching)	PRE	13.80±2.89	<0.0001	4.4	16.325	>0.10
		POST	9.4±2.71				

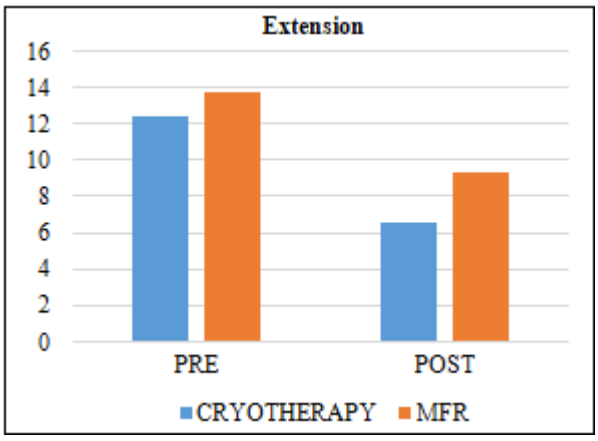

Table 3: Paired t test used for Extension ROM between group A and group B.The data has performed the normality test paired t test was performed within group A i.e. extension ROM of cryotherapy and stretching. The P was <0.0001, considered extremely significant. The P value was 0.0062. Paired t test was performed within group B i.e. extension ROM of MFR and stretching. P was <0.0001, considered extremely significant. The P value is > 0.10.

4. Discussion

DOMS (delayed onset muscle soreness) occurs after vigorous and unaccustomed resistance training or any other form of muscular overexertion. DOMS are noticeable in the muscle belly or at any myotendinious junction [(1)]DOMS appear approximately after 12 to 24 hours after the cessation of exercise.There were following theories which resulted in etiology of DOMS. [(1)]

There are various types of application of cryotherapy: Ice pack, Ice spray, Immersion, Ice massage.It is believed that our fascia can tighten; constricting our muscles, decreasing blood supply, causing pain and decreasing range of movement. It's not exactly known why fascia can tighten, but osteopathic theory suggests that tightness may be caused by overuse, disease, trauma, infection or inactivity.Stretching is a form of physical exercise in which specific muscle or tendon is deliberately flexed or stretched in order to improve the muscles felt elasticity and achieve comfortable muscle tone. There are various types of stretching:Ballistic stretching, dynamic stretching, Active stretching, passive stretching, Isometric stretching, and PNF stretching.The present study was designed to compare the effect of cryotherapy and stretching vs. effect of Myofascial release and stretching in exercise induced DOMS i.e. delayed onset muscle soreness.In this study group A showed better results than group B i.e. cryotherapy and stretching was more effective then Myofascial release and stretching in delayed onset muscle soreness. In NPRS, both the groups showed effect in DOMS.NPRS of cryotherapy stretching i.e. group A was (2.5±0.682) and that of MFR and stretching i.e. group B was (4.1±1.26). The mean difference seen in cryotherapy and stretching was (1.22) and in MFR and stretching was (0.08) for NPRS.For flexion ROM, there was no change seen in the ROM pre and post of both groups. For extension ROM, the ranges got restricted due to the induced DOMS, in the treatment part both MFR and stretching and cryotherapy and stretching showed effect in improving the ROM for extension. The extension ROM for the group A i.e. cryotherapy and stretching was (6.63±1.92) and that of MFR and stretching was (9.4±2.71).The mean difference seen in cryotherapy and stretching was (5.8) and that of MFR and stretching was (4.4).The main pathology in muscle soreness is that there is micro trauma to the muscle because of that there is mechanical disruption of muscle fibers/ connective tissue that results in the degeneration of the tissue [(1)].Evidence of tissue damage such as increase in blood serum of creatinine kinase and also inflammation and edema is seen [(1)]. Delayed onset muscle soreness i.e. DOMS induces in the muscle after 24 to 48 hours of strenuous exercise/workout [(1)].In group A i.e. cryotherapy and

stretching the application of ice on to a surface reduces the blood supply to that particular area due to vasoconstriction [(2)].Due to this there is decrease in inflammation and also reduce risk of swelling and tissue damage [(2)]. The application of ice to an area also gives an effect of, it numbs the sore tissue and acts as a local anesthetic [(7)].It reduces the pain message being transmitted to the brain [(5)].In addition to cryotherapy in group A static stretching was also given to the targeted muscle i.e. biceps brachii with a set of 4 with 20 sec hold.Although, the combination of the two treatments cryotherapy and stretching was much more effective in immediate treatment of delayed onset muscle soreness.In group B i.e. Myofascial release and stretching, the effect was seen in delayed onset muscle soreness. Both the parameters of outcome measure were reduced in the DOMS i.e. NPRS and ROM [(4)]. In group B due to the induced DOMS in the muscle the muscle gets stiff and knotted, due to the application of Myofascial release the fascia over the muscle gets relaxed and stretched which gives rise to the increase blood flow to that area also in combination to static stretching, stretch reflex is activated in the muscle [(3,6)].It increases the flexibility in the muscle [(6)]. Although, the combination of the two treatments MFR and stretching was not as effective as cryotherapy and stretching in immediate treatment of delayed onset muscle soreness.

5. Conclusion

After comparing both the groups i.e. group A and B, the effect of cryotherapy and stretching as well as MFR and stretching is seen significant.But there is a better increment of effect of cryotherapy and stretching then MFR and stretching in exercise induced DOMS.

References

[1] Carolyn Kisner, therapeutic exercises sixth edition.
[2] Sellwood KL[1], Brukner P, Williams D, Nicol A, Hinman R et al British journal of Sports Medicine 41(6), 392-397, 2007.
[3] Xian Y1, Feng B2, Chen K2, Andersen LL3,4, Page P5, Wang Y2.et al Physiotherapy 101, e1603, 2015.
[4] MS, CSCS,[1] and Matt Lee, PT, MPT, CS Scott W. Cheatham et al International journal of sports physical therapy 10 (6), 827,2015.
[5] Jihye jung,wonjae choi, yonghyuk lee, jiwoo kim, hyunju kim, kyoungho lee, jaewoo lee, seungwon lee et.al Physical Therapy Rehabilitation Science 30 March 2017; 6(1): 45-51.
[6] Jay kain PT, PhD, ATS et.al Journal of Bodywork and Movement Therapies Volume 15, issue 1, January 2011, pages 63-67.
[7] Gregory minnis et.al application of heat and cold therapy 25 July, 2017.
[8] Herbert RD,de norhona M, kamper SJ 6 July, 2011,thecochrane library.
[9] H.V hammill , n.smith an S thabethe et.al. African journal for physical activity and health sciences volume 22, issue-42,Dec 2016.
[10] Gregory E.P pearcey, David J bradburry squires and duane C button school of human kinetics and recreation, 2015Jan; 50(1): 5-13.
[11] Cynthia norkin, EdD , PT et.al Measurement of joint range of motion A guide to goniometry, Fourth edition.