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Effectiveness of Heat Therapy on Musculoskeletal Pain Before and After Exercise Therapy in Females

Ummara Qadeer[1], Anan Aftab[2], Iman Zahra[3]

[1] Lecturer at Federal Institute of Health Sciences
[2] Assistant Professor at Isra Institute of Rehabilitation Science
[3] Lecturer ar Federal Institute of Health Sciences
Corresponding author: ummaraqadeer025@gmail.com

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ABSTRACT

Objective: To compare whether heat therapy (moist heat pack) is more effective before exercise therapy or after exercise therapy in chronic MSK pain in females. **Design** Randomized clinical trial study. **Methodology:** This study is conducted in Abbas institute of medical sciences Muzaffarabad and Muzaffarabad physiotherapy clinic Muzaffarabad.40 female patients with chronic MSK pain are recruited in the study and a questionnaire-based survey was carried out. A self-structured questionnaire is used for demographic details. For screening of chronic MSK pain short form of Orebro pain questionnaire is used. A numeric rating scale in both groups is used to check the intensity of pain. **Result:** The results showed that between group A and B there was no significant difference. But clinically group B showed more improvement than group A.Both groups showed improvement after treatment. **Conclusion:** The application of heat therapy (moist hot pack) was found to be more effective after exercises than its use before exercises to improve pain in females with chronic musculoskeletal pain.

Introduction

Pain is the third leading reason for the absence from work in the united states, where the problem of chronic pain translates into an annual expenditure of at least $ 50billon.(1) Chronic pain has been recognized as pain that persists the past normal healing time and hence lacks acute warning function of physiological nociception. Usually, pain is regarded as chronic when it lasts for more than 3 to 6 months. Chronic pain is a frequent condition, that is affecting an estimated 20% of people worldwide and accounting for 15% to 20% of physician visits. (2) Regional and widespread musculoskeletal pain is somewhat higher today in comparison to forty years ago. (3) The results of a study done by Wijnhoven et al in 2006 showed that prevalence rates of musculoskeletal pain were higher in women than for men in the Dutch general population aged 25 to 64 years based on 2 population-based surveys. (4)

Topical cold and heat are commonly used to treat the injuries of the musculoskeletal system (bone, ligaments, muscles, and tendons). These modalities are useful adjuncts to medication, exercise, and patient education for the comprehensive treatment of many painful musculoskeletal conditions. Although the differences between dry and moist heat are commonly referred to in clinical practice, scientific data supporting the alleged differences are still lacking. This belief began with a 1946 study that showed moist (hot baths) heat warms tissue faster than dry (infrared lamp) heating. Moisture increases the rate of heat energy transfer and warming of tissues. (6)The application of a moist hot pack was found to be more effective before McKenzie exercises than its use after the exercises in the treatment of non-specific low back pain. (7)

There is limited literature found on the best application time of moist heat packs, whether they should be applied before exercises or after exercises to reduce chronic musculoskeletal pain in females. This study aims to find the best application time of moist hot pack in corresponding with exercises to reduce chronic MSK pain among females.

Method

This study was a randomized clinical trial study. This study was conducted in AIMS Muzaffarabad and Muzaffarabad physiotherapy clinic Muzaffarabad on 40 females with chronic MSK pain. Inclusion criteria were females with chronic MSK pain with age group 20-52 years while Exclusion criteria were females with metastasis, blood coagulation disorders deep vein thrombosis, diabetes, open wound, and acute pain.

Result

Table 1. Demographics of Data

Age	**Frequency**	**Percentage**
20-32 years	7	17.5%
33-42 years	13	32.5%
43-52 years	20	50%
Occupation	**Frequency**	**Percentage**
Housewife	26	65%
Teacher	6	15%
Office worker	5	12.5%
Engineer	1	2.5%
Student	1	2.5%
Nurse	1	2.5%
Marital status	**Frequency**	**Percentage**
Married	37	92.5%
Unmarried	3	7.5%
Involved body area	**Frequency**	**Percentage**
Shoulder	10	25%
Knee	4	10%
Back	13	32.5%
Neck	8	20%
Elbow	1	2.5%
Wrist	1	2.5%
Neck+shoulder	1	2.5%
Neck +back	2	5%

Table 2. Numerical Pain Rating Scale Reading Within Group Differences

Group A	**Pre value**	**Post values**
NPRS	**f (%)**	**f (%)**
0	0	4 (20%)
1	0	3 (15%)
2	0	3 (15%)
3	0	5 (25%)
4	0	2 (10%)
5	2 (10%)	3 (15%)
6	7 (35%)	0
7	6 (30%)	0
8	2 (10%)	0
9	2 (10%)	0
10	1 (5%)	0

Group B	Pre value	Post values
NPRS	f (%)	f (%)
0	0	0
1	0	5 (25%)
2	0	7 (35%)
3	0	5 (25%)
4	0	2 (10%)
5	0	1 (5%)
6	1 (5%)	0
7	1 (5%)	0
8	3 (15%)	0
9	7 (35%)	0
10	8 (40%)	0

Table 3. Numeric Pain Rating Scale Reading Between-Group Differences

Group A&B	Post value	Post values	p-value
NPRS	f (%)	f (%)	
0	4 (20%)	0	1.00
1	3 (15%)	5 (25%)	
2	3 (15%)	7 (35%)	
3	5 (25%)	5 (25%)	
4	2 (10%)	2 (10%)	
5	3 (15%	1 (5%)	
6	0	0	
7	0	0	
8	0	0	
9	0	0	
10	0	0	

Table 3. Orebro Musculoskeletal Pain Screening Questionnaire (Short)

Mean differences		
Group A	Pre value	p-value
	6.9	0.00
	Post value	
	2.3	
Group B	Pre value	0.00
	9.0	
	Post value	
	2.3	
Group A & B	Group A post value	1.00
	2.3	
	Group B post value	
	2.3	

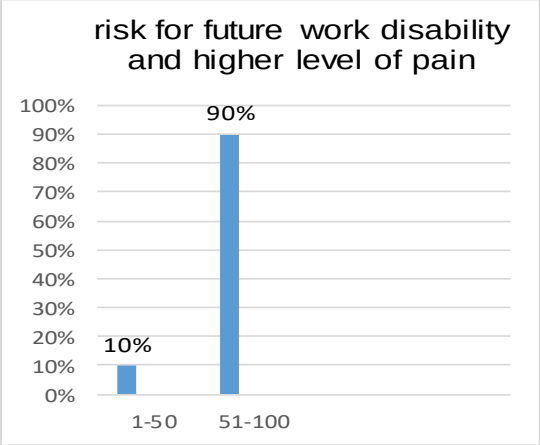

Figure 1. Risk for Future Work Disability and A Higher Level of Pain

Figure 1 shows the risk of future work disability and a higher level of pain. Out of 40 females, 10% have values between 1-50 and have low risk while 90% have values more than 50 and between 51-100 they have a higher risk for future disability and a higher level of pain.

Discussion

In the area of Asia Pacific, the prevalence shows that the pain which is chronic in nature ranges from about twelve to forty-five percent of the population there, with a majority of disease load with MSK, RA, and OA pain. (8) Chronic MSK pain conditions are complicated and ~ twenty percent of the total adult population live their lives with this severe chronic pain, with an increased prevalence rate among women and in people with low income. (9) Females involve in households and caregiving of a child more than that of males so they have more exposure to the risk factors for MSK pain. (10)This study is done on 40 female patients having chronic MSK pain aged group between 20-52 years.

This study is conducted to assess the effects of moist hot pack application before and after exercises in females with chronic MSK pain. Results of this study show that

the application of moist hot pack after exercises is more effective than application of moist hot pack application before exercises for chronic MSK pain and the alternate hypothesis that " application of heat therapy (moist heat pack) after exercise therapy has more effect on musculoskeletal pain" is not rejected. In physiotherapy and physical medicine, the superficial heating modalities are usually used for increasing the circulation in deep tissues and to help healing. (11). Evidence shows that moist heating modalities are more effective than dry heating modalities. This is because studies which investigated heat transfer proved better and faster heat penetration of moist heat than that of the dry heat (12). Moist heat causes the rise in temperature of superficial tissue, which causes dilatation of vessels that rises the oxygen supply and nutrient supply and discharge of carbon dioxide gas and metabolic waste and also arouses superficial nerve ending which in turn provide calming effects. In this study, it was observed that if hot pack application was performed after exercises for chronic musculoskeletal pain it is more effective than hot pack application before the exercises.

This concept is also supported by Mayer et al in their study, which showed the heat application rises the temperature of the muscle tissue which in turn advances the extensibility of the connective tissues (13). Greenberg found that the flow of blood in the forearm increased to double when applying hydrocollator packs for twenty minutes in ten individuals. Abramson measured how much tissue temperature rises by the application of wet heat topically. For this, he passed 1.3cm ed thermocouples in the skin, subcutaneous tissues, and muscles. The temperature of the skin increased an average of 6.4 celsius, the temperature of subcutaneous was 4.5 celsius, the temperature of the muse surface increased by 1.8 celsius. He also measured a rise in the flow of blood and found the same results as that of Greenberg. (6)The application of a moist hot pack was found to be more definite before McKenzie exercises than its use after exercise in the treatment of non-specific low backache. (7)This result does not match with my study.

In this study according to the results, when we compare the output of both groups, there is no significant difference in them. But when we compare the mean difference of pre and post values of both groups there is a greater mean difference in group B than group A it shows that group B which received hot packs after exercises showed clinically significant changes in pain while group A demonstrates less clinical improvement. The possible reason behind this could be that group A mostly had housewives and teachers who have to stand and sit for prolonged periods with obstinate postures most of the time. The limitation of the study was that the effects of the moist hot pack were only observed with stretching and strengthening exercises and the sample size was not large enough to make strong generalizations. Both working and non-working women were included which again limits its generalizability.

Conclusion

The application of heat therapy (moist hot pack) was found to be more effective after exercises than its use before exercises to improve pain in females with chronic musculoskeletal pain.

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