Original Article

EFFECTS OF MOIST HEAT THERAPY PRE AND POST BACK EXTENSION EXERCISES ON NON-SPECIFIC BACK PAIN IN MIDDLE AGED FEMALES

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Abstract

Background: Non-specific low back pain is one of the most debilitating condition commonly affecting middle aged women. The combination of moist heat therapy and McKenzie extension exercises are one of the most widely used and evidence based therapy options for the treatment of non-specific back pain. However, the sequence of application of moist heat pack is not very well established. **Objective :**To compare the effects of application of moist heat pack before and after back extension exercises in non-specific low back pain in middle aged females. **Methodology:** A single blinded randomized controlled trial was conducted at the Physical Therapy Department of Allied Medical and Dental Centre, Rawalpindi. A total of 50 middle aged female patients with non-specific low back pain were selected and randomly allocated to group A and B with 25 participants each. Group A received moist heat pack before extension exercises while group B was given moist heat therapy post extension exercises for 4 days a week for 6 weeks. Numeric pain rating scale, Oswestry disability index, tenderness grading scale and goniometer were used as outcome measures to assess pain, level of disability, tenderness and range of motion respectively. Data was analyzed using SPSS version 21. **Results:** Within group analysis showed significant improvement after treatment in mean scores of group A on all outcomes (p value <0.05). Group B demonstrated significant change on all measures (p value <0.0.5) except for lumbar spine flexion, lateral flexion and rotation (p value >0.05). Between group analysis showed significant differences in mean scores of group A and B on all variables (<0.05). **Conclusion:** The application of 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 ache.

Keywords: Back Pain, Moist Heat, Back Extension Exercises; McKenzie

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Introduction

Low back pain (LBP) is a foremost health issue affecting two third of adult people at some time in their lives and around 12% to 44% suffering from low back pain at any time [(1)]. Non-specific low back pain (nLBP) can be defined as the LBP that cannot be attributed to a known and identified pathological cause[(2)]. nLBP is a common musculoskeletal problem with major long term morbidity and about 70-85% of the adult population experience back pain at some time in their lives. In most cases, it is frequently influenced by posture and physical activities. Demographic features such as age, gender and others identified risk factors such as obesity; smoking, week abdominal muscles, abnormal vertebral curvatures, physical inactivity, weight lifting, vibrating equipment and poor socioeconomic level exacerbate LBP[(3)]. Those under 45 years of age have demonstrated increased risk for LBP due to a variety of factors such as seating characteristics, prolonged sitting, awkward postures and lifting[(4)]. Lifetime prevalence of LBP in Pakistan reaches up to 69.20% and it is directly proportional to increasing age, prolonged sitting and standing, sleep disturbances, and duration of work experience while inversely proportional to level of education, physical activity and job satisfaction[(5)]. Overall, the reported frequency of women affected by LBP is greater than men[(6)]. This difference in prevalence could be attributed to higher sensitivity of pain, menstrual cycle fluctuations, physiological changes in pregnancy and birth among females [(6–8)].

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Males and females also exhibit different responses to pain interventions due to different physiology [(9)]. Due to its unknown pathology, there are no specific treatments available to treat nLBP; the main focus of the management plan is to reduce pain and associated disability [(10)]. Moist heat packs increase superficial tissue temperature which increase arterial supply, venous drainage and create soothing effects on free nerve endings [(11,12)]. It also increases the extensibility of collagen tissues and relieves joint stiffness associated with different conditions [(13)]. Literature supports exercises for LBP which utilize McKenzie principle with reduced and low recurrence of pain[(14)] The main goal of McKenzie Extension exercises is centralization of pain from periphery as centralized pain is managed better than radiating pain. Patients following McKenzie exercise protocols may decrease or eradicate their acute or chronic centralized pain. Both moist heat packs and McKenzie extension exercises have beneficial effects in the management of nLLBP; however, the sequence of application between hydrocollator packs and McKenzie exercises

has not been investigated yet. The sequence of application of hot pack is important because of its effects on the circulation and muscle tissue. This study aimed to assess the effects of application of moist heat packs pre and post back extension exercises in female patients having nLBP.

Methods

A randomized controlled trial was conducted at the physical therapy department of Allied Medical and Dental Centre Rawalpindi. A step by step progression of the trail is displayed in fig. 1. After approval from the ethical committee and informed consent of the participants, a total of 50 female patients fulfilling the eligibility criteria were recruited through non probability convenient sampling. Females with non-specific low back pain aged 30-50 years were included while females with any known spinal conditions, deformities and any other co-morbidities were excluded from the study. The trial was a single blinded study in which the outcome assessor remained blinded from the group allocation. Participants were randomly allocated to group A and B with 25 participants in each group; the first person was allocated through coin toss method and the rest of the participants were allocated systematically to ensure equal number of participants in both groups. Group A received moist heat pack before extension exercises while group B was given moist heat therapy after the McKenzie extension exercises. The total therapy session lasted for 35 minutes for 4 consecutive days during a week for 6 weeks; moist heat pack was applied for 15 minutes and the McKenzie back extension exercises were performed for a period of 20 minutes. Patients were assessed for pain, disability, and range of motion on Numeric pain rating scale (NPRS), Oswestry Disability Index (ODI) and goniometer respectively on baseline and after 6 weeks of therapy. NPRS is an 11-point scale, which intends to determine the subjective intensity of pain in which '0' means no pain while '10' means most pain imaginable. The patient selects a value consistent with their pain intensity in the last 24 hours [15]. It is a valid and reliable and valid tool with good sensitivity [16] A change 30% from baseline on NPRS is considered to be clinically meaningful. ODI is a 10- section tool used to evaluate the functional disability [17]. It has shown good validity, reliability and responsiveness in patients with low back pain [17,18] A 10-point change in the ODI scores represents minimal clinically important difference [19]. Goniometry is an inexpensive, quick and reliable method to measure lumbar spinal mobility.[20] Patients were assessed on these outcome measures at baseline and after a treatment period of 6 weeks. Data was analyzed using SPSS version 21. After normality testing, parametric tests were selected for within and between group analysis. Within group analysis was performed using independent samples t-test while between groups analysis was done by applying paired samples t test.

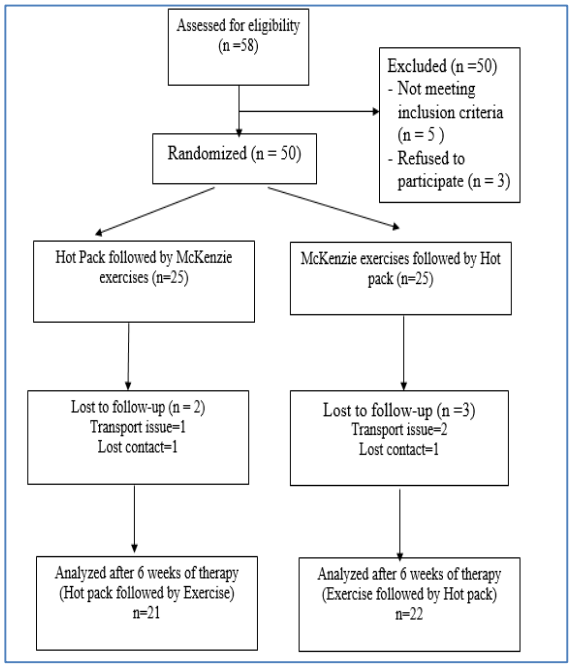

Figure 1: CONSORT Diagram

Results

Total female participants recruited initially were 50 in which the mean age was 37.37±6.00. Out these 50 participants, 42 (84%) were married and 8 (16%) were unmarried. Fig 1 displays the occupation of the females in group A and B respectively.

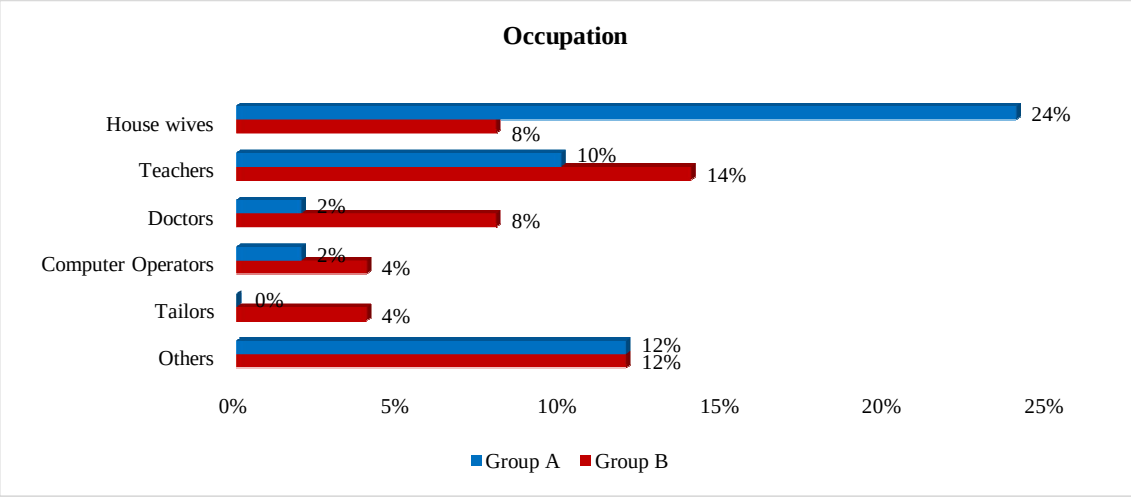

Figure 2 Occupation of the study participants

Table I shows within group analysis of both groups. There was a clinically and statistically significant improvement after treatment in mean scores of group A on all outcomes (p value <0.05) including NPRS, total score of ODI, and lumbar spine range of motion on goniometer. Group B demonstrated significant statistical change on all measures (p value <0.0.5) except for lumbar spine flexion, lateral flexion and rotation (p value >0.05) which did not show any marked difference; however, all outcomes failed to show any clinically significant difference in this group. Table II demonstrates between group analysis of post Intervention mean scores of group A and group B. It showed significant differences in mean scores of group A and B on all variables (<0.05) including pain, lumbar spine ROM and disability.

Table 1 With-in group analysis (Group A and B)

			Mean±S.D	Change	P value	Mean±S.D	Change	P value
Pain on NPRS		Pre Post	5.60±2.76 3.68±1.88*	34.29%	<0.05	7.20±2.09 6.30±1.62*	12.5%	<0.05*
Lumbar Spine ROM	Flexion	Pre Post	36.04±5.66 43.76±10.32*	7.72	<0.05	31.85±7.97 32.90±7.03	1.05	0.07
	Extension	Pre Post	16.24±4.45 19.68±5.07*	3.44	<0.05	14.30±5.69 15.60±5.60*	1.3	0.01*
	Lateral flexion (Right)	Pre Post	13.20±2.59 15.12±2.92*	1.92	<0.05	11.95±2.89 12.45±3.18	0.5	0.19
	Lateral flexion (Left)	Pre Post	13.05±2.43 15.65±2.94*	2.6	<0.05	13.46±2.79 13.56±2.61	0.1	0.51
	Rotation (Right)	Pre Post	3.16±1.54 7.20±5.49*	4.04	<0.05	3.60±1.66 3.60±1.60	0	1.00
	Rotation (Left)	Pre Post	3.96±1.00 6.36±1.67*	2.4	<0.05	4.53±1.40 4.73±1.34	0.2	0.54
Disability on ODI (%) (Total score)		Pre Post	43.76±25.39 32.64±23.17*	11.12	<0.05	56.50±26.42 50.70±22.01***	5.8	<0.001

ROM: Range of motion, ODI: Oswestry Disability Index, NPRS: Numeric Pain Rating Scale, S.D: Standard Deviation
**: p-value less than 0.05, ***: p-value less than 0.001*

Table 2 Between group analysis (Group A and B)

		Group	Mean±S.D	P value
Pain on NPRS		A	3.68±1.88	<0.001***
		B	6.30±1.62	
Lumbar Spine ROM on Goniometer	Flexion	A	43.76±10.32	<0.001***
		B	32.90±7.03	
	Extension	A	19.68±5.07	<0.001***
		B	15.60±5.60	
	Lateral flexion (Right)	A	15.12±2.92	<0.001***
		B	12.45±3.18	
	Lateral flexion (Left)	A	15.65±2.94	<0.001***
		B	13.56±2.61	
	Rotation (Right)	A	7.20±5.49	<0.001***
		B	3.60±1.60	
	Rotation (Left)	A	6.36±1.67	<0.001***
		B	4.73±1.34	
ODI score (%)		A	43.76±25.39	<0.001***
		B	32.64±23.17	

ROM: Range of motion, ODI: Oswestry Disability Index, NPRS: Numeric Pain Rating Scale, S.D: Standard Deviation
***: p-value less than 0.001

Discussion

This study was conducted to assess the effects of moist hot pack application before and after the McKenzie back extension exercises in the management of nLBP. The results showed that application of moist hot pack before the back extension exercises is more effective than application of moist hot pack application after back extension exercises for nLBP and the hypothesis that there is no difference in application of moist heat pack before and after the extension exercises is rejected.

Surface heating modalities are commonly used in physical therapy and physical medicine for increasing circulation, especially in deep tissues, to promote healing [(21)]. Evidence suggests moist heat to be more effective than dry heat modalities. This is because studies which investigated heat transfer demonstrated better and faster heat penetration of moist heat than the dry heat [(22)]. Moist Heat creates higher superficial tissue temperatures, which produces vasodilatation that increases the supply of oxygen and nutrients and the elimination of carbon dioxide and metabolic waste and also stimulates superficial nerve ending which in turn provide soothing effects.

In this study it was observed that if hot pack application was performed before the McKenzie extension exercises for lumbar spine, it greatly improves the range of motion as compared to hot pack application after the extension exercises in which only back extension was improved. This is supported by Mayer et al in his study who reported that application of heat rises the temperature of the muscle tissue which in turn improves the extensibility of the connective tissues [(13)]. According to the results, group A which received hot packs prior to the extension exercises showed clinically significant changes in pain and disability while group B failed to demonstrate clinical improvement in same outcomes. The potential reason behind this could be that moist heat enhances the resistance to muscle injury, decreases muscle viscosity and motor unit firing; thereby allowing the muscle to contract more smoothly, enhancing the force of contractions and range of motion [(13,23)]; consequently, decreasing associated pain and disability. Performing the exercises before the application of heat therapy could therefore not benefit from similar effect of heat. Another reason for the difference could be that group B mostly had working women (teachers, doctors etc.) who have to stand and sit for prolonged periods of time with awkward postures.

The limitation of the study was that the effects of moist hot pack were only observed only with back extension 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 moist hot pack was found to be more effective before McKenzie exercises than its use after the exercises to improve pain, range of motion and disability in non-specific low back pain. Future studies on both genders, with larger sample size and assessment of the physiological changes of moist heat that occur at the cellular level before and after the performance of exercises could help

understand the process of changes and make more strong conclusions about its use in clinical practice.

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Hina Tariq: Conception and design of the work and revising it critically for final approval. Responsible for data integrity.

***Hamid Hussain*:** Revising article critically for important intellectual content for final approval. Responsible for data integrity

Shabbir Hussain: Revising article critically for important intellectual content for final approval. Responsible for data

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