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COMPARATIVE STUDY ON EFFECT OF HOT MUD AND HOT MUSTARD APPLICATION AS AN ADJUVANT TO A COMPREHENSIVE NATUROPATHY TREATMENT IN MANAGEMENT OF LOW BACK PAIN- A RANDOMIZED CONTROL TRIAL

Naturopathy

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ABSTRACT

Background- Naturopathic medicine is a comprehensive system of health care. Low back pain is the common musculoskeletal disorders and accounts majority of the disability. it is essential to understand individual contributions of therapies when used as an adjuvant to Naturopathy in alleviating low back pain.

Objective: To compare the effect of 2 naturopathic modalities – hot mud and hot mustard application along with other naturopathic treatment in alleviating low back pain, disability and range of motion.

Material and methodology: Subjects aged between 19-60 years were randomly recruited by chit system from inpatient facility of SDM Yoga and Nature cure hospital, Dharmasthla. 90 subjects were assigned into 3 groups (group 1 is naturopathic intervention, group 2 naturopathic intervention + hot mud pack, group 2 naturopathic intervention + hot mustard pack). Subjects from each group received treatment allotted to that particular group for the period of 10 days. Assessments were made before (baseline) and after ten days of intervention in all 3 groups. The assessment tools included are VAS, ODI, SRT.

Results: The results showed a significant difference in 3 groups with respect to VAS, ODI, and SRT ($p < 0.001$). As for the comparison within group 2 was more significant than group 3 and group 3 was more significant than group 1 .The comparison within the groups was done showed a significant difference in severity of pain, disability index, daily functioning and range of motion in patients after their respective interventions.

Conclusion: The study suggest hot mud application along with Naturopathic intervention can be used as a more effective mode of treatment to reduce pain ,disability and range of motion in patients with low back pain .

KEYWORDS

Low Back Pain; Naturopathy; Mustard Pack.

INTRODUCTION

Low back pain is defined as pain localised between the 12th rib and the inferior gluteal folds, with or without by pain .[1]Whereas, it is has been found that as much as 97% of low back pain is called "non-specific" or "sprain or strain". [2]

according to diagnostic triage, patients are categorised into specific and non -specific low back pain. [5]Back pain has a life time prevalence of 60-85%. At any time, about 15% (12-30%) of adult have low back pain.[6-8]

Low back pain is the leading cause of limited activity and work absence throughout much of the world [12] and also associated with greater disability.[13] whereas it causes an enormous economic burden on individual families, communities, industry and government.[14-16]

The determination of risk factors for low back pain is a difficult task as the origin and cause of low back pain and disorders are complex , being affected also by psychosocial factors.[17,18]

Complementary and alternative medicine (CAM) is a group of medical and a health care systems, practices and products that are not presently considered to be part of conventional medicine but it is the way to improve health and wellbeing [19] and covers a different spectrum of ancient to new age approaches that claims to prevent or treat the disease. [20]CAM is a holistic health philosophy or a transformational experience that change one's world view and wanting greater control over one's own health .[19,21]

Mud is generally defined as a mixture of inorganic and organic matter with water, which has undergone geological and biological processes under the influence of various physiochemical factors. Used empirically in musculoskeletal and inflammatory joint disease.[24-26]

Mud-pack therapy is reported to decrease in the levels of tumour necrosis factor-alpha (TNF-α) resulting in decreased inflammatory reaction and cartilage damage, maintenance of cartilaginous homeostasis through decreasing serum levels of nitric oxide and myeloperoxidases, and decrease in serum concentrations of inflammatory mediators such as prostaglandin E2 (PGE2) and leukotriene B4 (LTB4).[27-29]

An enzymatic reaction in the wet mustard powder produces a chemical called allyl isothiocyanate, which is absorbed through the skin as a transdermal drug.[32]Whereas mustard seeds contains - glycosides(sinigrin)and enzyme (myrosin),When these mustard seeds are broken,the enzyme myrosinase is released and acts on a glucosinolate known as sinigrin to give allyl isothiocyanate. Allyl isthiocyanate, which is the organosulfur compound, is a counterirritant. [32]

METHODOLOGY

105 subjects with age ranging between 18-60 years participated in the study. They were screened through a routine medical checkup and 90 patient satisfying diagnostic criteria for low back pain were recruited. Study population was selected from Inpatient facility of Sri Dharmasthala Manjunatheshwara Yoga and Nature Cure Hospital. Subjects were informed regarding the study and intervention to be used. If there is any significant pathology, such as bone fracture, nerve damage or severe psychiatric condition, including clinical depression as determined by a physician, trauma, History of inflammatory arthritis of large joints, Pregnancy ,Exposure to naturopathy, physiotherapy or acupuncture in the 6 months preceding entry, Obesity associated with back pain will be excluded.

A Randomized control trial, where randomization was done by using the chit system. There were equal numbers of subjects (30 each) in Group 1 (naturopathic intervention) and Group 2 (naturopathic intervention+ hot mud pack) and Group 3 (naturopathic intervention+ hot mustard pack) . They were assessed at the baseline and after 10 days. Assessments were done using VAS, ODI and SRT.

The data was collected using three primary outcomes variables and one secondary Outcome variables. The assessments were collected on the first day (baseline data) and The end of 10 days (post data). The data was organized in Microsoft Excel Sheets (version 2010).Data were analysed using IBM SPSS 21.0. The data was checked for normality and Paired t test was employed to compare means between the two groups. For all the analysis, we present 95% confidence intervals and considered $p < 0.001$ as significant.

RESULTS

The present study was conducted to compare and evaluate if hot mud and hot mustard application along with naturopathy treatments had any influence on severity of pain, disability index and range of motion. Comparison of pre-test and post-test of VAS score, ODI and sit and reach score in three groups by paired T-test showed significant improvement in pain as observed in naturopathic treatment ($p \leq 0.0001$), hot mud application ($p \leq 0.0001$) and hot mustard application ($p \leq 0.0001$) were observed .Comparing post-test of VAS using paired T test group 1 and group 2 shows 3.56± 3.07 whereas when compared between group 2 and group 3 shows 3.07± 5.71. When comparison of three study groups were done by ANOVA with respect to pre-test and post-test of VAS score, ODI and sit and reach score shows significant improvement in pain when compared between groups and within groups($p \leq 0.0001$).Between group and within group comparison of three study group by tukeys multiple post –hoc procedures with respect to pre-test and post –test of VAS score, ODI and sit and reach score also showed significant improvement in pain .

Table 1: Comparison of pre-test and post-test VAS scores in three study groups by paired t test

Groups	Time	Mean	SD	SE	Mean Diff.	SD Diff	%of change	Paired t	p-value
Naturopathic	Pre-test	7.23	0.87	0.15					
	Post-test	3.56	1.19	0.20	3.67	1.19	50.79	18.2860	0.000*
Hot mud bath	Pre-test	7.54	1.17	0.20					
	Post-test	3.07	0.83	0.14	4.47	1.31	59.28	20.1720	0.000*
Hot mustard pack	Pre-test	7.46	1.44	0.24					
	Post-test	5.71	2.60	0.44	1.74	2.67	23.37	3.8590	0.000*

*p<0.05

Table 2: Comparison of three study groups with respect to pre-test and post-test disability scores by one way ANOVA

Variables	Sources of variation	Sum of Squares	Degree of freedom	Mean Square	F-value	p-value
Pre-test	Between groups	2.23	2	1.11	0.0530	0.9480
	Within groups	2128.00	102	20.86		
	Total	2130.23	104			
Post-test	Between groups	2105.39	2	1052.70	53.1440	0.0001*
	Within groups	2020.46	102	19.81		
	Total	4125.85	104			
Difference	Between groups	2022.31	2	1011.15	31.0290	0.0001*
	Within groups	3323.89	102	32.59		
	Total	5346.19	104			

*p<0.05

Table 3: Pair wise comparison of three study groups with respect to pre-test and post-test Sit and reach (extension) scores by Tukeys multiple posthoc procedures

Time	Groups (I)	Groups (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
						Lower	Upper
Pre-test	Naturopathic	Hot mud bath	-0.2000	0.64	0.9470	-1.71	1.31
	Naturopathic	Hot mustard pack	-0.3571	0.64	0.8410	-1.87	1.15
	Hot mud bath	Hot mustard pack	-0.1571	0.64	0.9670	-1.67	1.35
Post-test	Naturopathic	Hot mud bath	-2.1714	0.70	0.0070*	-3.83	-0.51
	Naturopathic	Hot mustard pack	1.0571	0.70	0.2890	-0.60	2.72
	Hot mud bath	Hot mustard pack	3.2285	0.70	0.0001*	1.57	4.89
Difference	Naturopathic	Hot mud bath	-1.9714	0.55	0.0010*	-3.27	-0.67
	Naturopathic	Hot mustard pack	1.4142	0.55	0.0300*	0.11	2.71
	Hot mud bath	Hot mustard pack	3.3857	0.55	0.0001*	2.09	4.69

*p<0.05

DISCUSSION

This study was to investigate and compare the effects of hot mud application and hot mustard application along with naturopathic intervention to reduce pain intensity (VAS), disability (ODI) and range of motion (sit and reach test) in patient with low back pain. Hot mud application and hot mustard application before and after in patients with low back pain were investigated and used self-reported variable to assess and these methods have been reported to be more satisfactory in analysis of the severity of pain, disability and range of motion in the patients.

According to results, mud application has been more beneficial than mustard application. As direct application is found to be superior, which implies that chemical properties of mud contribute to build up the therapeutic effect. Whereas one of the study revealed that mud pack treatment significantly improved the pain and functional status of patient with osteoarthritis of knee, whether applied directly or coated with the nylon.[39]

Both mud and mustard packs are the naturopathic treatment used as a management low back pain in nature cure hospital in spite of lack of scientific evidences and used as non-pharmacological tool in treating degenerative processes. Whereas mud has property to modify nitric oxide, myeloperoxidase, glutathione serum levels in arthritic patients and beta endorphins and stress hormones in patient affected by osteoarthritis by reducing inflammation, pain and therefore diminishes the cause of the stress [40]and anti-inflammatory in nature.

Comparison of 3 study groups with respect to pre-test and post-test VAS scores. Naturopathic group 7.23 ± 3.56, hot mud application 7.54 ± 3.07 and hot mustard application 7.46 ± 5.71. On comparing of 3 study group with respect to pre-test and post-test VAS score by paired t test is 0.0001. Percentage of changes in hot mud application along with naturopathic intervention is 59.28% when compared with pre and post VAS score by paired t test.

Mustard application provides warmth and functions as a counter irritant, meaning that it stimulates nerve endings in the skin and thereby distracts the body from deeper-seated pain.[32]Similarly the naturopathy group has also been very effective improvement in treating low back pain.

A randomized single- blind controlled follow-up study on effectiveness of balneotherapy in chronic low back pain concluded that balneotherapy has analgesic efficacy in alleviating the pain and improvement of mobility in patients with chronic back pain. Since we used hydrotherapy, in form of neutral spinal bath it may be one of the contributing factor for reducing the pain and increasing range of movements (naturopathy group).[41] Hot application decreases the pain and spasm and increases metabolism, blood flow and extensibility.[42] shani et al [43] in Israel noted increased serum concentration of bromine, rubidium, calcium, and zinc in psoriatic patient after bathing in the dead sea . There are data , however that the sulphur can be absorbed through the skin and may have the analgesic effect.[44,45] gutenbrunner et al found that sulphur bath reduces pressure induced, temperature induce and spontaneous pain in both normal patients and in rheumatoid arthritis patiens.[46] in freund's adjuvant induced chronic arthritis of rats, swelling was reduced by sulphurous bath better than in tap water, although the difference didn't reach the level of significance [47]. Radon also penetrated the skin and even can be inhaled during radon bath treatment. These substance might have anti-inflammatory and analgesic effects.[48] It has been reported that plasma level of endorphin are raised after 2 hours of bathing in the mineral water at 39 C.[49] and that mud pack reduce serum concentrations of PGE2 and LTB4.[50] Massage therapy increases parasympathetic activity, arterial and venous blood flow and improves lymphatic drainage. It induces a variety of positive physiological effects that may contribute to tissue repair, pain modulation, relaxation, and improved mood. [51]

Hot mud and hot mustard application along with naturopathic intervention has shown good results, simultaneously even Naturopathic intervention group as shown good result with the use of different naturopathic modalities especially hydrotherapy with hot and cold water application.The main use of the treatment is to relieve rheumatic musculoskeletal pain. [52]

The studies gives the evidences for hydrotherapy, yoga, thermotherapy, balneotherapy & manipulative therapy in alleviating the pain intensity, severity of disability and range of motion improvement in the patient with low back pain .

Strengths of the study is large sample size, High compliance rate ,No acute adverse effects documented, Possibilities of any kind of interactions and exchange of ideas of the subjects were almost nil. As subjects of all the groups were present can be a confounding factor; however equal care was given to all subjects who participated in the study.

Limitations and drawbacks of the study includes the patients with age group ranging from 18 years to 45 years. This may influence the results

as the younger age group may get improvements much sooner than the elder patients. However, as the study is a prospective comparative study, the exclusion of patients with extreme age was not possible. Additionally,

The study has a nonrandomized design Subjective variables were used which tend to be biased Shorter period of follow up compared to previous studies may have limited the magnitude of benefits reported. The interventions need to be administered to populations with varying intensity of back pain, to assess its efficacy.

Future prospects emerging through this study can have better objective variables (EMG studies), larger sample and a longer follow-up duration to authenticate the reported benefits of this study, Measures for assessment of anxiety, depression and stress can be included and Generalizability of this program among different cultures should be assessed and reported.

CONCLUSION

Back pain is not a disease but a constellation of symptoms that usually is acute and self limited. The present study showed that 10 days of naturopathic treatment modalities has a significant effect in subjects with low back pain by reducing pain, disability and improving range of movement. All 3 groups showed improvement in VAS, ODI and ROM within the group which suggests that hot mud application along with naturopathy intervention can be considered as effective treatments in patients with low back pain.

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