



Effect of heat therapies on pain and disability in patients with Osteoarthritis of knee joint

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ABSTRACT

Osteoarthritis (OA) of knee is most common form of arthritis and is a major cause of functional disability especially in elderly patients due to pain. Hot mustard and wax therapy are two modalities employed in management of pain. Aim: To compare the effect of hot mustard application and wax therapy on pain and disability in patients with osteoarthritis of knee. Methods and Material: The study adopts a comparative trial design. A total of sixty subjects of age 50-65 years were recruited. They were assigned to either group One (hot mustard application) or group Two (wax therapy). Every subject were assessed for pain and disability at baseline and following ten days. Results: Pre and post data was analysed by Wilcoxon signed rank test which showed difference in VAS ($P<0.00$), WOMAC ($P<0.00$) in mustard group and VAS ($P<0.00$), WOMAC ($P<0.00$) in wax group respectively. The overall comparison between the groups was done by using Mann Whitney U test which showed decrease in VAS scale ($P<0.007$). Conclusions: The study result suggests that both hot mustard application and wax therapy could be considered in reducing pain

Keywords: Osteoarthritis of Knee, Hot Mustard, Wax.

1. INTRODUCTION

Knee osteoarthritis (OA) is one of the most frequent musculoskeletal disorders worldwide, affecting 30-40 % of the population by the age of 65 years. It is a major cause of physical function impairment and disability among elderly peoples.[1] The most commonly affected joints are knees, hips, hands and spine.[2] Quadriceps strength deficits have also been reported in 20%–70% of patients with knee OA.[3] It affects most of the daily activities and any other lower extremity tasks than any other diseases, especially in the elderly.[4] It is one of the major causes of impaired function that reduces quality of life (QOL).[5] In older adults with symptomatic knee osteoarthritis undergo a significant impact and lower scores on multiple dimensions of HRQOL.[6,7] In

One third of general population in older adult shows radiological evidence of knee osteoarthritis and it is strongly age related.[8]

Complementary and Alternative Medicine (CAM) is a form of health-related practice designed to prevent, treat, and manage illnesses and preserve the mental and physical well-being of individuals. [9] The use of CAM modalities for musculoskeletal disorders, is primarily to alleviate associated discomfort and disability.[10] Naturopathic health care encourages the self-healing abilities of the individual primarily through the education and promotion of natural, non-toxic therapeutic methods and modalities.[11] It provides a way that remedies the whole individual, restores the body's natural balances, targets the origins of disease, and prevents future illnesses.[12] Mustard seed has been used internally and externally since ancient times.[13] Mustard application is widely used in the treatment of musculoskeletal diseases for pain relief.[14] An enzymatic reaction in the wet mustard powder produces a chemical called allyl isothiocyanate, which is absorbed through skin as a transdermal drug.[15,16]. Wax therapy is an application of the molten paraffin wax on specific joints.[17] It has been applied as a physical modality in treating patients related with musculoskeletal painful conditions such as arthritis.[18] It gives a local effect of relaxing smooth muscle fibers in arterioles, which results in vasodilation of peripheral blood vessels.[19]

Hence the present study aimed at evaluation of efficacy of wax therapy and hot mustard application for patients with OA knee.

2. SUBJECTS AND METHODS

Sixty subjects with age ranging between 50 to 65 years participated in this study. Potential subjects were screened through a routine medical check-up and those satisfying American college of Rheumatology diagnostic criteria of osteoarthritis of knee were recruited. Other medical conditions involving joints and undergoing any pharmacological

interventions for joints were excluded. Selected subjects were allocated in to one of two groups by lottery method.

Group One (mustard application): Mustard powder mixed with hot water up to 450C is retained and applied on the symptomatic knee by wrapping around it covering an area of 5 cm above and below the patella for 20 minutes daily for the period of 10 days.

Group Two (wax therapy): Linen Cloth is dipped into melted wax (40- 440C) and it is wrapped around knee covering an area of 5 cm above and below the patella for 20 minutes daily for the period of ten days. They were assessed at the baseline and after ten days of completing intervention. Assessment was done using VAS and WOMAC method.

The study adopts a comparative trial design. The subjects were allocated into two groups, the mustard group (30) and wax group (30). The subjects were assessed for VAS scale and WOMAC scale at baseline and following ten days The data were analyzed using IBM SPSS 25.0. Data was checked for normality using Shapiro wilks test. Wilcoxon signed rank test was employed to compare means within the groups and between group changes were assessed using Mann Whitney U test. For all the analysis, we present 95% confidence intervals and considered P<0.05.

Approval was also taken from the institutional research and ethical committee before the onset of study.

3. RESULT

The overall comparison between the groups was done by using Mann Whitney U test, which showed decrease in VAS scale (P<0.007). No changes were observed in WOMAC (P<0.210) in between the groups. Pre and post data were analyzed by Wilcoxon signed rank test which showed difference in VAS (P<0.00) and WOMAC (P<0.00) in mustard group and VAS (P<0.00) and WOMAC (P<0.00) in wax group respectively.

Table 1: Represents post intervention of group 1(hot mustard application) and group 2 (wax therapy)

Variables	Group 1 (Hot Mustard) Sample Median (SD)	Group 2 (Wax Application) Sample Median (SD)	Mann-Whitney U test value	P-value
VAS	5.00(1.25)	6.00(1.37)	275	.007*
WOMAC	58.00(10.28)	55.00(8.42)	365.5	.210

*P-value<0.05.

<0.05 represents significant.

VAS=Visual Analogue scale,

Womac=Western Ontario and McMaster Universities Secondary Osteoarthritis index.

Table 2: Represents descriptive analysis of group 1 (Mustard application)

Variable	MEAN± SD	MEAN± SD	P - Value
	PRE	POST	
VAS	7.47±1.38	4.77±1.25	0.00*
WOMAC	71.10±11.26	58.40±10.28	0.00*

*P<0.05.

VAS=Visual Analogue scale, Womac =Western Ontario and McMaster Universities

SD=Standard deviation

Within group analysis suggest a reduction in pain and disability (P<0.05)

Table 3: Represents descriptive analysis of group 2 (wax group)

Variables	MEAN±SD	MEAN±SD	P -Value
	PRE	POST	
VAS	7.43±1.45	5.63±1.37	0.00*
WOMAC	64.17±8.25	56.00±8.42	0.00*

*P<0.05.

VAS=Visual Analogue scale, Womac=Western Ontario and McMaster Universities

SD=Standard deviation.

Within group analysis suggest reduction in pain and disability (P<0.05)

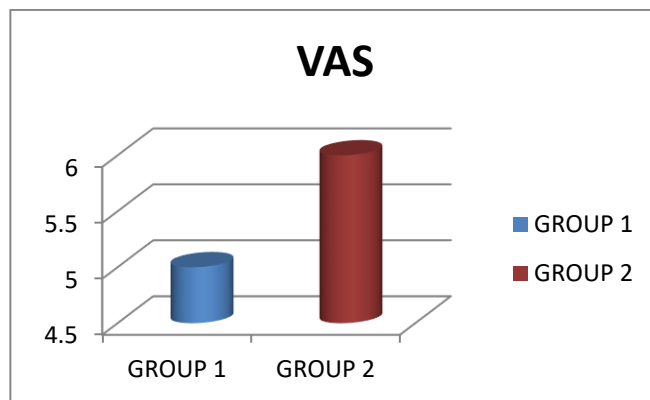


Fig. 1: Comparison between post group VAS (group 1 -hot mustard application, group -2 wax therapy)

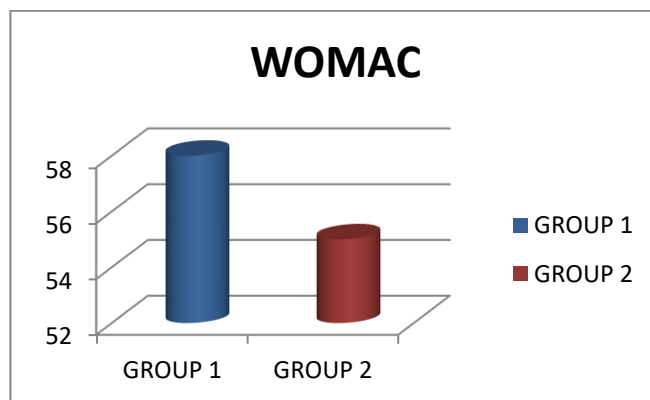


Fig. 2: Comparison between post group WOMAC (group 1 -hot mustard application, group -2 wax therapy)

4. DISCUSSION

The main aim of the study was to evaluate and compare the effect of hot mustard application and wax therapy to reduce pain intensity (VAS) and patients global assessment in adult patients with osteoarthritis of knee.

The study investigated the use of hot mustard application and wax treatment before and after in patients with osteoarthritis of knee. Self-reported visual analogue scale, patient global assessment (WOMAC-Western Ontario and McMaster

Universities Secondary Osteoarthritis index) were used as assessment tools.

In present study, both the groups, Group 1 (hot mustard application) and Group 2 (wax therapy) showed a significant difference with respect to pain severity and disability index. VAS scale showed statistically significant difference when compared between the two groups.

There is significant decrease on VAS scores for pain in mustard groups which might be due to stimulation of nerve endings in the skin and decreases the pain.[20]

Application of Mustard pack are used to warm muscle tissues, especially deeper tissues and reduces chronic pains such as arthritis. It acts as a counterirritant, stimulates nerve endings on skin, and reduces the pain.[21] Increase in temperature leads to a state of analgesia in the injured area by acting on free nerve endings.[22] Local application of heat reduces peripheral nerve conduction velocities, increase peripheral endorphin production, and raise the pain threshold.[23] A review by Nadler.SF shows that topical modalities applied with physical support activate another type of specialized nerve endings called proprioceptors. Proprioceptor activity also inhibits the transmission of nociceptive signals to the brain.[24]

The physiological effects of heat are vasodilation, accelerates the transport of nutrients and removal of the residum by increasing blood flow to the injured area of the body. It reduces the accumulation of venous blood in the region. Decrease in blood viscosity which helps in accelerating the transport of leucocyte and antibody to the injured area, increased capillary permeability, promotes muscle relaxation, controls inflammation, pain reduction.[25] Superficial heat exerts its therapeutic effects by providing analgesia, hyperemia, and changing local or systemic temperature.[23]

Topical heat treatment applied directly on the skin increases both deep tissue temperature and blood flow. Findings by Cameron MH have proved that A 1°C increase in tissue temperature is associated with a 10% to 15% increase in local tissue metabolism. This increase in metabolism aids in healing process and remove metabolic by-products of tissue damage and provides homeostasis for tissue repair.[26]

The study was able to prove that short term use of hot mustard application and wax therapy is effective in the treatment of osteoarthritis of knee in reducing pain. Although both the treatment modalities are effective mustard application showed significant reduction in pain scale.

5. CONCLUSION

The study results indicate that both hot mustard application and wax therapy showed improvement in VAS and WOMAC which suggests that hot mustard application and wax therapy can be considered as effective treatments in patients with osteoarthritis of knee for the management of pain. Wax therapy can be utilized by the practitioner in an hospital set up whereas mustard pack can be utilized as primary care in home by the patients.

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