



Comparative efficacy of *Nadi sweda* and *Pinda sweda* (Oleation therapies) on symptoms of knee osteoarthritis

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ABSTRACT

Osteoarthritis is characterized by deterioration of articular cartilage, marginal epiphyseal hypertrophy, subchondral sclerosis, and various biochemical and morphological changes in the synovium. Ayurveda offers remarkable help in this debilitating condition called *Sandhigata vata* and reduces morbidity. Along with internal medications, Ayurveda provides various external treatment options like *Snehana* (Oleation), *Swedana* (Sudation), *Veshtana* (Bandaging) and *Panchakarma* procedures for various ailments. Present study aims to assess the comparative efficacy of *Pinda Sweda* and *Nadi Sweda* in *Sandhigata vata*. This is a simple randomized comparative open label study with two groups. Each group consists of 20 patients and Group A received *Abhyanga* with *Tila taila* and *Nadi sweda* while Group B received *Abhyanga* with *Tila taila* and *Pinda sweda*. The signs and symptoms were scored numerically before and after the treatment and paired 't' test was applied at 5% significance level to see the efficacy of *Pinda Sweda* and *Nadi Sweda* in *Sandhigata vata* for pain, swelling, range of movement, stiffness, pressure exerted by affected leg and walking time. The results were statistically analysed and Group A showed better relief statistically in pain, stiffness and pressure exerted by affected leg whereas, both the Group A and Group B was found equally effective in reduction of swelling and reduction in walking time. **Keywords:** *Sandhigata vata*, *Snehana*, *Swedana*, *Pinda Sweda*, *Nadi Sweda*, *Vatavyadhi*, *Osteoarthritis*

Received 12.12.2023

Revised 02.01.2024

Accepted 21.02.2024

INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease that represents the failure of diarthrodial joints. The most commonly affected joints are the knee, hand, hip, foot and shoulder joints. Illness burdens include the cost of adaptive aids and devices, medications, surgery, and time off from work [1]. Osteoarthritis is characterized by deterioration of articular cartilage, marginal epiphyseal hypertrophy, subchondral sclerosis, and various biochemical and morphological changes in the synovium [2]. This causes the bones to rub against each other, causing stiffness, pain, and limited movement. Pathologic changes in late-stage osteoarthritis include softening, ulceration, and focal destruction of articular cartilage. There are many predisposing factors associated with OA, including age, gender, genetics, and obesity [3]. The exact etiology is still unknown, which hinders proper management of the disease. Ayurveda offers remarkable help in this debilitating condition called *Sandhigata vata* and reduces morbidity. Along with internal medications, Ayurveda provides various external treatment options like *Snehana* (Oleation), *Swedana* (Sudation), *Veshtana* (Bandaging) and *Panchakarma* procedures for various ailments. Fomentation reduces coldness, pain, stiffness, heaviness, bring softness and produces sweating [4]. *Sankara Sweda* and *Nadi Sweda* is one among various type of fomentation mentioned in Ayurveda medical textbooks. *Pinda Sweda* used as treatment modality in this study is based on the principles of *Sankara Sweda*. (wrapped in cloth or not) [5-8].

MATERIAL AND METHODS

Selection of patients: A total of 40 knee osteoarthritis patients (20 in each group) participating in OPD and IPD from Radhakishan Tonshniwar Ayurvedic University and Hospital, Akola Maharashtra University of Health Science, Nashik were enrolled regardless of age, gender, religion and caste. This study was conducted after approval of the Institutional Ethics Committee (Letter No. 266/18) and was registered with

the CTRI (CTRI/2018/03/012636 on 19.03.2018). Group 1 receives *Abhyanga* with *Tila Taila* followed by *Pinda Sweda* and Group B receives *Abhyanga* followed by *Nadi Sweda* for 6 weeks.

Inclusion criteria:

- Patients of age group 30-80yrs of either sexes, irrespective of religion, occupation and socio-economic status was enrolled.
- Patients those are clinically diagnosed with mild to moderate osteoarthritis symptoms (one or both knees), confirmed by a radiologist or experienced Ayurvedic practitioner, and willing to participate in the study.

Exclusion criteria: Knee pain caused by congenital dysplasia of the affected knee, rheumatoid arthritis, autoimmune disease, malignancy, knee surgery or knee arthroscopy. Co-morbidities such as arrhythmia, acute coronary syndrome, myocardial infarction, stroke, or history of severe arrhythmia within the past 6 months.

Laboratory Investigation: Patients selected for study were subjected to following investigations before and after the treatment Hb, TLC, DLC, E.S.R, platelet count, A.S.O. titre, RA factor. Urine Examination (Routine, Microscopic) and X-ray of involved knee joint.

Study design: This is a simple randomized comparative open label study with two groups. Each group consists of 20 patients and Group A received *Abhyanga* with *Tila taila* and *Nadi sweda* while Group B received *Abhyanga* with *Tila taila* and *Pinda sweda*.

Duration of treatment: 6 weeks

Intervention: Procedure/ Intervention: *Nadi Swedana* is a unique form of *swedana* procedure where sweating is induced by passing steam over the body part by using a special instrument known as *Nadi Swedana yantra*. Application of oil (sesame oil) to the body part that is to be subjected to sudation (sweating) treatment, followed by passing the steam to the same part with help of a tubular pipe is the procedure of *Nadi Swedana*. The steam is passed through a rubber tube fitted to the instrument and it is an easy method of applying heat to a localized part of a body. *Dashmoola* (mixture of 10 dried raw drugs) formulation in *Nadi Swedana yantra* along with sufficient quantity of water (Table 2) [9, 10]. *Nadi Swedana* is a unique form of *Swedana* procedure that induces perspiration by passing steam to parts of the body using special instruments called *Nadi Swedana Yantras*. The *Nadi Swedana* procedure involves applying oil (sesame oil) to the area to be treated and using a hose to apply steam to the same area. Steam is passed through a rubber hose attached to the appliance, a simple way of applying heat to a specific part of the body. *Dashmoola* (mixture of 10 dried raw drugs) formulation in *Nadi Swedana yantra* along with sufficient quantity of water. For *Abhyanga*, *Tila Taila* was used on the affected joint before *swedana* for 15 minutes. *Dashamoola kwatha* was used for *swedana* as *nadi swedana* externally on the affected joints after *snehana* for 10 minutes. In *Pinda sweda*, rice was cooked with medicated decoction and milk. Decoction is made with *Dasamoola* drugs and *Bala* (*Sida cordifolia*). The cooked paste was kept in two clean cloth pieces and tied to form of a bolus. Sudation was performed over the part of the body by using this bolus. An informed written consent of all patients was taken before the commencement of the trial. To compare the before and after effects of sudation therapy within the study group the paired t-test was done.

Criteria of Assessment

The improvement in the patients was assessed mainly on the basis of relief in the sign & symptoms of the disease. To assess the effect of therapy objectively, all the sign & symptoms were given scoring depending upon their severity.

1)Pain: Subjective assessment was done as per patient’s severity for pain. This was recorded according to Visual Analog Scale for assessment of Pain (Table 2).

Table 2: Visual Analog Scale for assessment of Pain

Score	
0	No Pain
1	Mild Pain that you are aware of but not bothered by.
2	Moderate Pain that you can tolerate without medication.
3	Moderate Pain that is discomforting and requires medication.
4-5	Severe Pain and Patient began to feel anti-social.
6	Severe Pain
7-9	Intensely severe Pain
10	Most Severe Pain. One may contemplate suicide over it.

2) **Swelling** : Assessment done by measuring the circumference of the joint, before and after treatment at the fixed point over the joint in centimeters.

3) **Stiffness** : It was assessed as the free movement against the normal range of movements (Table 3).

Table 3: Scale for assessment of stiffness

1	Complete free movement	-No stiffness
2	$\frac{3}{4}$ free movements against that of normal range of movement	-+ stiffness
3	$\frac{1}{2}$ free movements against that of normal range of movement	--+ stiffness
4	$\frac{1}{4}$ free movements against that of normal range of movement	- +++stiffness
5	Difficulty with complete range of movements	++++stiffne SS

4) Walking time

0	Walks without pain upto 1 km
1	Walks without pain upto 500 mtr
2	Walks without pain upto 250 mtr
3	Feels pain on standing
4	Cannot stand

5) **Range of Movement**: Goniometer was used to measure the possible movement of the joint. With the help of this apparatus the angle of restricted movement was measured against the normal range of movement (flexion, extension etc.)

6) **Pressure exerted by affected leg**: It was assessed by asking the patient to exert pressure over the weighing machine. Such three readings were observed and the average was notified.

Overall effect of therapies:

Detailed clinical observations were done every week for assessment of results. For final assessments the clinical date was divided into four groups.

Group 1	Group 2	Group 3	Group 4
Complete Improvement: <ul style="list-style-type: none"> Complete or more than 75% relief or more. 75% or more relief in swelling. Decrease in angle of stiffness by 75% or more. 	Marked Improvement: <ul style="list-style-type: none"> 50 to 75% subjective improvement in pain. (Pain scale-1) 50% or more relief in swelling. Decrease in angle of stiffness by 50% or more. 	Moderate Improvement: <ul style="list-style-type: none"> 25 to 50% relief in pain. (Pain scale-2) 25% or more relief in swelling. Decrease in angle of stiffness by 25% or more. 	Mild Improvement: <ul style="list-style-type: none"> Pain not relieved or only less than 25% (Pain scale-3 & 4) Less than 25% relief in swelling. Decrease in angle of stiffness by less than 25%.

The purpose of the study was explained by physicians and oral informed consent was obtained from the study participants. The patient data was recorded in a performa including information on demographic variables of the patients such as age, gender, education, occupation and family monthly income etc. The patients symptoms of pain, swelling and stiffness were assessed by clinically and documented.

Statistical Tools: The signs and symptoms were scored numerically before and after the treatment and paired 't' test was applied at 5% significance level to see the efficacy of *Pinda Sweda* and *Nadi Sweda* in *Sandhigata vata* for pain, swelling, range of movement, stiffness etc. Chi-square test was used to interpret association between obesity and chronicity of disease on relief caused by treatment respectively.

RESULTS

Vatavyadhi is one of the commonest geriatric problems. From the demographic details it is observed that *Sandhigata vata* is more predominant in female, in the age group of 41 to 60 yrs. (70%) and more common in household workers (55%) followed by labour workers (35%). Maximum numbers of patients included in study were educated (72.50%). *Vata-pitta prakruti* (55%) were more commonly affected followed by *Vata-kapha prakruti* (25%). Maximum of them had *Vishamagni* (50%) and *Madhyamakostha* (52.50%). It was observed involvement of left leg was maximum (45%) followed by both leg involvement (32.5%) and right leg (22.5%). In radiological investigation maximum patient showed reduction in joint space followed by sclerotic changes.

Table No. 4 Distribution of 40 patients according to radiological changes.

Group	Reduced joint space	Sclerosis	Osteophytes	NAD
A	16 (80%)	8 (40%)	3(15%)	4 (20%)
B	13(65%)	4 (20%)	5 (25%)	7 (35%)
Total	29 (72.5%)	12 (30%)	8 (20%)	11 (22.5%)

In group A (*Abhyanga and Pinda Sweda*) three patients (15 %) had complete improvement, 11 patients (55%) had marked improvement and six patients (30%) had moderate improvement. In group B (*Abhyanga and Nadi Sweda*), no one had complete improvement, six patients (30%) had marked improvement and ten patients (50%) had moderate improvement whereas four patients (20%) had mild improvement.

Table No. 5: Group wise distribution of 40 patients according to improvement.

Group	Complete	Marked	Moderate	Mild
A	03 (15%)	11 (55%)	06 (30%)	00(00%)
B	00 (00%)	06 (30%)	10 (50%)	04 (20%)
Total	03 (7.5%)	17 (42.5%)	16 (40%)	04 (10%)

The reduction in pain, stiffness and pressure exerted by affected leg is more in Group A as compared to Group B. Group A and Group B are equally effective in reducing swelling, increase range of movement and reduction in walking time to cover 21 meter distance.

Table No.6 S.D. and 't' value of Group A and Group B

Symptoms	Group A		Group B		't' value
	Mean Reduction	S.D.	Mean Reduction	S.D.	
Pain	1.95	0.943	1.20	0.692	2.859
Swelling	1.45	1.729	0.09	1.272	1.039
Range of movement	11.5	11.080	8.05	7.096	1.170
Stiffness	13.5	7.450	8.50	5.871	2.357
Pressure exerted by affected leg	1.70	1.017	1.05	0.759	2.078
Walking time	3.40	2.701	2.65	2.083	0.982

Table No. 7 Chi-square distribution between relief obtained and weight of patients.

No. of Patients	31 to 50kg	51 to 70 kg	Above 70 kg	Total
Relief obtained	13	08	01	22
Relief not obtained	03	13	02	18
Total	16	21	03	N=40

Table No. 8 Relief obtained and chronicity of Disease

No. of Patients	More than 1 year	Less than 1 year	Total
Relief obtained	6	6	12
Relief not obtained	26	2	28
Total	32	08	N=40

Chi-square test was applied to test the independence of attributes viz. weight of the patient, chronicity of disease on relief in sign and symptoms respectively; and no association was found between weight of the patient and relief from symptoms. While there is a positive association between attributes chronicity of disease and relief from symptoms.

DISCUSSION

Predominance of *Sandhigata vata* in old age and females corresponds with the risk factors associated with the disease [12, 13]. More prevalence of disease in household workers and labour may be due to over stress on knee joint from prolonged standing and over exertion. More prevalence of disease in middle income group and educated may be due to awareness towards health and Govt. awareness programme. Involvement of *vata-pitta prakruti* (55%) and *vata-kapha prakruti* (25%) corroborates the principles of

Ayurveda as it is one of the vatavyadhi commonly affecting *vata prakruti* patients. *Vishamagni* of the patient gives an overview of disturbed digestion and metabolism [14, 15]. Close observation showed there was no perfect co-relation in between radiographic evidence and symptoms found in patients. Though obesity is said to be one of the causative factors of *Sandhigata vata* its prognosis is independent of weight of patient. There is a positive association between attributes chronicity of disease and relief from symptoms i.e. more will be the duration of the disease lesser will be relief in symptoms. Probable mode of action of *Swedana Karma* (sudation therapy): The *Swedana karma* (sudation) helps in reducing the ailments of osteoarthritis by virtue of *Doshadravatama* (liquefaction of doshas) and *Vata Niyamana* (regulation of *vata*). *Doshadravatama* (liquefaction of *doshas*) causes *Doshashodhana* (removal of *doshas*) *Srotoshudhi* (Cleansing of channels) *Agnidipana* (improving digestion) and *Bhakta shradhha* (Improves appetite). *Vata Niyamana* (regulation of *vata*) causes improvement in microcirculation which indeed causes *Sandhi Chesta* (Joint movement) by providing nutrients to joints, *Gatravinamana* (Improving body elasticity), *Twaka mardava* and *Prasadana* (softening and brightening of skin), *Nidratandranasha* (reduction in sleep and drowsiness) [16]. Sudation causes the body temperature to rise more than 2-3°C which inhibits sympathetic nervous center in the posterior hypothalamus and makes vasodilatation improving microcirculation thereby reducing stiffness, contraction, pain, heaviness, coldness, numbness and produces sweat. Sudation liquefies the vitiated *doshas* and helps in expelling them from body through detoxification process (Emesis, purgation, urine or sweat). *Snigdha Pinda Sweda* is a type of fomentation for muscle emaciation and deformities in the joints. It checks the emaciation and gives strength to muscles and ligaments. Whereas medicated steam is passed to body part in *Nadi Sweda* and it relieves pain immediately without oral drugs. Decoction of *Dashamoola* used for both the *Pinda Sweda* and *Nadi Sweda* has anti-inflammatory property which is responsible for the reduction in swelling, increase range of movement, pain, stiffness, pressure exerted by affected leg and reduction in walking time. [17]

CONCLUSION

Group A (*Snehana* with *Pinda Sweda*) and Group B (*Snehana* with *Nadi Sweda*) were proved to be equally effective in three out of six parameters viz. reduction in swelling, increase range of movement and reduction in walking time to cover 21-meter distance; whereas Group A is more effective in the reduction in pain, stiffness and increasing the pressure exerted by affected leg. Thus, *Pinda Sweda* proves to be more efficacious than *Nadi Sweda* in relieving the symptoms of pain, stiffness and pressure exerted by affected leg.

Conflicts of interest

There are no conflicts of interest.

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CITATION OF THIS ARTICLE

Sandip B, Mahesh S, Dattatray D, Anjali B P, Deepa S. Comparative efficacy of *Nadi sweda* and *Pinda sweda* (Oleation therapies) on symptoms of knee osteoarthritis. Bull. Env. Pharmacol. Life Sci., Vol 13 [4] March 2024: 115-120