A Comparative Clinical Evaluation of *Marma Chikitsa* and *Agnikarma* in Management of Knee Osteoarthritis: An Evidence-Based Ayurveda Approach

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ABSTRACT:

Janusandhigata Vata is a *Vataja vyadhi* presenting with pain, swelling, stiffness, and restricted knee movements, closely resembling knee osteoarthritis, a chronic degenerative condition causing progressive functional limitation. This study was conducted to compare the clinical efficacy of *Marma Chikitsa* and *Agnikarma* in the management of *Janusandhigata Vata* (knee osteoarthritis), An open-label randomized comparative study was undertaken to evaluate pain, stiffness, function, and range of motion to determine their relative effectiveness. Both therapies produced significant intra-group improvement in pain, stiffness, WOMAC score, tenderness, and ROM, with no consistent statistically significant intergroup difference, although statistical analysis showed better symptomatic relief with *Marma Chikitsa* and sustained benefit with *Agnikarma* during follow-up.

KEYWORDS: *Agnikarma, Janusandhigata Vata*, Knee Osteoarthritis*, Marma Chikitsa,* Pain Management*, Panchadhatu Shalaka*.

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INTRODUCTION:

Sandhigatavata is a *Vata vyadhi* with symptoms of *sandhi shoola*, *sandhishotha*, *akunchana prasarana pravritti savedana*, *atopa* and in later stage *hanti sandhigata* [1]. When *vata* involves *janu sandhi* (knee joint), it is called as '*janu sandhigata vata*'.

In contemporary science, this condition closely correlates with knee osteoarthritis (KOA), the second most common rheumatologic disorder worldwide and a leading cause of disability among the elderly[2]. Global prevalence of knee OA is 22.9% in individuals above 40 years in 2020 [3]. 9.6% of men and 18.0% of women over 60 years have symptomatic osteoarthritis worldwide [4]. Overall global incidence is 3.08 million new cases annually. The prevalence of knee OA is around 22% to 39% in India and is 47% in adults above 60 years. Incidence is approximately 0.4–0.5% per year [5]. Contributing risk factors include aging, obesity, sedentary lifestyle, occupational stress on joints, and genetic predisposition. It is a chronic degenerative joint disease characterized by the progressive loss of articular cartilage, remodelling of subchondral bone, synovial inflammation, and osteophyte formation[6]. The earliest changes occur in the articular cartilage, with depletion of proteoglycans, disruption of the collagen network, and increased water content, leading to softening and fibrillation[7]. As the disease advances, full-thickness cartilage loss exposes the underlying subchondral bone, which undergoes sclerosis and cyst formation due to abnormal remodelling. The clinical features include joint pain typically aggravated by activity, swelling, stiffness, crepitus, joint instability and restricted movement. The diagnosis is based on clinical and radiographic findings. Conventional management includes physiotherapy, analgesics, intra articular steroid injections and in severe cases knee replacement surgery [8]. However, these options often provide only temporary relief, may cause side effects and have limitations in accessibility and affordability. This necessitates the need to look for safe and effective therapies. Ayurvedic management of *sandhigata vata* includes *snehana*(oleation),*upanaha* (warm poultice), *agnikarma*(controlled application of heat),*bandhana*(bandaging) and *unmardana*(massage with pressure / kneading)

Acharya Susrutha has given the direction for treatment of *sandhigata vata* as *Agnikarm*a, the most powerful para surgical procedure is practiced as a quick pain-relieving panacea. It involves controlled application of heat, which is believed to pacify the aggravated *Vata* and *Kapha* through its *ushna* (hot) and *tikshna* (penetrating) properties. Modern studies suggest mechanisms such as vasodilation, improved circulation, release of endorphins, and modulation of pain pathways, all contributing to rapid and sustained pain relief [9]. *Acharya Susrutha* has also mentioned that *marma* are said to cover half of the jurisdiction of surgery [10].

Recent research studies indicate that if there is inflammation or pain at *marma* points, then stimulating the nearby *marma* points can help in alleviating the pain[11]. The present clinical study therefore aims to assess and determine if *Marma Chikitsa is* more beneficial than *Agnikarma* in the pain management of *Janusandhigata vata* with special reference to knee osteoarthritis or vice versa. Hence, this study was undertaken to assess and compare the efficacy of *Marma Chikitsa* and *Agnikarma* in the pain management of *Janusandhigata Vata* (knee osteoarthritis).

MATERIALS AND METHODS:

An open label randomized comparative clinical study was conducted in the Department of *Shalya Tantra*, teaching hospital attached to Government Ayurveda Medical College and Hospital, Bengaluru from January 2024 to September 2025. A total of 40 patients fulfilling the diagnostic and inclusion criteria of *Janusandhigata Vata* were randomly selected and divided into two groups of 20 each irrespective of gender, occupation, and religion.

Inclusion criteria:
1. Patients with classical signs and symptoms of *sandhigata vata - sandhi* shula (pain over knee joint) and *sopha(*swelling*), vedana* during *prasarana* and *akunchana* (painful Range of movement), *vata purna dritisparsha*(crepitus) in *janusandhi* affecting either left or right knee or both knees with chronicity less than 5 years were selected irrespective of their sex, religion and occupation
2. Subjects between Age of 40- 70 years were taken.

Exclusion criteria:
1. Subjects with any other type of arthritis like rheumatoid arthritis, psoriatic arthritis, infective arthritis, gout, ankylosing spondylitis
2. Traumatic causes like fracture and dislocation, meniscal injury, ligament tear
3. Other diseases such as paralysis, Parkinson's disease, severe anaemia and cancer patients
4. Secondary OA due to tuberculosis, syphilis, AIDS & leprosy
5. Pregnant women and lactating women
6. Contraindications of *Agnikarma* [12]

STUDY DESIGN: A Randomized Open Label Comparative Clinical Study.

Written Consent: Written informed consent was obtained from all participants prior to enrolment in the study.

Ethical clearance: The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC) of Government Ayurveda Medical College and Hospital, Bengaluru (IEC Approval No: Shalya / PG/2023/1_). The study was conducted in accordance with the ethical principles.

INTERVENTION:
Table 1: showing the plan of study

Plan of study	Group A	Group B
No of patients	20	20
Intervention	*Marma chikitsa*	*Agnikarma*
Duration of Intervention	14 days	17 days
Assessment	0th Day,7th Day,14th Day	0th Day,8th Day,17th Day
Follow up period	One Month at a interval of 2 weeks	One Month at a interval of 2 weeks

Note:
    Wash out Period of 15 days was fixed before intervention in both the groups

GROUP A: *MARMA CHIKITSA*
***PURVAKARMA*:**
- Informed written consent of the patient was taken.
- Patient was advised to remove tight clothing and metallic items.
- Patient was made to lie down in supine position.
- The hands of the patient were placed over the body.

PRADHANA KARMA:
- *Shakagata marmas -ani marma, janu marma, indrabasti marma* were stimulated by pressure technique in the affected lower limb- [Figure 1] [13,14].

***Ani marma*:**
- Location: situated 3 fingers breadth above the knee joint and is of ½ *angula* size.
- Method of stimulation: Tolerable Pressure over the *marma* point was given using pulp of thumb finger.

Janu marma :
- Location: situated in knee joint and is of 3 *angula* size.
- Method of stimulation: placing the thenar aspects of both hands at the lateral side of upper part of tibia and other fingers posteriorly, tolerable pressure was exerted internally by the thenar region of both hands over proximo tibio fibular joint and other fingers posteriorly exert pressure in upward direction.

***Indrabasti marma*:**
- Location: situated 8 fingers breadth of first skin fold appearing posterior to ankle joint and is of ½ *angula* size.
- Method of stimulation: placing the ring and middle fingers of both the hands over the *marma* points, pressure was exerted and released. Base of the hand kept over the shin bone for support.

- The Rhythm and rate of applying pressure was kept similar to the rhythm of heart beat (0.8 s for each heart beat) and the cycle was maintained similar to the respiratory rate (14-16 times) of the patient.

PASCHAT KARMA:

- Patient was observed after the procedure.
- *Pathya* and *apathya* was explained to the patient.
- *Marma chikitsa* was performed on every alternate day for two weeks.

GROUP B: *AGNIKARMA*

PURVA KARMA:

- Informed written consent of the patient was taken.
- The affected knee joint was cleaned with betadine solution and wiped with dry sterilized gauze.
- The maximum tender sites (6-10) over the affected knee joint were marked, maintaining a minimum space of 1-5 mm.
- *Panchadhatu shalaka* was heated to red hot.

PRADHANA KARMA:

- Patient was made to lie down in supine position.
- *Agnikarma* was done at the marked tender sites.[Figure 2]

PASCHAT KARMA:

- *Madhu* and *grita* was applied over the site of *agnikarma* and dressing was done.
- *Pathya* and *apathya* was explained to the patient.
- 3 sittings of *agnikarma* were performed with interval of 7 days.

PROCEDURE OF *MARMA CHIKITSA*:

Stimulating Ani Marma

Stimulating Janu Marma

Stimulating Indrabasti Marma

Figure 1: showing the procedure of *Marma chikitsa*

MATERIALS REQUIRED FOR AGNIKARMA:

PROCEDURE OF AGNIKARMA:

Figure 2: showing the procedure of *Agnikarma*

SUBJECTIVE PARAMETER:
1. Pain- assessed using the Visual Analogue Scale (VAS). Each patient was asked to rate the intensity of their pain ranging from 0 to 10 and the value was recorded.
2. Stiffness- assessed through patient-reported difficulty in initiating or continuing joint movement especially after period of rest.
3. WOMAC Score- The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC index) was used to assess the subjective impact of osteoarthritis on the patient.

Gradation of Parameter:

Table 2: Gradation of Subjective Parameters

Description		Grade
1.PAIN		
No pain	VAS SCORE 0	0
Mild pain	1-3	1
Moderate pain	4-7	2
Severe pain	8-10	3
2.STIFFNESS		

No restriction in range of movement		0
Mild restriction		1
Moderate restriction		2
Severe restriction		3
3.WOMAC SCORE		
None	Normalized-score 0-20%	0
Mild disability	21-40%	1
Moderate disability	41-60%	2
Severe disability	61-80%	3
Extreme disability	81-100%	4

OBJECTIVE PARAMETER:

1. Tenderness - assessed by palpating the affected knee joint. Pressure was applied over joint margins and periarticular structures. The patient's response was observed and clinically graded.
2. Range of Motion(ROM) - assessed using a goniometer. The patient was placed in a supine position, and flexion and extension angles were measured and the values were recorded.

Table 3: Gradation of Objective Parameters

Description	Grade
1.TENDERNESS	
No tenderness	0
Mild (feels pain on pressure but does not withdraw knee joint)	1
Moderate (feels pain and on touch withdraws knee joint)	2
Severe (patient doesn't allow to touch the knee joint)	3
2.RANGE OF MOTION (ROM)	
Flexion	
Normal flexion 135° -150°	0
<130° and >110°	1
<110°and >90°	2

<90° and >70°	3
<70°	4
Extension	
0°	0
<10°	1
10-20°	2
>20°	3

RESULTS:
Between Group A & Group B:

Factors: PAIN, STIFFNESS, WOMAC, TENDERNESS, ROM

The **Mann-Whitney U test** was applied to compare the effect of the two interventions between **Group A and Group B** at BT, AT1, and AT2.

To test whether there is significant difference in factors stated above between Group A & Group B.

1) **PAIN**

Table 4: Calculation Table of pain Between Group A & Group B:

Ranks				
Groups		N	Mean Rank	Sum of Ranks
BT	Group A	20	19.20	384.00
	Group B	20	21.80	436.00
	Total	40		
AT1	Group A	20	18.25	365.00
	Group B	20	22.75	455.00
	Total	40		
AT2	Group A	20	18.25	365.00
	Group B	20	22.75	455.00
	Total	40		

Table 5: statistics results of pain Between Group A & Group B:

Test Statistics			
	BT	AT1	AT2
Mann-Whitney U	174.000	155.000	155.000
Wilcoxon W	384.000	365.000	365.000

Z	-.833	-1.409	-1.441
P value (2-tailed)	.405	.159	.150
a. Grouping Variable: Groups			
b. Not corrected for ties.			

Pain: No significant difference was observed between the two groups at any time point (**p > 0.05**). Both interventions produced comparable pain relief.Since p values > 0.05, the level of significance; there is no sufficient evidence to reject the null hypothesis.

Conclusion: There is no significant difference in the factor stated above between Group A & Group B. The effect on the factor stated above is nearly same in Group A & Group B.

2) STIFFNESS
Table 6: Calculation Table of stiffness Between Group A & Group B

Ranks				
Groups		N	Mean Rank	Sum of Ranks
BT	Group A	20	18.28	365.50
	Group B	20	22.73	454.50
	Total	40		
AT1	Group A	20	17.55	351.00
	Group B	20	23.45	469.00
	Total	40		
AT2	Group A	20	17.65	353.00
	Group B	20	23.35	467.00
	Total	40		

Table 7: statistics results of stiffness Between Group A & Group B

Test Statistics[a]			
	BT	AT1	AT2
Mann-Whitney U	155.500	141.000	143.000
Wilcoxon W	365.500	351.000	353.000
Z	-1.535	-1.930	-2.042
P value (2-tailed)	.125	.054	.041
a. Grouping Variable: Groups			
b. Not corrected for ties.			

There is no significant difference in the factor stated above between Group A & Group B except at AT2.There is significant difference in the factor stated above between Group A & Group B at AT2.The effect on the factor stated above is higher in Group A than that in Group B at AT2.

3) WOMAC
Table 8: Calculation Table of WOMAC Between Group A & Group B

Ranks				
Groups		N	Mean Rank	Sum of Ranks
BT	Group A	20	16.50	330.00
	Group B	20	24.50	490.00
	Total	40		
AT1	Group A	20	17.45	349.00
	Group B	20	23.55	471.00
	Total	40		
AT2	Group A	20	17.45	349.00
	Group B	20	23.55	471.00
	Total	40		

Table 9: statistics results of WOMAC Between Group A & Group B

Test Statistics[a]			
	BT	AT1	AT2
Mann-Whitney U	120.000	139.000	139.000
Wilcoxon W	330.000	349.000	349.000
Z	-2.416	-1.810	-1.770
P value (2-tailed)	.016	.070	.077
a. Grouping Variable: Groups			
b. Not corrected for ties.			

There is no significant difference in the factor stated above between Group A & Group B.The effect on the factor stated above is nearly same in Group A & Group B

4) TENDERNESS
Table 10: Calculation Table of tenderness Between Group A & Group B

Ranks				
Groups		N	Mean Rank	Sum of Ranks
BT	Group A	20	18.75	375.00
	Group B	20	22.25	445.00
	Total	40		
AT1	Group A	20	17.53	350.50
	Group B	20	23.48	469.50
	Total	40		
AT2	Group A	20	17.75	355.00
	Group B	20	23.25	465.00
	Total	40		

Table 11: statistics results of tenderness Between Group A & Group B

Test Statistics[a]			
	BT	AT1	AT2
Mann-Whitney U	165.000	140.500	145.000
Wilcoxon W	375.000	350.500	355.000
Z	-1.249	-1.956	-1.789
P value (2-tailed)	.212	.050	.074
a. Grouping Variable: Groups			
b. Not corrected for ties.			

There is no significant difference in the factor stated above between Group A & Group B.The effect on the factor stated above is nearly same in Group A & Group B.

5) Range of Motion (ROM)

Table 12: Calculation Table of ROM   Between Group A & Group B

Ranks				
Groups		N	Mean Rank	Sum of Ranks
BT	Group A	20	17.63	352.50
	Group B	20	23.38	467.50
	Total	40		
AT1	Group A	20	18.03	360.50
	Group B	20	22.98	459.50
	Total	40		
AT2	Group A	20	18.50	370.00
	Group B	20	22.50	450.00
	Total	40		

Table 13: statistics results of ROM Between Group A & Group B

Test Statistics[a]			
	BT	AT1	AT2
Mann-Whitney U	142.500	150.500	160.000
Wilcoxon W	352.500	360.500	370.000
Z	-2.055	-1.583	-1.442
P value (2-tailed)	.040	.113	.149
a. Grouping Variable: Groups			
b. Not corrected for ties.			

Range of Motion (ROM): No significant difference at BT, AT1, or AT2 (**p > 0.05**). Both therapies were effective in restoring joint mobility.Since p values > 0.05, the level of significance; there is no sufficient evidence to reject the null hypothesis.

DISCUSSION:

Effect of treatment on Pain (*Shoola*)

Both interventions demonstrate a significant reduction in pain in both groups, with comparatively better response in the *Marma Chikitsa* group (Group A) at the end of therapy (Table-4,5). The probable reason is the *Marma Chikitsa* acts gradually by balancing *vata* through activation of *Pranavaha srotas* whereas *Agnikarma* relieves *Vata* by *Swedana* and *Srotoshodhana*, which causes vasodilation, increases metabolic activity, and modulates local nociceptors .

Effect of treatment on Stiffness (*Stambha*)

Both interventions effectively showed significant reduction in stiffness, with superior relief seen in Group A (Table-6,7).

Marma Chikitsa, by stimulating specific *Marma points* such as *Ani*, *Janu Marma*, and *Indrabasti*, enhances *Rakta* and *Prana vaha srotas* flow, improving muscle tone and joint mobility over time. The *Ushna guna* of *Agnikarma* counters the *Sheeta guna* of *Vata* and *Kapha*, relieving stiffness immediately. Therefore, the stiffness-relieving effect of *Marma Chikitsa* is gradual, while *Agnikarma* provides faster results.

Effect of treatment on WOMAC score :

The WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) is a comprehensive parameter assessing pain, stiffness, and physical function.

Group B demonstrated higher percentage improvement compared to Group A (Table -8,9)This indicates that while both interventions significantly enhance the patient's quality of life. However, the *Marma Chikitsa* group reported fewer relapses at follow-up, suggesting longer sustainability of results.

Effect of treatment on Tenderness (*Sparsha Asahatva*)

Group A showed significant improvement in tenderness(Table-10,11) . In *Agnikarma*, heat application causes coagulation of pain mediators and increases local metabolism, leading to reduction in tenderness. *Marma Chikitsa*, by balancing *Vata* and enhancing local blood flow, gradually reduces tenderness through neuromuscular relaxation and endorphin modulation. Thus, the difference between groups was minimal at the end of treatment, indicating both methods effectively address localized hyperalgesia.

Effect of treatment on Range of Motion (ROM)

Group A showing clear functional restoration, Improvement in knee flexion and extension was significant in both groups [Table- 12,13]. The thermal effect of *Agnikarma* increases elasticity of soft tissues, and enhances functional capacity. *Marma Chikitsa* improves neuromuscular coordination and joint stability through restoration of flow of *Prana vata* and stimulation of *Majja dhatu*, which indirectly supports *Asthi dhatu* nourishment.

PROBABLE MODE OF ACTION OF MARMA CHIKITSA [15]:

Marma Chikitsa, through the gentle stimulation of *Marmas*(vital points) through pressure(mardana) helps in :

- Activation of *Prana vaha srotas* balances *Vata dosha* and removes *Srotorodha* (blockage), regulating *vata gati* and relieves *shoola* and *shotha*.
- It harmonizes *Vyana vayu* and *sleshaka kapha*, improving circulation and reduces pain, enhancing joint function.
- By stimulating *Marmas-Janu marma*, *Indrabasti marma*, *Ani marma*, allows free flow of *prana vata* and *rakta* relieving *Shoola* and *Stambha*.

Modern Correlation:

Marma points correspond anatomically to nerve plexuses, myofascial trigger zones, and vascular nodes. Their stimulation produces neurovascular and neuromuscular responses.

PROBABLE MODE OF ACTION OF AGNIKARMA [16]:

Agnikarma

- *Vata-Kapha Shamana*: Heat counters the *Sheeta Guna* (cold quality) of *Vata* and *Kapha*, relieving pain, stiffness of the joint.
- *Shoolahara* and *Stambhahara*: By the *Ushna* and *Tikshna* properties of Agni, *Srotas sanga* is relieved, and localized pain is reduced.
- *Vilayana Karma***:** The heat removes *Avarana* and *Vilayana* of accumulated *Kapha*, thus reducing stiffness.

Modern Correlation

1. **Thermotherapy Action:**
- Local heat application increases tissue temperature, causing vasodilatation, improved oxygenation, and metabolite clearance.
- Heat reduces nerve conduction velocity, thereby decreasing pain transmission.
2. **Analgesic Effect:**
- The heat stimulates thermal receptors, which compete with pain receptors for transmission, resulting in counter-irritation analgesia.
- Also triggers release of substance P and beta-endorphins, enhancing pain tolerance.
3. **Anti-inflammatory and Anti-spasmodic Effect:**
- Heat reduces muscle spasm, promotes synovial fluid secretion, and increases collagen elasticity, reducing stiffness.
- Enhances phagocytic activity and resorption of inflammatory exudates.
4. **Regenerative Effect:**
- Controlled heat stress activates heat shock proteins (HSPs) that protect chondrocytes from oxidative damage and enhance repair cartilage.

CONCLUSION:

Based on the conceptual analysis, clinical observations, and statistical evaluations made in this study, the following conclusions were drawn:

There is no statistically significant difference between Group A (*Marma Chikitsa*) and Group B (*Agnikarma*) in most of the assessment parameters at various time intervals (BT, AT and follow-up). However, at later assessment points, particularly in pain intensity (VAS) and functional ability (WOMAC Index), Group A exhibited faster improvement compared to Group B. Within-group analysis showed statistically significant improvement in all parameters in both groups.

Comparative analysis of the overall therapeutic effect indicates that both *Marma Chikitsa* and *Agnikarma* provide symptomatic relief and improvement in the management of *Janusandhigata Vata* (Knee Osteoarthritis).

The non-invasive approach and cost effectiveness makes it easier in routine clinical practices.

Limitations of this study:

Limitations of the study include a relatively small sample size and a short follow-up period. Future studies with larger cohorts and longer-term monitoring are recommended to validate these findings and explore sustained efficacy.

Scope: Future studies may be designed with stratification based on OA grading to enhance result accuracy.

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