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Case Report

Clinical pilot study evaluation of *avartana*-processed *Panchatikta guggulu ghrita matra basti* in *janusandhigatavata* (osteoarthritis of the knee): A case series of five patients

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Abstract

Background: Knee osteoarthritis is the commonest degenerative joint disorder and a leading contributor to years lived with disability in adults above sixty. In Ayurveda it is understood as *Janusandhigatavata*, a *Vatavyadhi* produced by *Dhatukshaya* and *Srotorodha* at the *Sandhi*. Contemporary care is largely symptomatic, is limited by gastrointestinal, renal and cardiovascular adverse effects, and ends in arthroplasty for advanced disease, so safer non-invasive options are needed. Aim: To document the clinical response of five patients of *Janusandhigatavata* to *Matra Basti* with *Sapta-Avartita* (seven times reprocessed) *Panchatikta Guggulu Ghrita*, and to relate the physicochemical changes produced by *Avartana* to the observed clinical outcome. Materials and methods: Five patients attending the *Panchakarma* outpatient department of Parul Institute of Ayurved, Vadodara, received *Matra Basti* of 40 ml of *Sapta-Avartita Panchatikta Guggulu Ghrita* once daily for eight consecutive days. Each *Basti* was preceded on the same morning by *Sarvanga Abhyanga* with *Mahanarayana Taila* and *Bashpa Sweda* with *Dashamula Kwatha*, and was administered within thirty minutes of a light midday meal. *Rasnadi Guggulu*, *Panchakola Churna* and *Shunthi-siddha Jala* were given orally. *Shoola*, *Sandhigraha*, *Vatapurna Drutisparsha*, *Prasarana-Akunchana Vedana* and *Sandhishotha* were graded 0-3 before treatment and on days 10, 16 and 25. The *ghrita* was analysed after each *Avartana* against Ayurvedic Pharmacopoeia of India methods. Results: Every patient improved on every parameter. The mean total symptom score fell from 6.8 to 1.0, a relief of 85.3 per cent (range 75-100 per cent). No adverse event occurred. Saponification value, viscosity, specific gravity and refractive index rose while acid value, iodine value and loss on drying fell after seven *Avartanas*. Conclusion: Forty millilitres of *Sapta-Avartita Panchatikta Guggulu Ghrita* given as *Matra Basti* produced consistent, well tolerated symptomatic relief in *Janusandhigatavata* and merits a controlled trial.

Keywords: *Avartana, Basti, Janusandhigatavata, Matra Basti,* Osteoarthritis, *Panchatikta Guggulu Ghrita*, *Sneha Kalpana*

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Introduction

Osteoarthritis is the most prevalent joint disease worldwide. The Global Burden of Disease study estimated that osteoarthritis affected close to 600 million people in 2020, with the knee the most frequently involved joint, and projected a further steep rise by 2050 driven by ageing and obesity.(1) The disease is now understood not as simple cartilage wear but as failure of the whole joint organ, involving subchondral bone, synovium, ligament and periarticular muscle, with low-grade inflammation contributing to pain and progression.(2) Current guideline-based management rests on exercise, weight reduction, topical and oral non-steroidal anti-inflammatory drugs and intra-articular injection, none of which alters structural progression; long-term pharmacotherapy carries gastrointestinal, renal and cardiovascular risk, and joint replacement remains the final option.(2,3) A safe, well tolerated and non-invasive alternative is therefore of practical value.

Ayurveda describes this presentation as *Janusandhigatavata*. Vitiated *Vata*, aggravated by *Dhatukshaya* of advancing age or by *Margavarana*, localises in the *Sandhi* and produces *Shoola*, *Sandhigraha*, *Vatapurna Drutisparsha* and *Prasarana-Akunchana Vedana*, with loss of *Shleshaka Kapha* and consequent loss of joint lubrication.(4,5) *Basti* is the treatment of choice in

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Vatavyadhi, being described as half of the whole of therapeutics; acting at the *Pakvashaya*, the principal seat of *Vata*, it regulates *Vata* systemically.(6) Among the *Sneha Basti* varieties, *Matra Basti* is given in the smallest unctuous dose, requires no strict dietary regimen, is stated to be free of complications, and is therefore suited to elderly and frail patients, in whom repeated *Niruha* may be poorly tolerated.(6,7)

Avartana is a classical pharmaceutical operation in which a prepared *Sneha* is repeatedly cooked with fresh *Kalka* and *Kwatha* of the same drugs, so that the lipid base is progressively enriched with the active principles of the herbs.(8,9) The operation raises the concentration of extracted constituents in a fixed volume of *Sneha*, and is the classical justification for using a smaller dose of an *Avartita Sneha* than of an ordinary one.(9) Reports on repeated *Avartana* suggest that seven cycles represent a practical optimum, beyond which the yield loss and time cost outweigh the gain in potency.(8,9)

Panchatikta Guggulu Ghrita is a classical polyherbal *Sneha Kalpana* containing the five bitter drugs *Nimba*, *Guduchi*, *Vasa*, *Patola* and *Kantakari* together with *Guggulu*, and is indicated in *Asthi-Sandhi-Majjagata Vata*.(4) Its use as *Matra Basti* in knee osteoarthritis has been reported, but always in the plain, single-*paka* form and generally at volumes of 60 ml or more.(5) To the best of our knowledge the clinical use of the *Sapta-Avartita* form of this *ghrita* as *Matra Basti* has not previously been reported. The present case series was undertaken to document the clinical response of five such patients and, in parallel, to record the physicochemical changes produced by the seven *Avartana* cycles, so that the pharmaceutical basis of the reduced dose could be stated explicitly rather than assumed.

Materials and Methods

Study design and setting. This was a single-arm, open-label, prospective case series of five consecutive patients of *Janusandhigatavata* attending the *Panchakarma* outpatient department of Parul Institute of Ayurved, Parul University, Vadodara.

Ethics and consent. Written informed consent was obtained from every patient in a language he or she understood, at the first outpatient visit, after the nature, duration and possible discomforts of the procedure had been explained, and before any screening investigation or treatment was begun. Separate written consent was taken for the publication of clinical and radiological data in anonymised form.

Patient selection. Patients of either sex, aged 30 to 70 years, presenting with the classical features of *Janusandhigatavata* with radiographically confirmed osteoarthritis of the knee and without gross deformity, were included. Patients with a history of significant knee trauma or fracture, inflammatory arthritis or other systemic inflammatory disease, and those with conditions contraindicating *Basti*, were not taken up. The complete presentation of each case is given in the section on case reports.

Assessment criteria

Five cardinal symptoms were graded on a four-point ordinal scale before treatment, on the eighth day, and at follow-up on the tenth, sixteenth and twenty-fifth day after completion of therapy.(5) The grading is given in Table 1. Operational definitions have been added for *Sandhishotha* so that the grades are reproducible.

Table 1: Symptom assessment criteria

Symptom	Grading	Score
Shoola (pain)	No pain	0
	Pain during walking	1
	Constant pain disturbing routine work	2
	Pain at rest	3
Sandhigraha (stiffness)	No stiffness	0
	Morning stiffness only	1
	Stiffness occurring later in the day	2
	Severe stiffness hampering daily activities	3
Vatapurna Drutisparsha (crepitus)	No crepitus	0
	Crepitus without pain or wincing	1
	Crepitus with pain and wincing of face	2
	Patient shouts or prevents complete flexion	3
Prasarana-Akunchana Vedana (pain on movement)	No pain on movement	0
	Pain without wincing of face	1
	Pain with wincing of face	2
	Patient shouts or prevents complete flexion	3
Sandhishotha (swelling)	No swelling: normal contour of both parapatellar hollows; bulge sign and patellar tap negative; suprapatellar girth equal to the opposite knee	0
	Slight swelling: medial parapatellar hollow obliterated; bulge sign positive, patellar tap negative; girth up to 1 cm more than the opposite knee; range of movement unaffected	1
	Moderate swelling: both parapatellar hollows full; patellar tap positive; girth 1 to 2 cm more than the opposite knee; terminal flexion mildly restricted	2
	Severe swelling: globular knee with loss of normal contour and tense effusion; patellar tap positive; girth more than 2 cm over the opposite knee; flexion markedly restricted	3

Suprapatellar girth was measured with a non-stretchable tape 10 cm above the upper pole of the patella with the knee extended, by the same observer throughout. Where both knees were affected, the girth of the less affected knee at the first visit was taken as the internal reference.

Radiological assessment

Plain digital radiographs of the affected knee were obtained in the standing weight-bearing antero-posterior and the non-weight-bearing lateral view, at the Department of Radiodiagnosis of the institute, before treatment and on the twenty-fifth day of follow-up. Films were reported by a radiologist blinded to the treatment schedule and were graded by the Kellgren and Lawrence system. (10) No computed tomography, magnetic resonance imaging or ultrasonography was performed.

Preparation of *Sapta-Avartita Panchatikta Guggulu Ghrita*

Panchatikta Guggulu Ghrita was prepared in the teaching pharmacy of the institute by the standard method of *Sneha Kalpana*, using *Kalka* and *Kwatha* of *Nimba* (*Azadirachta indica*

A. Juss.), *Guduchi* (*Tinospora cordifolia* (Willd.) Miers), *Patola* (*Trichosanthes dioica* Roxb.), *Vasa* (*Justicia adhatoda* L.) and *Kantakari* (*Solanum xanthocarpum* Schrad. and Wendl.) together with shodhita *Guggulu* (*Commiphora wightii* (Arn.) Bhandari), in the classical proportion of one part *Kalka*, four parts *Ghrita* and sixteen parts *Kwatha*.(11) The raw drugs were authenticated in the Department of *Dravyaguna* of the institute before use.

The *Prathama Paka* was carried out on a mild flame until the *Madhyama Sneha Siddhi Lakshanas* appeared, namely disappearance of froth and of the crackling sound, and the formation of a smooth *varti* when the *Kalka* was rolled between the fingers.(11) The *ghrita* was filtered while warm and the filtrate was used as the lipid base for the next cycle. Six further cycles were performed in the same way, each with a freshly prepared *Kalka* and *Kwatha* of the same drugs in the same proportion, giving seven cycles in all (*Sapta-Avartita*).(8,9) A representative sample was withdrawn after every cycle for physicochemical analysis. The finished product was dark golden, of characteristic odour, and appreciably thicker than the first *paka*, changes that are described classically as indicators of progressive potentiation.(9)

Physicochemical evaluation

Specific gravity, refractive index, viscosity, saponification value, acid value, iodine value, loss on drying and pH of a ten per cent aqueous dispersion were determined by the methods prescribed in the Ayurvedic Pharmacopoeia of India, Part II, Appendix 2, supplemented where necessary by the World Health Organization quality control methods for herbal materials.(12,13) Analyses were carried out in the Quality Control Laboratory of the institute; each value is the mean of three determinations.

There is no official pharmacopoeial monograph for *Avartita Panchatikta Guggulu Ghrita*, and none for the plain form of this *ghrita* either. Two comparators have therefore been used, as shown in Table 2. The first is the plain, single-*paka Panchatikta Guggulu Ghrita* prepared from the same batch of *Goghrita* and the same lots of raw drugs, which serves as the internal control against which the effect of *Avartana* is judged. The second is the pharmacopoeial specification for *Goghrita*, quoted only as an indicative external benchmark, since a medicated *ghrita* carries a substantial load of extracted non-lipid solids and cannot be expected to conform to the limits set for plain ghee.(12)

Table 2: Physicochemical parameters of plain and *Sapta- Avartita Panchatikta Guggulu Ghrita*, with reference values

Parameter	Plain PGG (internal control)	After 7th Avartana	Change (%)	Indicative reference for Goghrita (API/ FSSAI)	Interpretation
Specific gravity (40 °C)	0.912	0.938	2.8	0.910-0.920	Higher content of dissolved and dispersed solids
Refractive index (40 °C)	1.456	1.474	1.2	1.4520-1.4566	Denser lipid matrix with greater solute interaction
Viscosity (cP at 40 °C)	42.5	56.8	33.6	Not specified	Greater lipid-phytoconstituent association
Saponification value (mg KOH/ g)	188.2	203.6	8.1	220-241	Shift towards shorter-chain esters; value below the ghee range in both samples, attributable to the non-saponifiable extracted matter of the medicated ghrita
Acid value (mg KOH/g)	1.54	0.94	-38.9	Not more than 6.0	Both samples well within limit; lower value after Avartana indicates less free fatty acid and better stability
Iodine value (g I2/100 g)	35.8	28.3	-20.9	26-38	Both samples within range; fall indicates reduced unsaturation and improved oxidative stability
Loss on drying (%)	0.21	0.11	-47.6	Not more than 0.5	Both within limit; lower residual moisture after repeated paka
pH (10% dispersion)	5.8	5.3	-8.6	Not specified	Mildly acidic; compatible with the rectal mucosal pH range
PGG: *Panchatikta Guggulu Ghrita*; API: Ayurvedic Pharmacopoeia of India; FSSAI: Food Safety and Standards Authority of India. The reference column is indicative only and is not a pass or fail specification for a medicated *ghrita*					

Therapeutic intervention

The protocol was administered for eight consecutive days and is summarised in Table 3.

Table 3: Details of the therapeutic intervention

Component	Details
Purvakarma	*Sarvanga Abhyanga* with *Mahanarayana Taila* (approximately 100 ml, 30 minutes) followed by *Bashpa Sweda* with *Dashamula Kwatha* (15 minutes, to *Samyak Swinna Lakshana*), performed in the forenoon, before the midday meal
Pradhanakarma	*Matra Basti* with *Sapta-Avartita Panchatikta Guggulu Ghrita*
Dose	40 ml daily (rationale given below)
Kala (time of administration)	Once daily between 1.00 and 2.00 p.m., within 30 minutes of a light midday meal, at approximately the same hour for each patient on each day
Duration	8 consecutive days
Oral medication	*Rasnadi Guggulu* 2 tablets (500 mg each) twice daily after food; *Panchakola Churna* 2 g twice daily after food; *Shunthi-siddha Jala* 200 ml daily(5)
Follow-up	10th, 16th and 25th day after completion of therapy

Rationale for the dose of 40 ml

The reviewer's observation that *Matra Basti* is customarily given in a volume of about 60 ml is correct for the plain *Sneha*. Four considerations governed the reduction to 40 ml in the present series. First, *Matra Basti* is defined not by a fixed volume but by the *Hrasiyasi Sneha Matra*, the smallest unctuous dose, which the classics leave to be individualised according to *Agni*, *Koshtha*, *Bala*, *Vaya* and *Vyadhi*; a range rather than a single figure is therefore authorised.(6,7) Second, four of the five patients were above 55 years of age, two had *Mandagni* and one had *Malavibandha*, and in such patients a smaller unctuous volume reduces the risk of *Sneha Vyapat* such as *Adhmana*, *Aruchi* and *Atisara*. Third, and centrally, the *Sapta-Avartita* preparation carries the extracted principles of seven successive cycles in the same volume of lipid; dose reduction is the intended pharmaceutical consequence of *Avartana*, and the classical texts themselves state that an *Avartita Sneha* is to be used in a smaller *Matra*.(8,9) Fourth, a smaller volume is retained more readily, which reduces premature expulsion and lengthens the contact time of the *Sneha* with the rectal mucosa. The 40 ml volume was therefore chosen deliberately as a test of dose optimisation, and not for convenience.

Procedure of *Matra Basti*

Purvakarma: On each treatment day the patient reported in the forenoon in the fasting or light-breakfast state, and was asked to evacuate bowel and bladder. *Sarvanga Abhyanga* with lukewarm *Mahanarayana Taila* was performed for about 30 minutes, followed by *Bashpa Sweda* with *Dashamula Kwatha* until *Samyak Swinna Lakshanas* appeared. The patient then rested for about 30 minutes and was given a light, warm, moderately unctuous midday meal of a quantity less than his usual intake. After the meal the patient walked about 100 steps within the ward as mild ambulation. *Matra Basti* was then administered within 30 minutes of the meal.(6,7)

This ordering follows the classical injunction that *Snigdha Svinna* should precede *Basti*, and that *Anuvasana* and *Matra Basti* are given to one who has eaten, unlike *Niruha*, which is given on an empty stomach.(6,7) *Abhyanga* and *Sweda* liquefy and mobilise the *Doshas* and dilate the peripheral and rectal vasculature, while the postprandial state prevents the *Vayu* that is dominant in an empty *Pakvashaya* from expelling the *Sneha* immediately and reduces the risk of *Sneha Vyapat*. The brief ambulation after the meal aids gastric emptying and even distribution of the food, and is completed before, not after, the administration of the *Basti*. Physiologically, postprandial splanchnic vasodilatation and slowed rectal motility favour retention and absorption of a lipid vehicle, which is consistent with the modern pharmacokinetic account of rectal drug administration.(14)

***Pradhanakarma*:** The patient was placed in the left lateral position with the right lower limb flexed at hip and knee and drawn towards the abdomen and the left limb kept extended. Forty millilitres of *Sapta-Avartita Panchatikta Guggulu Ghrita* was warmed to body temperature in a water bath and loaded into a 100 ml sterile syringe fitted with a soft rubber catheter of size 8 to 10 Fr, and all air was expelled. The catheter tip and the anal orifice were lubricated. The catheter was introduced into the anal canal for 4 to 6 inches in the direction of the vertebral column and the *ghrita* was injected slowly and steadily over 30 to 60 seconds while the patient took slow deep breaths. The catheter was withdrawn gently at the end of injection.(6,7)

***Paschatkarma*:** The patient was made to lie supine with a pillow beneath the buttocks so that the pelvis was elevated by about 15 cm, and remained in this position for 10 to 15 minutes, after which he was allowed to sit up and move about while avoiding exertion, day sleep, suppression of natural urges and exposure to cold. The time of expulsion of the *Basti* was recorded on each day; in all five patients the *Sneha* was retained until the natural urge for defaecation, and no *Basti* was expelled prematurely. No specific dietary restriction was imposed, in keeping with the classical statement that *Matra Basti* is free of complications and does not demand a strict regimen.(6,7)

Case Reports

Case 1: A 61-year-old housewife presented with pain, stiffness and swelling of both knees of four years' duration, gradual in onset and progressive, aggravated by climbing stairs and by cold weather and partly relieved by rest and local warmth. There was no history of trauma, fall or fever, and no history of diabetes, hypertension or inflammatory joint disease. Her appetite was reduced, bowels were regular, and she reported disturbed sleep on account of night pain. On examination the pulse was 74 per minute and regular, the general condition fair. Both knees showed local tenderness, palpable crepitus and moderate periarticular swelling with fullness of both parapatellar hollows; terminal flexion was restricted and there was no deformity or instability. Routine haematological and biochemical investigations were within normal limits. Weight-bearing radiographs showed reduced intra-articular space with marginal osteophytes in both knees, Kellgren-Lawrence grade 3. Pre-treatment scores were *Shoola* 3, *Sandhigraha* 1, crepitus 1, pain on movement 1 and *Sandhishotha* 2, a total of 8.

Case 2: A 60-year-old male farmer presented with pain of both knees of two and a half years' duration with marked stiffness and swelling, worse on prolonged standing and squatting in the field. There was no history of trauma or fall and no systemic illness. Appetite, bowels and sleep were normal. The pulse was 79 per minute and regular. Both knees were tender with coarse crepitus and slight swelling; morning stiffness lasted about twenty minutes and stiffness recurred later in the day. Routine investigations were normal. Radiographs showed medial joint space narrowing with marked osteophyte formation, Kellgren-Lawrence grade 3. Pre-treatment scores were *Shoola* 1, *Sandhigraha* 2, crepitus 2, pain on movement 2 and *Sandhishotha* 1, a total of 8.

Case 3: A 55-year-old male carpenter presented with pain of the right knee of seven years' duration with mild stiffness and tenderness, aggravated by kneeling and by prolonged work in a squatting posture. There was no history of trauma or fall. His appetite was reduced; bowels and sleep were normal. The pulse was 74 per minute and regular. The right knee showed local tenderness and crepitus without swelling; movements were full but painful in the terminal range. Routine investigations were normal. Radiographs showed marked and asymmetrical narrowing of the joint space with osteophytes, Kellgren-Lawrence grade 3. Pre-treatment scores were *Shoola* 2, *Sandhigraha* 1, crepitus 1, pain on movement 1 and *Sandhishotha* 0, a total of 5.

Case 4: A 45-year-old male farmer presented with pain of the left knee of one year's duration with mild stiffness and tenderness, of insidious onset, aggravated by field work and relieved by rest. There was no history of trauma or fall and no systemic illness. Appetite, bowels and sleep were normal and the pulse was 78 per minute. The left knee showed tenderness with crepitus that was accompanied by wincing, and slight swelling with obliteration of

the medial parapatellar hollow. Routine investigations were normal. Radiographs showed mild osteoarthritic change with doubtful joint space narrowing and possible osteophytic lipping, Kellgren-Lawrence grade 1. Pre-treatment scores were *Shoola* 3, *Sandhigraha* 1, crepitus 2, pain on movement 1 and *Sandhishotha* 1, a total of 8.

Case 5: A 67-year-old male manual worker presented with pain of the right knee of one year's duration with mild stiffness and tenderness. There was no history of trauma or fall. He gave a history of *Malavibandha* of long standing; appetite and sleep were normal and the pulse was 80 per minute. The right knee showed tenderness, crepitus and slight swelling, with pain on terminal flexion. Routine investigations were normal. Radiographs showed moderate osteoarthritic change with definite osteophytes and possible joint space narrowing, Kellgren-Lawrence grade 2. Pre-treatment scores were *Shoola* 1, *Sandhigraha* 1, crepitus 1, pain on movement 1 and *Sandhishotha* 1, a total of 5.

Observations and Results

All five patients completed the eight days of therapy and attended all three follow-up visits. The symptom scores before and after treatment are given in Table 4.

Table 4: Symptom scores before and after treatment

Symptom	C1 BT	C1 AT	C2 BT	C2 AT	C3 BT	C3 AT	C4 BT	C4 AT	C5 BT	C5 AT
Shoola	3	1	1	0	2	1	3	1	1	0
Sandhigraha	1	0	2	1	1	0	1	0	1	0
Crepitus	1	0	2	0	1	0	2	0	1	0
Pain on movement	1	0	2	1	1	0	1	0	1	0
Sandhishotha	2	0	1	0	0	0	1	0	1	0
Total score	**8**	**1**	**8**	**2**	**5**	**1**	**8**	**1**	**5**	**0**
Relief (%)	**87.5**		**75.0**		**80.0**		**87.5**		**100**	
BT: before treatment; AT: after treatment; C1 to C5: Case 1 to Case 5.										

Table 5: Radiological findings before and after treatment

Case	Before treatment	After treatment (day 25)
1	Reduced intra-articular space with marginal osteophytes, both knees	No change in bony architecture; slight reduction in periarticular soft tissue shadow
2	Medial joint space narrowing with marked osteophyte formation	No change in bony architecture; reduced soft tissue swelling
3	Marked, asymmetrical joint space narrowing with osteophytes	No radiological change; clinical improvement only
4	Mild osteoarthritis with joint space narrowing and osteophytic lipping	No definite change; joint space clarity marginally better
5	Moderate osteoarthritis with definite osteophytes and possible joint space narrowing	No radiological change; clinical improvement only

The mean total symptom score fell from 6.8 before treatment to 1.0 after treatment, a mean relief of 85.3 per cent, with individual relief ranging from 75 to 100 per cent. Crepitus and *Sandhishotha* resolved completely in every patient in whom they were present at the outset. *Shoola* and *Sandhigraha*, the two cardinal features, showed the largest absolute reduction; residual grade 1 *Shoola* persisted in three patients at the twenty-fifth day, and residual grade 1 *Sandhigraha* in one. The gains recorded on the eighth day were maintained at the tenth, sixteenth and twenty-fifth day of follow-up in all five patients. No patient reported abdominal distension, loose stools, anorexia, anal discomfort, bleeding or any other adverse effect, and no *Basti* was expelled prematurely.

Structural change in osteoarthritis evolves over months to years, and no radiological improvement was expected over a treatment period of eight days with twenty-five days of follow-up.(2,10) The radiographs are therefore reported only to document that no deterioration occurred and that the improvement recorded was clinical. The apparent changes in soft tissue shadow in cases 1 and 2 are consistent with the resolution of periarticular swelling recorded clinically, and should not be read as structural repair.

Discussion

The five patients in this series improved consistently on all five symptom parameters within eight days of *Matra Basti*, with a mean relief of 85.3 per cent that was sustained through twenty-five days of follow-up, and without a single adverse event. Three features of the observation call for discussion: the choice of *Basti* as the mode of delivery, the pharmaceutical effect of *Avartana* and its relation to the reduced dose, and the actions of the constituent drugs.

The pathogenesis of *Sandhigatavata* is governed by *Vata Prakopa* on a background of *Dhatukshaya*, which in the elderly is physiological and progressive.(4,5) Treatment must therefore both pacify *Vata* and nourish the depleted *Dhatus*, and a purely *Shamana* approach is insufficient. *Basti* answers both requirements: acting at the *Pakvashaya*, the seat of *Vata*, it regulates *Vata* throughout the body, while a *Sneha* vehicle supplies the *Snigdha* and *Guru* qualities that oppose the *Ruksha* and *Laghu* qualities of vitiated *Vata* and restore *Shleshaka Kapha* at the joint.(4,6) In modern terms, the rectum offers a large absorptive surface with rich venous and lymphatic drainage, and lipid vehicles administered rectally are absorbed substantially by the lymphatic route, partially avoiding hepatic first-pass metabolism.(14) This provides a plausible physiological account of how a small volume of a medicated lipid delivered rectally can produce systemic effect.

Pharmaceutical potentiation and dose optimisation

The analytical data in Table 2 give an objective account of what *Avartana* does to the vehicle. The rise in specific gravity, refractive index and viscosity indicates a denser lipid matrix

carrying a larger load of extracted solutes, which is the expected result of seven successive extractions into the same volume of *ghrita*.(8,9) The rise in saponification value indicates a shift of the ester profile towards shorter-chain fatty acids, which are more readily emulsified and absorbed. The fall in acid value and iodine value indicates a lower free fatty acid content and reduced unsaturation, and therefore better resistance to oxidative rancidity, a quality attribute of practical importance in a *Sneha* that is stored and reused. The fall in loss on drying confirms progressive removal of the aqueous phase, which is the classical endpoint of *Sneha Paka* itself.

Conceptually, a lipid matrix of increased viscosity carrying a raised concentration of both lipid-soluble and water-soluble extractives is analogous to the lipid-based delivery systems of contemporary pharmaceutics, in which a drug is presented in a lipid vehicle that improves solubilisation and lymphatic uptake. (15) This analogy should be stated with restraint. The present study did not measure droplet size, self-emulsification time, dissolution or plasma concentration, and the physicochemical data alone do not establish that *Sapta-Avartita ghrita* behaves as a self-emulsifying or nanolipid carrier system. What the data do support is the narrower and sufficient claim that seven *Avartanas* produce a measurably more concentrated and more oxidatively stable vehicle, which is the pharmaceutical premise on which the reduced dose of 40 ml was chosen. The clinical result is consistent with that premise, since earlier reports of plain *Panchatikta Guggulu Ghrita Matra Basti* have used 60 to 80 ml, whereas comparable symptomatic relief was obtained here at 40 ml over eight days.(5) A direct comparison is not warranted, because the assessment scales, treatment durations and patient populations of those reports differ from the present one; the observation is offered as a hypothesis for a controlled comparison of *Avartita* against plain *ghrita* at equal and at reduced volumes.

Actions of the constituent drugs

Guggulu has been evaluated clinically in knee osteoarthritis, with reduction in pain and improvement in function attributed to inhibition of inflammatory signalling.(16) *Nimba* has well characterised anti-inflammatory activity; nimbidin suppresses macrophage and neutrophil function, which is relevant to the low-grade synovial inflammation of osteoarthritis.(17,18) *Guduchi* has been shown in experimental arthritis to inhibit interleukin-1 beta, tumour necrosis factor alpha, interleukin-6 and interleukin-17 and to reduce bone and cartilage damage, which addresses the degenerative as well as the inflammatory component.(19) *Vasa* contains vasicine and related alkaloids with documented anti-inflammatory and analgesic activity.(20) A whole-formulation Ayurvedic regimen has been shown in a randomised, double-blind, controlled equivalence trial to be comparable to glucosamine and celecoxib in symptomatic knee osteoarthritis, which supports the plausibility of the clinical effect observed here. (21) In *Ayurvedic* terms, the *Tikta* and *Katu Rasa* of the *Panchatikta* group act as *Ama-pachana* and *Shothahara*, *Guggulu* acts on *Asthi* and *Majja Dhatu* and checks further degeneration, and the *ghrita* base supplies *Snehana* and restores joint lubrication.(4,5)

Limitations

This is an uncontrolled case series of five patients, and the design cannot exclude natural fluctuation of symptoms, regression to the mean, the effect of the concurrent oral medication and of *Abhyanga* and *Sweda*, or the expectation effect of an intensive daily therapy.

Conclusion

Matra Basti with 40 ml of *Sapta-Avartita Panchatikta Guggulu Ghrita*, given for eight consecutive days with *Sarvanga Abhyanga* and *Bashpa Sweda* as *Purvakarma*, produced consistent and well tolerated symptomatic relief in all five patients of *Janusandhigatavata*, with a mean relief of 85.3 per cent sustained to the twenty-fifth day and no adverse effect. Physicochemical analysis showed that seven *Avartanas* yield a more concentrated and more oxidatively stable *ghrita*, which provides the pharmaceutical rationale for the reduced volume. These observations are preliminary and hypothesis-generating. A randomised controlled trial comparing *Avartita* with plain *Panchatikta Guggulu Ghrita* at equal and at reduced volumes, using a validated outcome instrument and a longer follow-up, is required before any claim of superior potency can be made, and would also allow the optimum number of *Avartana* cycles to be defined.

Declarations

Patient consent: written informed consent for treatment and for anonymised publication of clinical and radiological data was obtained from all five patients. **Source of funding:** nil. **Conflict of interest:** none declared. **Author contributions:** KP conceived the study, supervised the preparation of the formulation, treated and assessed the patients and drafted the manuscript and revised the manuscript critically for intellectual content and to revision of the manuscript; SHT supervised the work; NR contributed to case assessment. All authors read and approved the final version.

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