



Research Article

Exploring the potential of Ayurvedic intervention in Tuberculous Arthritis integrated with Anti-Tubercular therapy: A case study

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Abstract

Introduction: Tuberculous Arthritis is an extra-pulmonary manifestation of Tuberculosis infection seen in about 1-3% in infected patients. Success management of one such TB arthritis case with ayurveda has been meticulously detailed in this study. **Methodology:** This is a case study of 50-year-old female diagnosed with Tuberculous Arthritis of the right knee, concurrently undergoing anti-tubercular therapy. A tailored Ayurvedic intervention, encompassing specific internal medicines such as *Kashayam*, *Vati*, and *Rasa Aushadhi*, alongside targeted external therapies such as *Lepam*, *Dhara*, *Swedana*, and *Vasti* were employed. **Results and Discussion:** This case has been perceived in the lights of *Amavata* in Ayurveda and treated accordingly which yielded a significant reduction in *Shoola* and *Shotha*, coupled with notable functional improvements evidenced by objective assessments and enhanced mobility. This case greatly portrays the promising yet undiscovered curative potential of Ayurvedic system of medicine when integrated with modern medicine in complex conditions. This is a single case study aimed at understanding and approaching TB arthritis in Ayurveda. **Conclusion:** By addressing the underlying *Ama* and *Vata Vikruti* through principles of *Amavata Chikitsa*, this case highlights Ayurveda's potential to provide symptomatic relief and improve the quality of life in individuals with this challenging condition.

Keywords: *Amavata*, Anti-tubercular therapy, *Ayurveda*, Extra-pulmonary tuberculosis, Infective arthritis, Integrative medicine.

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Introduction

Tuberculosis, an infection caused by *Mycobacterium tuberculosis*, is listed as the top infectious killer according to World Health Organisation as about 1.5 million affected people succumb to it annually(1). It is also one of the oldest diseases to be recorded in the history. Tuberculosis (TB) is an air-borne infectious condition which spreads through air from one person to another by transferring tiny droplet nuclei from the affected to otherwise healthy person. These M.tuberculosis containing droplets can also sustain in the environment for several hours depending on the

environment(2). Though the primary site of infection is lung, these bacteria can also affect other parts or organs in the body such as lymph nodes, pleura, genito-urinary tract, skeleton, meninges, pericardium and Gastro-intestinal tract(3). Musculoskeletal system is the 4th most common site of extra-pulmonary TB with a prevalence of 1-3% of total TB infected cases spreading through haematogenous involvement. The lower bound estimate for Global prevalence of latent musculo-skeletal involvement of TB infection is about 19-38 millions. It has been known to commonly affect the weight bearing joints such as ankles, knees and hip(4). It progresses slowly and the prominent feature would be pain with swelling which is due to hypertrophy of synovium and joint effusion. Pain can be so severe that it leads to immobilization of the affected joint. The likelihood of suspicion of tuberculosis as a causative factor in mono-articular arthritis is significantly low hence diagnosis maybe delayed. In 1933, Phemister and Hatcher described the radiological features of tuberculous arthritis as Juxta-articular osteoporosis, Peripheral

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osseous erosion, Gradual narrowing of joint space. The drug regimen prescribed for pulmonary tuberculosis is appropriate for any extra-pulmonary tuberculous manifestation(5). The prognosis of Tuberculous arthritis is good when generally detected early but can progress to worsen with delay in diagnosis whereas prognosis is extremely good when integrated with ayurvedic intervention. This condition has been perceived in the lights of *Amavata* in ayurveda. *Amavata* is a condition in which the undigested *Ama* (Undigested metabolic toxins) gets stagnant over the joints due to the movement of *Vata* (one of the three basic elements in body) resulting in the manifestation of *Angarmarda* (Bodypain), *Aruchi* (loss of taste), *Trshna* (thirst), *Alasya* (lassitude), *Gauravam* (body heaviness), *Jwara* (fever), *Avipaka* (improper digestion) and *Shunata* (Instability/ weakness) of *Anga* (joints). The treatment approach in an *Amavata* case is to administer *Langhana* (lightening) therapies followed by *Swedana* (sudation) and *Deepana* (kindling digestive fire) drugs with *Tikta* (bitter taste) and *Katu Rasa* (pungent taste)(6) and the same has been followed in the this case as well. This case report has been articulated in an aim to showcase the potential of Ayurvedic intervention in successful management of TB arthritis when integrated with Anti-tubercular therapy. Given the scarcity of documented evidence on successful Ayurvedic approaches to Tuberculous arthritis, this case study seeks to offer valuable insights. By detailing the diagnostic process, therapeutic interventions, and observed outcomes, this report aims to provide the medical community with a fresh perspective and contribute to the search for effective strategies in managing this challenging condition.

Pathophysiology of Tuberculosis Arthritis

Bone and Joint TB is usually due to re-activation of dormant tuberculosis bacteria, often many years after primary infection and it is more common in adults than children or young adults.

Under favourable conditions such as immune-compromised state or Local joint trauma, the bacteria can be triggered which then travels via bloodstream or sometimes through lymphatic drainage (uncommon) and afflict the epiphysis of the bones especially in long bones as epiphysis of bones have the most rich blood in the body. This leads to initiation of inflammatory cascade of events in the synovium due to invasion of bacilli which causes granulation tissue formation which ultimately progress to erode the bones, cartilages and loss of minerals in the bone(7,8). In most cases of monoarticular TB arthritis involving knee joint, the pain would be insidious and associated with swelling in some while few of them might have stiffness along with pain which could result in restricted knee joint flexion and extension(9). Articular infection by *M. tuberculosis* can occur without manifestation of other features of active tuberculosis(10).

Pathophysiology of Amavata

When a patient indulges in *Viruddha Ahara* (incompatible foods) and *Vihara* (incompatible lifestyle), it invariably deranges the *Agni* (digestive fire), leading to *Agni Mandhya* (impaired digestion and metabolism) and the consequent formation of *Ama* (undigested metabolic toxins). Should the patient continue with *Vatakara Ahara* and *Vihara* (diet and regimens which further vitiate *Vata*) in the presence of this *Ama* (undigested metabolic toxins), the aggravated *Saama Vayu* (*Vata* vitiated by the metabolic wastes) propels this *Ama*(undigested metabolic toxins) and lodges it within the *Kapha Sthana* (sites of *Kapha*)(11). This localization manifests as symptoms like *Sandhi Shoola* (joint pain) and *Sandhi Stabdha* (joint stiffness), *Sandhi Sparshasahyata* (joint tenderness/hypersensitivity to touch). Simultaneously, the *Rasa Dhatu* (circulatory fluid matrix) undergoes vitiation, giving

rise to *Rasavaha Srota Dushti Lakshanas* (clinical signs of nutrient-transport system) such as *Shotha* (swelling/oedema) and *Dourbalya* (generalised weakness/debility).

Case History

50 years aged female, with familial history of tuberculosis (Father and cousin), presented with complaints of aggravated pain and swelling causing to restrict movement over right knee joint since 3 months. Patient had a history of fall 2 years prior, since then she has been experiencing intermittent pain over right knee joint. 3 months back, the pain got worsened and she resorted to conventional medicine. Initially she was suspected with ligament injury, for which she opted various folklore therapies. On non subsidence of pain, she was advised to take knee joint X-ray and other laboratory workups which were suggestive of Tuberculous arthritis (Positive AFB and Montoux test with presence of phemister triad in X-ray). Patient is on Anti-Tubercular medications such as Rifampicin (150mg), Isoniazid (75mg), Ethambutol (275mg), Pyrazinamide (750mg) along with T. Rantidine, Domeperidone, Ibuprofen, Vit B complex since 12th February 2025. As the knee pain and swelling were persistent, patient had approached our OPD on 18th February 2025. On examination, warmth and tenderness (Grade 3) over right knee joint was elicited along with swelling over right knee associated with varicosity of greater saphenous vein were seen in both the lower limbs. Pain increased on extension, flexion as well as circumduction. The patient was initially prescribed with following medicines for a period of 1 week- *Amruthotharam Kashayam* – 10ml along with *Mustadi marma Kashayam* – 10ml twice a day before food, Tab. *Chandraprabha Vati* (500mg) – 1 tablet and Tab. *Vatagajankusa Ras* (125mg) – 1 tablet twice a day after food.

On 25th February, Patient had revisited our OPD after 1 week of medications. Patient felt mild relief with swelling of right knee and for further betterment she was admitted in our IPD. During the course of patient's stay at the hospital, patient had intermittent fever along with chills, bitter taste in mouth and generalised myalgia. Patient was under Anti-tubercular drug therapy throughout the course of ayurvedic treatment.

Clinical findings

Personal History

Upon interrogation, the patient reports a mixed diet but experiences poor appetite due to a persistent bitter taste in their mouth, significantly reducing her desire to eat. Sleep is notably disturbed by pain, with the patient barely managing half an hour of sleep at night and experiencing no sleep during the daytime. Bowel habits indicate chronic constipation, with the patient passing stool only once every two days for the past 5 to 6 years. During the course of treatment, patient had complained of burning defecation which then subsided on medications. In contrast, micturition is reported as regular and without any associated pain, itching, or burning sensations. The urine is pale yellow in color, and the frequency of urination is approximately 5 to 6 times per day. The patient's psychosocial history was normal, with no indications of significant stressors, mental health concerns, or social difficulties.

General examination

On general examination, the patient's blood pressure was recorded at 110/80 mmHg. The heart rate was measured at 99 beats per minute, while the pulse rate was 96 beats per minute. The respiratory rate was observed to be 17 breaths per minute. The

patient's height was measured at 155 cm, and their weight was 48 kg, resulting in a Body Mass Index (BMI) of 20.

Dasavidha pariksha

- *Prakruti: Vata-Pitta*
- *Vikruthi: Doshas- Kapha and Vata, Dhatus - Rasa, Raktha, Mamsa, and Asthi.*
- *Sara: Madhyama Sara*
- *Samhana: Madhyama*
- *Pramana: Madhyama*
- *Satmya: Dvirasa (Katu and Amla)*
- *Satwam: Madhyama*
- *Vaya: Madhyama*
- *Ahara Shakthi: Avara*
- *Vyayama Shakthi: Avara.*

Ashtasthana Pariksha

- *Nadi: Vata-Pitta*
- *Mutram: Prabhoota*
- *Malam: Nirama*
- *Jihwa: Lipta*
- *Shabda: Spashta*
- *Sparsha: Ushna*
- *Drik: Prakrita*
- *Akruthi: Madhyama*

KNEE JOINT EXAMINATION

Knee joint examination of the patient before the commencement of the treatment was carried out and the findings are as mentioned in Table 1 and the blood tests were as mentioned in Table 2.

Table 1: Findings of knee joint examination

Parameters	Right	Left
Pain	Present	Absent
Tenderness	Present	Absent
Oedema	Present	Absent
Temperature	Present	Absent
Redness	Present	Absent
Flexion	20 degree	90 degree
Extension	0 degree	0 degree
McMurray's test	Positive (Lateral) Negative (Medial)	Negative (Lateral) Negative (Medial)
Stroke Test	1	0

Laboratory investigations

Table 2: Blood investigations

Hb – 12.9 % g/dL	Neutrophils – 71.1 %
Total RBC count – 4.38 million/cu.m	Eosinophil – 0.6 %
PCV – 38.5 %	Basophil – 0.1 %
M.C.V – 87.8 fl	Lymphocyte – 25.2 %
M.C.H – 29.5 pg	Monocyte – 3.0 %
M.C.H.C – 33.6 g/ dL	CRP – 26.1 mg/dL
E.S.R – 75 mm/hr	RA factor - 5.6 IU/ml

Platelet count – 3 lakhs/ cu.m	ASO titre – 107.8 IU/ml
Tuberculin Skin Test - Positive	

Figure 1: Tuberculin Skin Test on day 1



Figure 2: After 48 hours of tuberculin injection (showing an induration of 22mm leading to positive TST)



Figure 3: Tuberculin Skin Test results revealing positive TST with 22mm induration and volume of 0.1ml



Figure 4: Negative Sputum Test report



Radiological investigations

Findings in right knee joint X-RAY (04/02/25): Juxta-articular osteoporosis, Peripheral osseous erosion, Gradual narrowing of joint space were seen

Findings in MRI of right knee joint (07/02/25): Minimal joint effusion with synovial thickening, Mucoid degeneration of ACL, Oblique tear of anterior horn of lateral meniscus with extrusion.

Assessment scales

Before treatment (25/02/25):

• SF-36 Questionnaire – 78/100

Short Form-36 Health Survey (SF-36):

Health-related quality of life was assessed using the 36-Item Short Form Health Survey (SF-36), a widely used and validated questionnaire. It evaluates eight dimensions of health, including physical functioning, physical and emotional role limitations, bodily pain, general health, vitality, social functioning, and mental well-being. Scores for each domain are converted to a scale of 0–100, with higher scores indicating better perceived health and quality of life.

• New Oxford Knee score questionnaire – 11/48

Knee pain and functional status were evaluated using the Oxford Knee Score (OKS), a validated patient-reported questionnaire consisting of 12 items related to pain and activities of daily living. Each item is scored on a 5-point scale (0–4), giving a total score ranging from 0 to 48. Higher scores reflect better knee function and less pain, whereas lower scores indicate greater disability.

• **Visual Analogue Scale for knee pain – 8/10**

Pain severity was measured using the Visual Analogue Scale (VAS), a simple and reliable tool for assessing subjective pain

intensity. Patients rate their pain on a 10-cm scale, where 0 indicates no pain and 10 represents the worst pain imaginable.

• **Swelling over right knee joint – Severe**

• **Tenderness over right knee joint – Grade 3**

Therapeutic interventions:

Internal medications given in this patient are mentioned in Table 3.

Table 3: Internal medication given with dosage & remarks

17/02/25 to 01/03/25	<i>Amruthothara Kashayam + Mustadi Marma Kashayam</i>	10ml each <i>Kashayam</i> with 45ml warm water – Morning & Night – Before food	Swelling and pain reduced significantly
17/02/25 to 01/03/25	Tab. <i>Chandraprabhavati</i> (250mg)	1 tablet at morning and night – Before food	Occasional lower abdomen pain, constipation and burning defecation improved.
17/02/25 to 10/03/25	Tab. <i>Vatagajankusa Ras</i> (250mg)	1 tablet at morning and night – After food	Betterment in knee joint pain
28/02/25 to 01/03/25	Tab. <i>Dhanwantara gulika</i> (125mg)	2 tablets at morning and night – as lozenges – After food	For complaints of epigastric pain which then subsided on taking this tablet
01/03/25 to 10/03/25	<i>Mahamanjistadi Kashayam</i>	15ml with 45ml luke warm water - Morning & Night – Before food	Occasional lower abdomen pain and burning defecation improved.
01/03/25 to 10/03/25	<i>Sudarshana Churna</i> tablets (500mg)	2 tablets - Morning & Night – After food	Intermittent fever subsided

External therapies administered are as mentioned in Table 4.

Table 4: External therapies administered with remarks

25/02/25 to 10/03/25	<i>Lepa</i> (over right knee)	<i>Nagaradi Churnam</i> with rice boiled water	Reduction in swelling was evident
25/02/25 to 04/03/25	<i>Dhara</i> (Full body)	<i>Dhanyamla</i>	Reduction of inflammatory signs over knee joint and swelling.
03/03/25 to 07/03/25	<i>Valuka Swedana</i> (Full body)		Reduction in swelling
07/03/25 to 09/03/25	<i>Matra Vasti</i>	<i>Balaguduchyadi Tailam</i> (50ml)	Knee pain was reduced by 40%

Case History Timeline

Table 5: Timeline of the case report

Date / Period	Clinical event
2000	History of exposure through close contact with a tuberculosis-affected family member (father's cousin brother).
2023	Patient sustained a fall from stairs
December 2024	Knee pain began to worsen progressively
January 2025	Sought contemporary (allopathic) medical treatment for persistent knee pain
02 January 2025	Revisited the allopathic hospital and was advised to undergo radiographic investigations
04 January 2025	X-ray of the right knee revealed features suggestive of Phemister's triad
07 January 2025	MRI of the right knee demonstrated minimal joint effusion with synovial thickening
13 January 2025	Diagnosed with tuberculous arthritis of the right knee (extra-pulmonary tuberculosis)
14 January 2025	Anti-tubercular therapy (ATT) was initiated at Government Hospital, Nagapattinam
18 January 2025	Despite ongoing medications, knee pain worsened; patient subsequently approached SJSACH OPD for Ayurvedic management.
25 January 2025	Admitted to the inpatient department (IPD) of SJSACH
10 March 2025	Discharged after completion of 14 days of inpatient treatment

Figures 5, 6: Nagaradi Churna Lepa over right knee**Outcome measures****Table 6: Comparison of before and after assessment**

	Before treatment	After treatment
SF-36	78/100	49/100
New Oxford Knee	11/48	31/48
Stroke Test	1	0
Pain (Visual	8/10	4/10
Swelling	Severe	Mild
Tenderness	Grade 3	Grade 0

Following the intervention, the patient demonstrated marked alleviation of knee joint pain and a significant diminution of effusion in the right knee joint. Palpatory tenderness decreased from grade III to grade I. Concomitant improvements were observed across the assessment scales which were used in this case. The patient reported that she was able to walk for approximately 70-90 meters without inciting pain or functional limitation post-treatment. However, prolonged standing beyond 30 minutes elicited discomfort. Furthermore, a notable improvement in the range of motion of the affected knee joint was evident.

Figure 8: Both the knees (Before treatment)	Figure 9: Lateral aspect of right knee before treatment	Figure 10: Right knee before treatment
		
Figure 11: After treatment (10/03/25)	Figure 12: After treatment (10/03/25)	Figure 13: After treatment (10/03/25)
		

Follow-up

Since the patient was residing in a village that is 300km away from the hospital, it was difficult for her physically and financially to come in person for follow up hence 1st follow up was done via telephonic conversation in which she had mentioned that she was able to flex and extend the knee without much pain and that her appetite and bowel has improved and regular. However a mild pain persists on climbing the stairs or with prolonged standing for more than 30-40 minutes. Swelling or stiffness has been completely resolved and didn't reoccur.

Intervention adherence and tolerability

Patient adhered to the instructions of the consultant and had the medicines in prescribed dose and timing. She had co-operated well with no complaints regarding the external therapies. However, in spite of repeated advice from consultant about the food intake, patient couldn't tolerate bland food diet that was provided at the hospital so did not have much of solid food intake.

Adverse and unanticipated events

Though there were no adverse events observed as such, unanticipated recurring episodes of intermittent fever was seen in this case which subsided on switching to appropriate medications.

Discussion**Discussion on Pathogenesis in this case**

The mycobacterium will lie dormant for a long time after initial infection, when a favourable condition avails, the pathogen will get reactivated and causes re-infection. In this case, the patient had been exposed to and been in contact with her father (who was having an active infection) in her earlier years and that infection could have been reactivated now owing to conducive situations such as *Viruddha Ahara* and *Vihara* which we can take infer as the presence of *Ama* and simultaneous vitiation of *Vata* through the activities. Though the prime site of infection remains lungs in tuberculosis, it can infiltrate into lymphatic system and spread to various other parts of the body, in this case it has spread to Knee Joints. This can be understood in ayurveda as the vitiated *Vayu* carrying the *Ama* through *Rasavaha Srotas* and lodging in *Kapha Sthana* (*Sandhi*) thereby producing the classical features of *Amavata*.

Discussion on Ayurvedic diagnosis

Considering the patient's two-month history of diminished appetite, progressive weakening since the onset of pain, concurrent constipation, and a sensation of heaviness localized in the knee joint, a strong likelihood of *Ama* formation and its systemic involvement, with a pronounced lodgment in one of the *Kapha Sthana* (in this case- the knee joint), emerges. This localization manifests as severe knee pain, accompanied by swelling in the knee region. Furthermore, the patient reports generalized body aches and a marked disinclination towards food. Based on this constellation of symptoms, a diagnosis consistent with *Amavata*, as understood in Ayurveda, was ascertained.

Discussion on treatment principle

The treatment protocol consists of two phases- first phase is to clear out the accumulated *Ama* and next is to tackle the vitiated *Vata Dosha*. The first line of management in *Amavata* is

Langhana therapy to facilitate the process of *Ama Pachana* and to correct the *Mandagni* with *Tiktha* or *Katu Deepana-Pachana Dravyas*. External therapies such as *Swedana* (*Ruksha/ Ruksha-Snigdha*), *Lepana* and/or *Seka* with *Ruksha Dravyas*. *Shodhana* therapies such as *Virechana* can also be carried out to eliminate the *Ama* out of the body. *Vasti* such as *Kshara Vasti*, *Vaitarana Vasti* can also be used in these conditions. Generally, *Sneha* is contra-indicated in *Amaja Avastha* but in *Bhaishajya Ratnavali Amavata Chikitsa*, it has been mentioned that *Snehavasti* can be administered with addition of *Saindhava Lavana*. However in this case, the patient was too weak to carry out *Kshara/Vaitarana Vasti* hence *Matravasti* was administered.

After the ascertainment of *Amapachana*, general *Vatahara* treatments can be employed. *Abhyanga*, *Nadi sweda*, *Patrapottali Sweda*, *Taila Dhara* and *Shashtika Shali Pinda Sweda* are usually given in any *Vata Vikaras*. The application of *Brihmana* therapy should utilize a progressively increasing potency of its inherent *Brihmana guna*.

However, in this case, Extensive external *Brihmana* therapy were not given as per the framed treatment protocol as patient was discharged sooner than anticipated. Since the patient's main concern was severe pain, swelling and stiffness, the first line of treatment was sufficient to address those concerns.

Discussion on internal medications

Amruthotharam Kashayam contains of *Nagara*, *Amruta* and *Haritaki* in 2,4 and 6 parts respectively. As it has *Amapachana* property, it helps in *Pachana* of *Ama* and has *Shothahara* property which facilitates in resolving the inflammation. Notably, *Guduchi* exhibits significant antimicrobial, anti-inflammatory, anti-arthritic, and immunomodulatory activities. Similarly, *Ardra* and *Haritaki* possess antimicrobial and anti-inflammatory, and antimicrobial, anti-inflammatory, and anti-arthritic properties, respectively. Given the patient's presenting symptoms of intermittent pyrexia with rigors, dysgeusia, and generalized myalgia, the administration of *Amruthotharam Kashayam* was deemed appropriate, aligning with its traditional therapeutic application in various types of *Jwara*, particularly considering its predominantly immunomodulatory constituents which may enhance the host's response to infection(12,13,14).

Mustadi Marma Kashaya was selected to address the *Marma Abhigata* affecting the *Janu Marma*. As *Janu Marma* is a *Sandhi Marma* and *Vaikalyakara Marma* (vital point whose injury can cause deformity), trauma to this site carries the potential for inducing structural or functional impairments. This formulation is generally used in case of any *Marma Abhigata* and yields benefit even in *Ama Avastha* pertaining to its *Deepana* and *Pachana* nature of most of the drugs present in it. Owing to the presence of *Musta*, *Bala*, *Rasna*, *Sunthi*, this formulation is known to have potent anti-inflammatory and analgesics property. Some ingredients, such as *Nimba* and *Kutaja*, possess antimicrobial properties which could be of use to a certain extend in this case.

Dhanwantara Gulika: Based on the patient's report, a two-day course of *Dhanwantaram Gutika* lozenges effectively alleviated epigastric pain. Considering the formulation's constituents, including *Ela*, *Ardra*, *Haritaki*, *Jati*, *Bruhati*, *Kiratatiktha*, *Jeeraka*, *Kankola*, *Bhunimba*, *Rudraksha*, *Devadaru*, *Karpoora*, and *Karigrudha*, which are processed with *Jeeraka Kashaya* and *Chandhana Kashayam*, the observed pain relief can be attributed to its inherent *Kapha-Vatahara*, *Deepana*, *Pachana*, *Srotoshodaka*, and *Vatanulomana* properties. Furthermore, the

anti-inflammatory efficacy of this formulation, particularly within the gastrointestinal system, has been substantiated through preclinical animal studies(15).

Mahamanjishthadi Kashaya drugs are classified under *Kandughna*, *Varnya*, *Deepaniya*, *Dahaprashamana*, and *Vayasthapana Mahakashayas*. This formulation exhibits a dominant *Tikta Rasa* and *Sheeta Virya*, rendering it a potent *Pitta Shamaka*. When the patient presented with upper abdominal pain, burning defecation, and skin itching, indicative of *Pitta* vitiation, *Mahamanjishthadi Kashaya* was administered. Within a week, the patient experienced a notable reduction in these symptoms.

Sudharshana Gutika effectively pacifies the aggravated *Tridoshas*, bringing them back into equilibrium. It proves beneficial in a wide spectrum of *Jwara*, extending to even *Dhatugata Jwara* and *Sannipataja Jwara*. By virtue of its dominant *Tikta Rasa*, it counteracts *Dhatu Agnimandya*, rekindling *Dhatwagni* and thereby promoting *Dhatu Samyatha*. This potent formulation predominantly features *Kirata Tikta* and is enriched with other key *Dravyas* such as *Musta*, *Haritaki*, *Dwi Chandana*, *Usheera*, *Ardra*, and a diverse array of additional medicinal herbs. *Kirata Tikta* has been proven to possess pronounced antimicrobial action against gram positive and gram negative bacteria which along with anti-inflammatory and analgesic properties which may have benefitted in this case(16,17). As the patient experienced intermittent fever along with poor appetite, this tablet was prescribed for 10 days which facilitated in subsidence of the aforesaid symptoms.

Chandraprabha Vati has *Katu*, *Tiktha*, *Kashaya* and *madhura rasa*, *Ushna virya*, *Laghu*, *Ushna*, *Tikshna* and *Ruksha Guna*. It is *Tridosha Shamaka* more precisely *Vata-kaphahara Tridosha Shamaka* in nature. It has *Agni Deepana* property which helps in enhanced stimulation of *Jatharagni* as well as *Dhatwagni*. Studies reveal that drugs such as *Karpoora*, *Musta*, *Devadaru*, *Guggulu*, *Triphala*, *Ela*, *Shilajitu* and *Makshika Bhasma* aids in relieving pain while *Loha bhasma* and *Shilajitu* facilitates strength gain and addresses fatigue and general debility. Notably this formulation is known to work efficiently in *Apana Vayu Vikaras* as it brings about *Anulomana* of *Vata*, which is essential in this case as the patient has chronic constipation. Furthermore, the proven anti-bacterial activity of this formulation helps in curbing the further progression of the pathogen(18).

Vatagajankusa Ras comprises *Shuddha Parada*, *Loha Bhasma*, *Shuddha Gandhaka*, *Shuddha Haratala*, *Haritaki*, *Shruni*, *Vatsanabha*, *Maricha*, *Pippali*, *Shunti*, *Agnimantha*, and *Tankana Bhasma*, processed in *Mundi Swarasa* and *Nirgundi Swarasa*. The majority of its constituents exhibit *Deepana* and *Pachana* properties, while *Vatsanabha's Vyavayi* and *Vikasi Guna* facilitate rapid dispersion and absorption of the formulation. *Vatagajankusa Ras* was opted for it being *Balya* and *Rasayana* in nature, can contribute to the overall improvement of the patient's general condition as the patient was growing weak during the course of the treatment.

Discussion on External therapies

Lepa is mentioned as one of the prime treatment modality in case of *Vata* associated with *Ama*(19). When a drug is applied externally, it quickly gets into the minor capillary circulation through cutaneous absorption by skipping the whole oral- drug metabolism pathway and avails an easier access to enter into systemic circulation at a faster rate. In this case, *Lepa* was advised with *Jatamayadi churna* mixed in *Dhanyamla*. The drugs in *Jatamayadi Churna* such as *Brahmi*, *Turushka*,

Pushkaramoola, Tagara, Aswagandha, Usira, Rasna, Sarala are predominantly *Kapha-Vata Shamaka* in nature along with *Vedanasthapaka* property. This aids in bring down the swelling and in relieving the pain. *Tagara, Pushkaramoola, Brahmi* has been studied for their anti-inflammatory and anti-microbial activities(20,21,22). *Rasna* is well known for its anti-arthritis and anti-inflammatory activity(23). In this case, *Lepa* contributed greatly to reduction of swelling in the affected joint owing to its anti-inflammatory and shothahara property.

Dhanyamladhara was advised from Day 1 however it was paused on Day 2 and Day3 as precaution as the patient had undertaken tuberculin skin test by the end of Day 1. It was resumed on Day 4. Patient felt a significant improvement in range of motion in right knee joint after 5 days of *Dhanyamladhara*. Textually, *Dhanyamladhara* consists of ingredients such as *Tandula, Prthuka, Kulattha, Laja, Kangubija, Kodrava, Nagara, Danthasatha, Dipyaka* and is categorized under *Drava Sweda* and it has *Ama pachana* property which helps in resolving the swelling, stiffness and other inflammatory features. It is *Kapha-Vatahara* in nature hence it facilitated the movement of knee joint by addressing the *Vaikruta Kapha* localised in that region. Though *Dhanyamla* is *Sheeta guna*, it acquires *Ushna Guna* on heating which aids in levelling the vitiated *Kapha* and *Vata* and its *Prabhava* of *Dhanyamla* is said to be *Dahahara* hence widely used in all *Vata Vikara* associated with *Ama Avastha*(24). Continuous *Dhanyamladhara* enhances transdermal absorption, allowing its active components to access local circulation. This prolonged warm pouring leverages skin's partial permeability. *Dhanyamla's Prabhava* likely reduced initial burning sensation, while its *Ama Pachana* property facilitated resolution of swelling and other local inflammatory signs. Ginger's external anti-inflammatory effects stem from its key phytochemicals, primarily gingerols, shogaols (specifically found in dried ginger), paradols, zingerone, and essential oils. These compounds exert their therapeutic action by inhibiting inflammatory pathways like COX and LOX, suppressing pro-inflammatory cytokines and demonstrating antioxidant properties, ultimately reducing inflammation and pain upon topical application. These compounds have anti-microbial activity(25) as well which helps in curbing the infective pathogen in this case.

Valuka Sweda: The observed significant reduction in knee swelling following *Valuka Sweda* in this TB arthritis case can be rationally justified by integrating both Ayurvedic principles and modern physiological effects of dry heat therapy. From an Ayurvedic perspective, *Valuka Sweda* is specifically indicated for conditions characterized by *Ama* and *Kapha* dominance as it possess *Ruksha, Ushna* and *Tikshna Guna*. The dry heat of the sand boluses is believed to induce *Ama Pachana*, facilitating the metabolic clearance of accumulated toxins and exudates. Physiologically, the localized, penetrating far-infrared energy from heated sand induces vasodilation, significantly enhancing local blood and lymphatic circulation. This increased perfusion aids in the efficient re-absorption of inflammatory fluid and waste products from the knee joint, thereby directly reducing swelling and improving joint mobility. Furthermore, dry heat's analgesic properties and ability to modulate local inflammatory mediators contribute to overall symptomatic relief, complementing the primary anti-tubercular treatment.

Matra Vasti with *Balaguduchyadi Tailam* was given on 11th and 12th day, once the inflammation and fever were subsided. Patient's appetite was better than the initial days of treatment and her bowels movements were regular every day. Hence, it was

inferred that the *Ama Avastha* had been gradually transitioned to *Nirama Avastha* and only after this ascertainment *Matra Vasti* was administered. *Matra Vasti* helps in combating the *Vata* vitiation in its own *Sthana (Pakwashaya)* and through this primary site, *Vasti* gains control over *Vata* located all over the body. According to *Dalhana, Purishadhara* (located in *Pakwashaya*) is the same as *Asthidhara Kala* so it can be understood that *Vasti* helps in proper nourishment of *Asthidhara Kala* thereby nourishing the bone and joints. The transdermal absorption of this *Taila*, particularly through the rich vascularity of the rectal mucosa, ensures systemic delivery of active compounds. *Balaguduchyadi Taila*, rich in ingredients like *Bala, Guduchi, Devadaru, Rasna*, and *Eranda* offers a potent synergy. Phytochemicals such as alkaloids and flavonoids from *Bala*, diterpenoid lactones and alkaloids from *Guduchi*, sesquiterpenes from *Devadaru*, and ricinoleic acid from *Eranda* provide significant analgesic, anti-inflammatory, and immune-modulatory effects. This combined action targets pain by reducing inflammation, mitigating muscle spasms, and providing vital lubrication and nourishment to the affected joint, ultimately facilitating the observed drastic pain relief in this case.

Conclusion

This case study meticulously documents the positive outcomes achieved through a tailored Ayurvedic intervention in Tuberculous Arthritis of the right knee, even amidst concurrent anti-tubercular therapy. While acknowledging the need for broader clinical validation, this report strongly suggests that a well-integrated Ayurvedic approach can be a valuable adjunct in the management of Tuberculous Arthritis, offering a ray of hope where conventional treatment alone may leave persistent suffering. Therefore, this case serves as a compelling testament to the unexplored potential of Ayurveda in the realm of complex musculoskeletal infections, urging a renewed consideration of its integrative role in modern healthcare.

Strength, limitations and take away lesson of this case report

This case demonstrates a favourable clinical outcome in a confirmed case of tuberculous arthritis managed with a well-planned Ayurvedic regimen alongside standard anti-tubercular therapy, suggesting its value as a supportive treatment. However, the planned *Rasayana* phase could not be completed due to the patient's early discharge, and follow-up was limited to telephonic communication because of the long travel distance. As a single case report, the findings cannot be generalized, but they highlight the need for larger, well-designed studies to further evaluate the role of Ayurveda in improving symptoms and quality of life in tuberculous arthritis.

Patient's Perspective

"At first, my knee hurt a lot and was swollen, even after trying different therapies. When my relative suggested Ayurvedic treatment, I visited SJSACH, Chennai. After treatment, slowly, the pain got better and the swelling went down. Now I can walk around more easily for a short distance. My knee still bothers if I stand for too long, but overall, I am feeling much better with this new treatment."

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