

Effectiveness of Ayurvedic Management in Ankylosing Spondylitis: A Retrospective Observational Study

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ABSTRACT

Background: Ankylosing Spondylitis (AS) is a chronic inflammatory disorder predominantly affecting the axial skeleton, leading to persistent pain, stiffness, and progressive functional limitation. Conventional management provides symptomatic relief but is often associated with incomplete response and long-term adverse effects, necessitating exploration of integrative therapeutic strategies.

Objective: To evaluate the clinical presentation and treatment outcomes of Ayurvedic management in patients with AS through a retrospective hospital record review.

Methods: Medical records of 117 patients diagnosed with AS and treated at Arya Vaidya Sala, Kottakkal, between 2020 and 2024 were analysed. Baseline and post-treatment data included Erythrocyte Sedimentation Rate (ESR), C-reactive protein (CRP), Visual Analogue Scale (VAS) for pain, radiological findings, HLA-B27 status, and Ayurvedic clinical assessment, including Prakriti (body constitution). Patients received individualised Ayurvedic interventions comprising internal medications and Panchakarma procedures. Statistical analysis was performed using the Wilcoxon Signed-Rank Test, and effect size was calculated using Cohen's d.

Results: Most patients were HLA-B27 positive and presented with elevated inflammatory markers and radiological evidence of sacroiliitis or bamboo spine. Vata-Kapha predominant constitutions were commonly observed. Significant reductions were noted in ESR (43.49 to 19.27 mm/hr), CRP (25.08 to 7.92 mg/L), and VAS scores (7.27 to 3.07), with $p < 0.005$. Large effect sizes were observed for ESR (2.80), CRP (2.32), and VAS (2.26), indicating substantial clinical improvement. Patients reported marked relief in pain, stiffness, and overall well-being.

Conclusion: Ayurvedic management demonstrated significant improvements in inflammatory markers and clinical symptoms in AS patients. These findings warrant further prospective controlled trials to substantiate the role of Ayurveda in chronic spondyloarthropathies.

Keywords: Ankylosing Spondylitis, HLA-B27, Retrospective study, Observational study, Vatavyadhi, Panchakarma, Rasayana Chikitsa

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INTRODUCTION

Ankylosing spondylitis (AS) is a chronic, systemic, inflammatory, rheumatic disorder of uncertain aetiology primarily affecting the axial skeleton. The inflammation involves the insertions of ligaments and tendons, and is followed by ossification, forming bony bridges that fuse adjacent vertebral bodies or other joints.^{1,2} Historically referred to as Marie-Strümpell disease or Bechterev's disease, AS is characterised by chronic inflammatory back pain and definitive structural changes observable in sacroiliac joint radiographs.³ AS typically begins with lower back pain and spinal stiffness in adolescence, which are more pronounced in the early morning and gradually worsen throughout the day, along with tenderness of the lumbar spine and sacro-iliac joints due to polyarthritis.⁴ In AS, there is reduced spinal mobility and chest expansion, which adversely affects pulmonary function and gait pattern due to weak respiratory muscles and stiffness.³

The radiological findings showed bamboo spine in X-rays, whereas magnetic resonance imaging and computed tomography scans of the spine and pelvis are also used for diagnosis and to detect risk of fractures and deformities.⁵ Some patients may also show extra-articular manifestations. It can severely impact patients' lives by limiting physical activity, causing joint deformities, and in extreme cases, leading to paralysis and death.⁶

The condition typically manifests in individuals during their thirties, with a higher prevalence in males.¹ Studies indicate that AS affects approximately 88.19% of males within the early age range of 15–30 years, with the highest prevalence rate (0.16% in Asia) observed between 20 and 40 years.⁴

Nonsteroidal anti-inflammatory drugs (NSAIDs) are first-line therapy, and recent studies suggest that regular use among patients with AS slows radiographic progression. Tumour necrosis inhibitor therapy has strikingly improved the quality of life for more than two-thirds of AS patients with an inadequate response to NSAIDs.⁷

Vigorous clinical studies have not been conducted to establish the role of Ayurvedic interventions in the management of AS. In this article, we are pointing out the potential of Ayurveda in reducing dependence on steroids, Nonsteroidal anti-inflammatory drugs (NSAIDs) and Disease-Modifying Antirheumatic Drugs (DMARDs) in patients suffering from AS. The article also aims to demonstrate the outcomes of Ayurvedic management in AS, which may serve as a useful reference for other patients with similar conditions.

MATERIALS AND METHODS

Study Design and Setting

A retrospective observational study was conducted by reviewing clinical records of patients treated at **Aryavaidya Hospital and Research Centre,**

Kottakkal, Kerala, India, between May 1, 2020 and December 31, 2024.

Study Population: Patients diagnosed with AS who completed inpatient Ayurvedic treatment during the study period.

Inclusion Criteria

- Confirmed diagnosis of AS based on Clinical and Radiological examinations.
- Completed full inpatient Ayurvedic treatment at AVS.
- Availability of complete clinical records and follow-up data.

Exclusion Criteria

- Other forms of arthritis or autoimmune disease.
- Neurological conditions affecting mobility.

Outcome Variables

Primary outcomes: ESR, CRP, and VAS score.

Secondary outcomes: Improvement reported by patients in pain, stiffness, and overall well-being.

Data Collection Method

Data were extracted from JMJ software used in AH&RC, Kottakkal, patient files, including demographic details, laboratory test values, radiological findings, Ayurvedic diagnosis and treatment protocols.

Ethical considerations

The study was conducted in accordance with the ethical standards of the institutional ethical committee (IEC No.: AVS/IEC/CC10/07/25) and the Declaration of Helsinki (2013 revision).

Statistical Analysis

The Wilcoxon signed-rank test was used to assess pre-post changes in ESR, CRP, and Visual Analogue Scale (VAS) scores. Effect size was calculated using Cohen's d. A two-tailed p-value < 0.05 was considered statistically significant. Statistical analyses were performed using Microsoft Excel and IBM SPSS 19.0.

Handling of Missing Data

Complete case analysis was performed. Patients with missing key variables were excluded from statistical analysis.

Confounders

Potential confounders such as prior NSAID use, comorbidities, and age were recorded but not adjusted for due to the retrospective design. This is addressed as a limitation.

RESULTS

General observations

Age

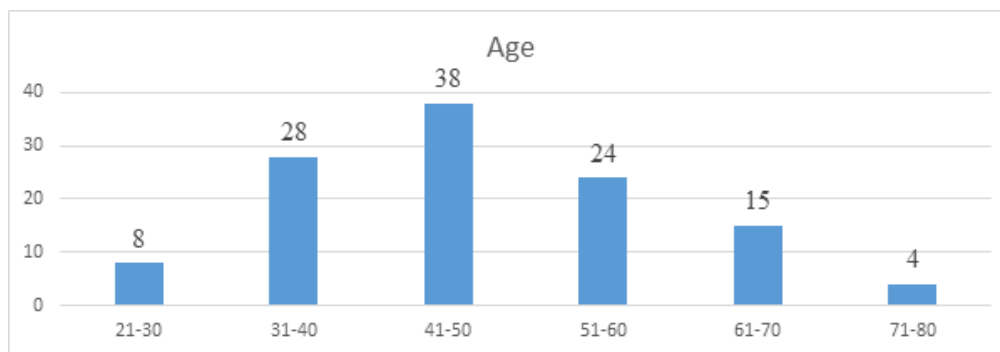
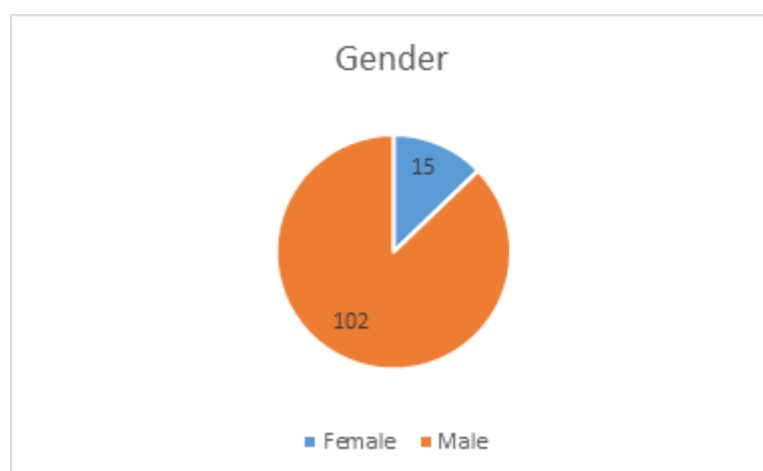
Figure 1. Age

Figure 1 illustrates the age-wise distribution of patients. Out of 117 patients, 38 (32.47%) belong to the age group of 41–50. Additionally, 28 patients (24%) fall within the age group of 31–40, while 24 patients (21%) are in the 51–

60 age group. 15 patients diagnosed with ankylosing spondylitis are in the age group of 61–70.

Gender

Figure 2. Gender

Among the patients, **102 (87%) are Male** and **15 (13%) are females**. As per many studies, the male-to-female prevalence is approximately 3:1 (Figure 2).

Prakriti (body Constitution)

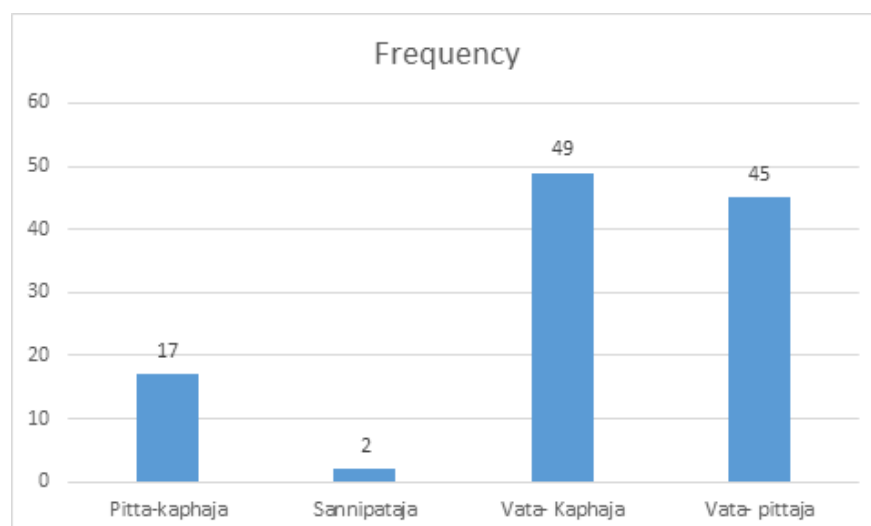
Figure 3. Body Constitution

Figure 3 illustrates the body constitution of AS patients under study. Among the patients, 49 individuals (42%)

were identified as having *Vata-Kapha* constitution. A total of 45 patients (38%) were categorised under *Vata-Pittaja*

constitution, while 17 patients exhibited *Pitta-Kaphaja* constitution.

Blood parameters

Most of the participants presented with raised ESR, often accompanied by HLA-B27 positivity, but no other significant laboratory findings were noted, including the absence of autoantibodies.

Physical Examination of Patients:

The nervous, cardiovascular, and respiratory systems were within normal limits (WNL). An abdominal examination was also normal in most cases.

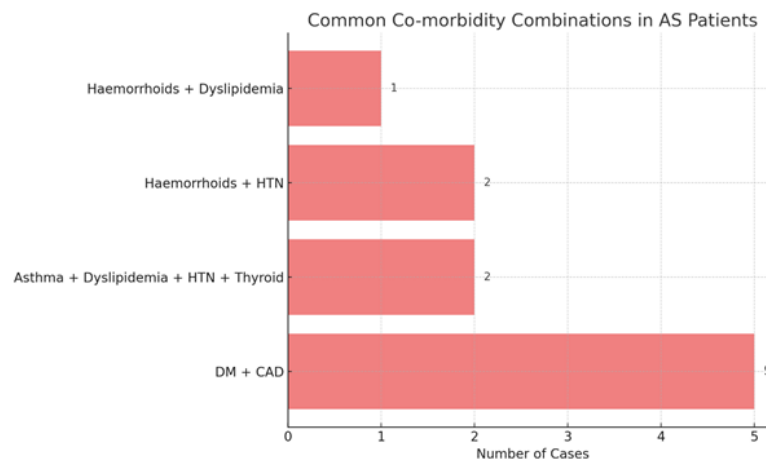
Musculoskeletal examination - Majority of participants complained of tenderness over the L3, L4, L5 region, and

tenderness over the bilateral sacroiliac joints. A few participants also reported tenderness over the bilateral knees and the hip joint. Movements were restricted and painful. In most cases, the SLR (straight-leg raise) test was positive.

Radiography of the majority of participants showed progressive squaring-off of the vertebral bodies (which become rectangular), intervertebral ossification ('bamboo spine'), calcification of tendon/ligament insertions, and obliteration of the sacroiliac joints, suggesting AS.

Co-morbidities

Figure 4: Common co-morbidity combinations observed in AS patients



Among the 117 admitted patients with AS, the majority have multiple co-morbidities (Figure 4). Diabetes Mellitus (DM) is the most frequently recorded condition (8 cases), followed by Hypertension (HTN) and Dyslipidemia, each with 5 cases. Haemorrhoids (7 cases) are also prevalent, occurring both independently and in combination with conditions like HTN and Dyslipidemia. Coronary Artery Disease (CAD) is commonly associated with DM, appearing together in 5 cases. Asthma is reported in 5 cases, often accompanied by additional co-morbidities such as Dyslipidemia, HTN, and Thyroid Dysfunction.

Statistical analysis

The evaluation of treatment outcomes focused on inflammatory markers and subjective measures of symptom improvement:

1. Inflammatory Markers: Significant reductions in ESR and CRP levels were observed over the treatment period. Baseline ESR levels averaged 45 mm/hr, decreasing to 20 mm/hr by the end of the treatment. Similarly, CRP levels showed a mean reduction from 25 mg/L to 8 mg/L (Table 1).

2. Pain and Mobility: Patients reported noticeable relief in pain severity, assessed using a visual analog scale (VAS). Initial VAS scores averaged 7.5, which reduced to 3.2 by the end of the study (Table 2).

All three parameters (ESR, CRP, VAS) showed statistically significant improvement post-treatment ($p < 0.05$), indicating effective reduction in inflammation and pain severity.

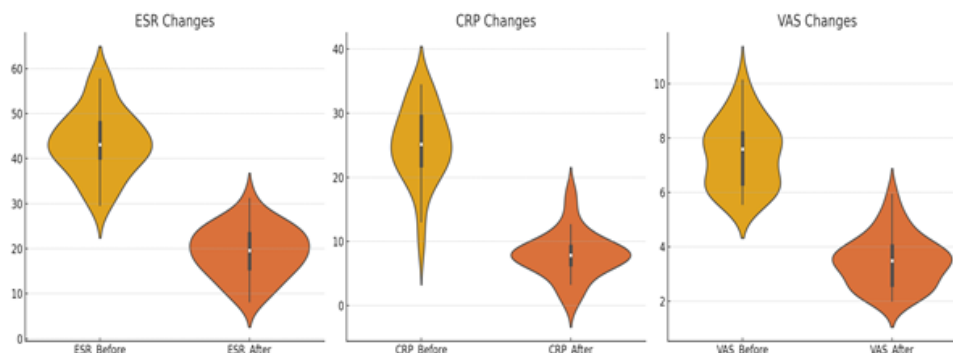
Table 1: Statistical analysis of inflammatory markers using the Wilcoxon Signed-Rank Test

Inflammatory markers		Mean value	Mean diff.	p value
ESR	BT	43.49	24.22	$p < 0.005$
	AT	19.27		
CRP	BT	25.08	17.15	$p < 0.005$
	AT	7.92		

Table 2: Statistical analysis of VAS Score using the Wilcoxon Signed-Rank Test

VAS	Mean value	Mean diff.	P value
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	BT	7.27	3.90	p<0.005
	AT	3.07		

Figure 5: Visual Representation**Figure 5** shows the improvements in Pain, ESR level and CRP.**Table 3:** Effect Size (Cohen's d)

Parameter	Cohen's d
ESR	2.80
CRP	2.32
VAS	2.26

Cohen's d values (Table 3) greater than 0.8 indicate a large effect size. All three parameters showed a large effect, suggesting clinically meaningful improvements.

The Wilcoxon Signed-Rank Test revealed statistically significant reductions in VAS, ESR, and CRP scores post-treatment ($p < 0.001$ for all), indicating effective pain relief and resolution of systemic inflammation through Ayurvedic interventions. Furthermore, effect size analysis demonstrated large effects across all three domains (Cohen's $d > 1.0$), confirming that the treatment effects were not only statistically significant but also clinically meaningful.

DISCUSSION

The present study evaluated the clinical characteristics and treatment outcomes of patients with AS managed with Ayurvedic interventions. The demographic profile observed in this study was consistent with previous reports, indicating a higher prevalence of AS among young males.^{4,5} The majority of patients belonged to the 41–50 years age group, with a clear male predominance. This observation aligns with earlier studies reporting a strong association between HLA-B27 positivity and earlier disease onset in males.^{6,7}

Elevated ESR and CRP levels observed in most patients reflect systemic inflammation mediated by pro-inflammatory cytokines such as TNF- α , IL-6 and IL-1.⁸ Following Ayurvedic treatment, a statistically significant reduction in these inflammatory markers was observed, suggesting a potential anti-inflammatory effect of the therapeutic interventions.

From an Ayurvedic perspective, the disease manifestations of ankylosing spondylitis resemble conditions described under *Vatavyadhi* (Neuromusculoskeletal disorders), particularly *Asthigatavata* (*Vata localised in bone tissue*)

and *Sandhigatavata* (joint disorders).^{9,10} Symptoms such as pain, stiffness, restricted movement and muscle weakness correspond to *Vata-Kapha dosha* (*bodily humours -Vata and Kapha*) imbalance, affecting *Asthi* (Bone tissue) and *Majja dhatu*s (bone marrow).¹⁰

In the clinical presentation of patients, fever accompanied by joint pain was observed in certain cases, indicating a need for management aligned with the principles of *Amavata Chikitsa* (treatment for metabolic toxins due to vitiated Vata). Such patients were initially managed with our internal medications like *Amruthothara kwatha*, *Amrutharishta*, *Vettumaran Gulika*, *Sudarsanam Gulika*, etc. Conversely, stiffness, pain, and reduced range of motion were the predominant complaints in most patients, highlighting the need to prioritise interventions for pain relief. This indicates *Vata* as the predominant *Dosha*, contributing to *Asthikshaya* (depletion of *Asthi dhatu*).¹⁰ To begin Ayurvedic treatment effectively, the first and most crucial step is to arrive at an accurate diagnosis using Ayurvedic principles. Rather than simply mapping Ayurvedic disease classifications (*Vyadhi*) onto modern medical diagnoses, it's more beneficial to construct an Ayurvedic diagnosis directly from the patient's observed symptoms and characteristics.

The treatment approach is rooted in classical Ayurvedic principles, with a focus on *Ama pachana* (digesting metabolic toxins), *Vata samana* (pacifying the aggravated *Vata dosha*), and *Rasayana chikitsa* (rejuvenation therapy) to enhance overall health and improve the quality of life in affected individuals.¹¹ Along with internal medications, the Panchakarma therapies administered for AS patients are primarily aimed at reducing inflammation, relieving pain and stiffness, correcting the vitiation of Vata, and slowing the progression of the disease.

In most cases, Ayurveda treatment based on *Vata kapha Samana*, which could also be beneficial in *Asthidhatu Gata Vyadhi* (bone disorders), is adopted. The first line is to treat the *Agni* (digestive fire), as the main pathogenesis starts after depletion of *Agni*. So, *Deepana* (appetizer) and *Pachana* (digestant) drugs, which have *Tikta* (bitter) and *Katu* (Pungent) rasa (taste), were given initially. It will improve digestion and will reduce the formation of *Ama* (metabolic toxins).¹² In this stage, internal medication like *Rasnerandadi kashayam*,¹³ *Maharasnadi kashayam*,¹⁴ along with *Yogaraja guggulu gulika*¹⁵ is generally given. Later, after examining the condition of the patient, these *kashaya yogas* (decoctions) will change either to *Dhanwantharam kashayam*¹⁶ or *Sahacharadi kashayam*¹⁷.

Once *Ama* is adequately digested and *Agni* (digestive-metabolic fire) is balanced, medicated ghee preparations such as *Daḍimadi Ghr̥ta*¹⁸ and *Guggulutiktaka Ghr̥ta*¹⁹ are considered appropriate, particularly during the chronic phase of Ankylosing Spondylitis (AS). This phase is characterised by *Vata*-predominant symptoms such as joint stiffness, dryness, reduced mobility, and tissue degeneration, rather than acute inflammation.

Daḍimadi Ghr̥ta contains *Daḍima* (*Punica granatum*), which possesses well-documented *Agnidipana* (digestive) and *Ama-pachana* (metabolic detoxification) properties. Enhancing digestive function and resolving metabolic toxins, it helps interrupt the chronic inflammatory cycle commonly observed in autoimmune conditions like AS. Additionally, the formulation exerts *Vata-Kapha* balancing effects, mitigating symptoms such as *Rukṣha* (dryness) and *Khara* (roughness) in joints through its inherent *Snigdhatva* (unctuousness), thereby improving joint lubrication and mobility.¹⁸

Guggulutiktaka Ghr̥ta, on the other hand, is especially suited for chronic musculoskeletal conditions. *Guggulu* (*Commiphora mukul*) exhibits anti-inflammatory, analgesic, and immunomodulatory actions, and has shown promise in managing chronic synovial inflammation. The presence of *Tikta* (bitter) rasa herbs like *Nimba* (neem), *Patola* (pointed gourd), and *Guduchi* (giloy) supports deep tissue detoxification, while also nourishing *Asthi* and *Majjā dhātus* (bone and marrow tissues). These actions may help slow down joint degeneration, modulate immune dysfunction, and promote tissue repair.²⁰

Furthermore, the *Ghr̥ta* (ghee) base in both preparations enhances the bioavailability of active phytoconstituents, facilitates deeper tissue penetration, and has been reported to reduce oxidative stress, a known contributor to autoimmune pathogenesis.²¹ The lipid-rich medium also supports neuromuscular stability and tissue rejuvenation, making these formulations particularly beneficial in the long-term management of AS.

In the stage of active inflammation or when the patient is suffering from either joint pain, warmth, swelling, or low-grade fever, in all such conditions, the therapeutic goal is primarily to reduce the inflammation, digest the *ama* and relieve the pain. Thus, along with internal *Ama-pachana*

medications, usually patients are given external therapies like *Pinda sweda* (bolus fomentation therapy), *Parisheka Sweda* (Warm liquid pouring sudation), *Veshtana* (therapeutic oil bandaging), *Lepanas* (Topical herbal paste application), etc., to relieve acute pain and inflammation.²²

In the early stages of AS, most patients present with chronic, dull pain localised to the lower back or gluteal region, often accompanied by marked stiffness. From an Ayurvedic perspective, such presentations may be classified under *Katishoola* or *Katigraha* (sacroiliitis), primarily attributed to aggravated *Vata*.²³ Management in these cases involves the administration of *Vata*-pacifying internal medications. In instances of acute pain, external application of *Agragrahyadi Choorna* as *Lepana* (local application) has demonstrated notable analgesic effects. Additionally, in cases exhibiting signs of active inflammation, *Veppila Aravu* (paste of Neem leaves) is particularly effective in mitigating inflammatory responses.

In the later stage, loss of spinal mobility and chest expansion with reduced lumbar movement are seen in patients. Compared to this condition, the management line of *Katiprishtagraha* (low back ache)²³, by giving *Rookshana* (drying) therapy, is given externally. *Pinda swedas*, like *Podi kizhi* (Powder bolus sudation therapy), *amritakadi podikizhi*, etc., are advised according to the condition of the patients. The herbs used in powder bolus sudation therapy have *Shothahara* (anti-inflammatory) properties and help reduce synovial inflammation and paraspinal muscle spasms. The thermal effect offered by *Pinda Sweda* increases local blood circulation, promoting the removal of *Ama* and inflammatory metabolites.²⁴ In certain conditions, where inflammation is controlled but stiffness, pain, and restricted movement persist, the *Dasamoolasruta Ksheeradhara* is advised. Pharmacological studies on *Dasamoola* show significant COX-2 inhibition, reduction in nitric oxide and TNF- α levels, and pain-relieving effects in animal models of arthritis.²⁵

Veshtana (bandaging or wrapping affected body parts) plays a supportive role in the management of AS by offering stability, reducing pain, and alleviating stiffness.²⁶ Here, we initially used to apply oil over the affected part, and then *Veshtana* was done for patients. *Tailas* like *Mahanarayana Taila*²⁷, *Sahacharadi (big) Taila*²⁸, *Karpasasthyadi taila*²⁹, etc., are mainly used in such conditions. Therapeutic oil bandaging helps to stabilise the spine and sacroiliac joints, minimising painful micro-movements. When combined with warm medicated *Taila*, it acts as a form of mild fomentation, enhancing local circulation and reducing *Vata* aggravation.

Pizhichil (Medicated oil pouring therapy) is often recommended for most of the patients once the inflammatory phase has subsided, and the focus shifts towards relieving stiffness, enhancing mobility, and rejuvenating the musculoskeletal system.³⁰ This therapy

not only supports pain reduction and functional improvement, but also has a profound nourishing and rejuvenative effect on joints and tissues, which is crucial in a degenerative, progressive condition like AS.

LIMITATIONS

This study is limited by its retrospective design, which may be associated with selection and reporting biases. The absence of a control group makes it difficult to fully exclude placebo effects or regression to the mean. Additionally, certain confounding factors, such as prior use of NSAIDs or other treatments before Ayurvedic admission, could not be completely accounted for. Nevertheless, the findings provide useful preliminary insights, and further prospective, controlled studies are recommended to strengthen the evidence base.

4 CONCLUSION

The retrospective observational study conducted at Arya Vaidya Sala, Kottakkal, highlights not only the typical demographic and clinical patterns of AS but also underscores the potential of integrative Ayurvedic approaches in its management. The majority of patients exhibited Vata-Kapha predominant symptoms and responded positively to a carefully individualised protocol comprising internal medications, Panchakarma therapies, and Rasayana treatments. While the chronic and progressive nature of AS poses challenges, especially in advanced stages, the findings from this study suggest that Ayurvedic treatment can play a supportive and complementary role in symptom relief, improving functional capacity, and potentially reducing dependence on long-term NSAID or steroid use.

Future recommendations

Future controlled clinical trials are essential to scientifically validate these findings and to better define Ayurveda's role in managing Ankylosing Spondylitis as a part of a holistic, patient-centred care model.

Conflict of interest

None declared.

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