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Efficacy of *Balāsahacharādi Kashāya* with *Dashāngalēpaya* in the Management of Knee Osteoarthritis: A Controlled Clinical Study

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Abstract

Knee osteoarthritis is one of the most common degenerative joint disorders affecting the elderly population and is characterized by pain, stiffness, swelling, and reduced mobility. In Ayurveda, this condition is correlated with *Janu Sandhigata Vāta*, which arises due to the aggravation of *Vāta dōsha* leading to degeneration of joint structures. Ayurvedic management emphasizes reducing inflammation, relieving pain, and improving joint function through internal and external therapeutic formulations. The present study was conducted to evaluate the effectiveness of two Ayurvedic treatment protocols in the management of knee osteoarthritis. A comparative clinical study was carried out among patients diagnosed with knee osteoarthritis at the Rural Ayurveda Hospital, Kesbewa, Sri Lanka. Participants were divided into two groups receiving different treatment protocols for a period of two weeks. Clinical features such as pain, tenderness, crepitus, oedema, and range of motion of the knee joint were assessed before and after treatment. Statistical analysis was performed using appropriate tests with a significance level of $p < 0.05$. Both treatment protocols showed improvement in the clinical signs and symptoms of knee osteoarthritis. However, the treatment protocol consisting of *Balāsahacharādi Kashāya* with *Dashāngalēpaya* demonstrated comparatively greater improvement in pain reduction and range of motion. The findings suggest that Ayurvedic treatment protocols can effectively reduce clinical manifestations of knee osteoarthritis and improve functional mobility. The study highlights the clinical significance of traditional Ayurvedic formulations in the management of degenerative joint disorders.

Keywords: Ayurvedic treatment; *Balāsahacharādi Kashāya*; Comparative clinical study; *Dashāngalēpaya;* Knee osteoarthritis

1 Introduction

Knee osteoarthritis is a chronic degenerative joint disorder characterized by progressive deterioration of articular cartilage, leading to pain, stiffness, swelling, and limitation of joint movement (CDC, 2020).[1] It is a major cause of disability among middle-aged and elderly individuals and significantly affects quality of life. The condition commonly involves structural changes within the joint, including cartilage degeneration, osteophyte formation, and synovial inflammation (Lloyd, G., and Smith, R., 2020).[2] In Ayurvedic literature, knee osteoarthritis can be correlated with *Jānu Sandhigata Vāta*, a condition caused by the aggravation of *Vāta dōsha* affecting the joints (Singhal, G. D. (2005).[3] Classical Ayurvedic texts describe symptoms such as pain (*shūla*), swelling (*shōtha*), crepitus (*ātōpa*), and restriction of joint movement (Kumarasinghe, 1991).[4] Management of this condition focuses on pacifying aggravated *Vāta*, reducing inflammation, and improving joint function through the use of internal herbal formulations and external therapeutic applications.

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A systematic review of available literature indicates that many Ayurvedic herbal formulations possess pharmacological properties such as anti-inflammatory, analgesic, antioxidant, and anti-oedematous activities (Datta, 2025).[5] These properties may contribute to the reduction of pain, inflammation, and functional limitations associated with knee osteoarthritis (Alshami, A. M., 2014).[6] Herbal formulations containing multiple medicinal plants are often used in Ayurvedic clinical practice to address the complex pathophysiology of degenerative joint disorders (Bala K., *et.al,* 2020).[7] Considering the therapeutic potential of Ayurvedic formulations and the need for effective management of knee osteoarthritis, the present study was undertaken to evaluate the clinical effectiveness of two Ayurvedic treatment protocols in the management of knee osteoarthritis.

2 Materials and Methods

A comparative clinical study was conducted at the Rural Ayurveda Hospital, Kesbewa, Sri Lanka, to evaluate the effectiveness of two Ayurvedic treatment protocols in the management of KOA. Study was carried out over a period of two weeks among patients attending the outpatient department of the hospital.

Study Population and Sampling - Patients diagnosed with knee osteoarthritis were selected according to predefined inclusion and exclusion criteria. A total of 60 patients were recruited and divided into two groups consisting of 30 participants each.

Treatment Protocols - Participants in Group A (Treatment group) received *Balāsahacharādi Kashāya* internally along with external application of *Dashāngalēpaya*. Participants in Group B (Control group) received *Dashamula Kvātha* internally with external application of *Shūlahara Thailaya*. Both treatment protocols were administered for two weeks under medical supervision and 1 week follow up was followed.

2.1 Inclusion Criteria

- Female patients between the age of 55 – 65 years diagnosed with KOA
- Patients with knee joint pain, tenderness, swelling and reduced range of movement of knee joints
- Patients who have taken Ayurveda treatments from OPD of Rural Ayurveda Hospital - Kesbewa for KOA (*Sandhigatha vāta*) before
- Patients not taking Allopathic medicines for KOA
- Patients with positive family history of KOA

2.2 Exclusion Criteria

- Patients who have faced knee bone grafting, Hydrocortisone injections to knee joints
- Patients with past medical history of MI, Angina, CABG (Bypass surgery)
- Patients with chronic skin diseases, allergies and rashes, Gastritis, Peptic Ulcer disease
- Patients diagnosed with CKD, liver diseases, cirrhosis or abnormal baseline liver function tests
- Patients with mental, memory related disorders

Data Collection Procedure - Clinical assessment was carried out before treatment (BT) and after treatment (AT). The following clinical parameters were evaluated:

- Pain during activities (standing, walking, climbing stairs) using the Visual Analog Scale (VAS)
- Tenderness of the knee joint
- Crepitus during knee movement
- Presence of oedema
- Range of motion of the knee joint measured using a goniometer

2.3 Preparation of Herbal Formula

2.3.1 Balāsahacarādi Kaṣāya (Chandra & Aryadasa, 1984)[8]

Weight of *kalan* 1 *madata* 10 (7.5g) from all the 8 dried ingredients [Roots of *Sida cordifolia* L. (*Balā*), Stems of *Barleria prionitis* L. (*Sahachara*), Stems of *Ricinus communis* L. (*Ēranda*), Rhizome of *Zingiber officinale* Roscoe. (*Shunti*), Bark of *Aegle marmelos* L. (*Bilva*), Stems of *Cedrus deodara* Lamb. (*Dāru*), Leaves of *Vitex negundo* L. (*Nirgundi*) and Bulbs of *Allium sativum* L. (*Laśuna*)] were measured and prepared decoction by boiling with 8 cups of water (1920ml) to 1 cup (240ml). Patients were advised to take ½ of it (120ml) in morning and evening after meal for 14 days.

2.3.2 Daśaṅgalēpaya (Dasji, 2017)[9]

Equal amounts (20g) of dried powder of all the ten ingredients [Bark of *Albizia lebbeck* L. (*Mahari*), Roots of *Glycyrrhiza glabra* L. (*Yashtimadu*), Bark of *Pterocarpus santalinus* L. (*Rakthachandana*), Leaves of *Valeriana wallichi* L. (*Thvarala*), Seeds of *Elettaria cardamomum* L. (*Ēlā*), Stem of *Nardostachys jatamansi* DC. (*Jatāmānsi*), Rhizome of *Curcuma longa* L. (*Haridrā*), Stem of *Berberis aristata* DC. (*Dāruharidrā*), Bark of *Saussurea lappa* Falc. (*Kushta*) and Roots of *Vetiveria zizanioides* L. (*Ushira*)] mixed together and made a paste by mixing with ghee (amount sufficient to mix the powder). Then the paste was heated in mild heat and the poultice was prepared. Amount used at a time was able to cover the whole knee joint area (approximately 5g). Applied and covered on the affected knee joints with a thickness of 2mm two times daily in morning and evening. Patients were asked to remove the paste after 6 hours and washed with mild hot water and keep open to get ventilated.

Statistical Analysis - Data obtained from the clinical assessment were analyzed using Statistical Package for the Social Sciences (SPSS) software. Paired sample *t*-tests and independent sample *t*-tests were used to determine the statistical significance of changes before and after treatment. A p-value < 0.05 was considered statistically significant.

Ethical Considerations - Ethical approval for the study was obtained from the relevant institutional authority. All participants were informed about the study procedures, and informed consent was obtained prior to enrollment.

3 Results

A total of 60 patients diagnosed with knee osteoarthritis participated in the study and were divided equally into two groups. Clinical assessment of pain, tenderness, crepitus, oedema, and range of movement was conducted before and after treatment in both groups. Both treatment protocols demonstrated improvement in the clinical signs and symptoms of knee osteoarthritis.

3.1 Demographics

Both groups were comparable in age, gender, and baseline BMI ($p>0.05$). The demographic characteristics of the participants in both the test and control groups were analyzed to determine the baseline comparability of the study population. The results indicated that the distribution of participants in terms of age, gender, and other demographic parameters was relatively similar between the two groups. This comparability suggests that both groups were adequately matched at baseline, thereby minimizing the possibility of demographic bias influencing the treatment outcomes.

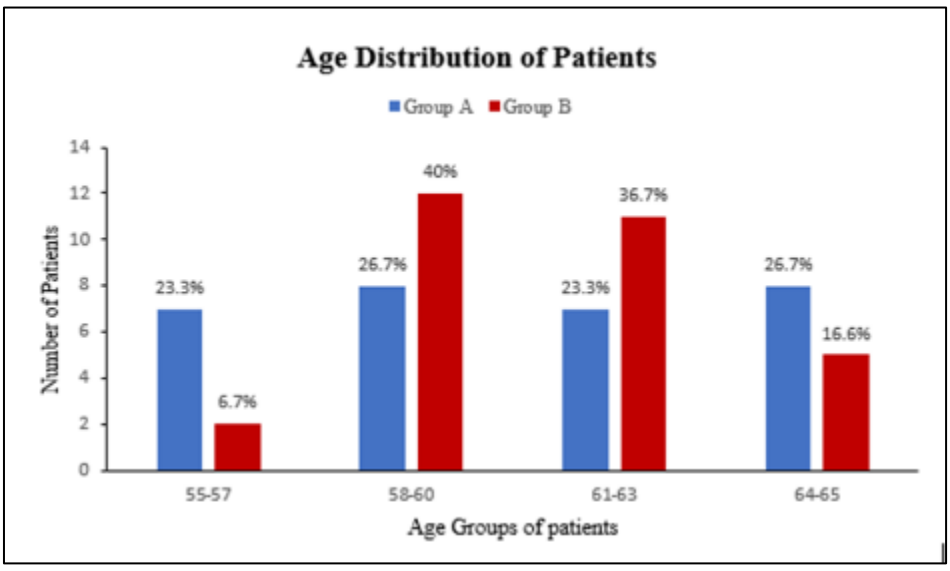

Figure 1 Age-wise Distribution of Patients in both Groups

Both groups exhibited a similar age distribution, and mean ages were comparable, indicating a consistent demographic profile across treatment and control groups.

Knee osteoarthritis is generally considered a condition that predominantly affects middle-aged and elderly individuals due to progressive degeneration of articular cartilage and joint structures. In the present study, the majority of participants belonged to the middle-aged and older adult population, which is consistent with the commonly reported epidemiological pattern of the disease. The involvement of female participants in the study further reflects the broad occurrence of knee osteoarthritis in female population.

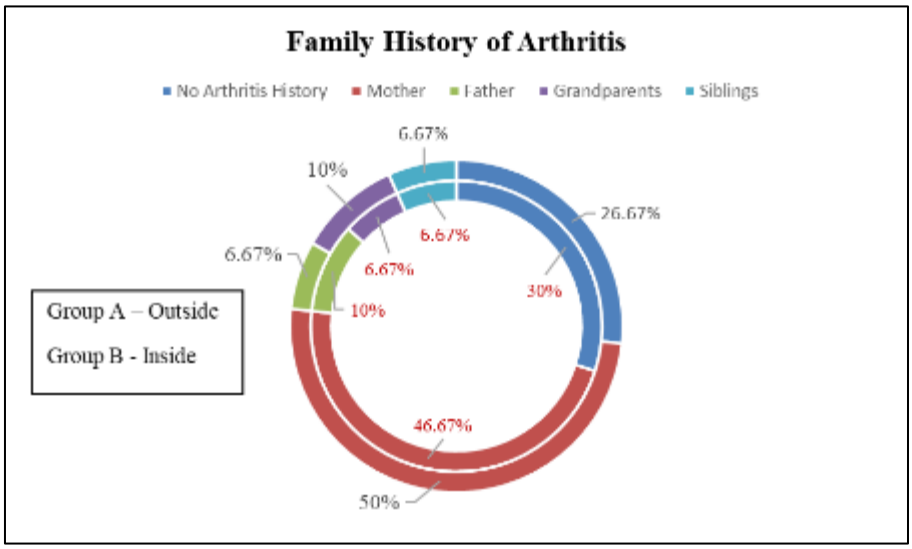

Figure 2 Family history of Arthritis in both Groups

Considerable number of participants reported a family history of arthritis, particularly from their mothers, suggesting a possible hereditary link. No related family history number was similar while familial connections through fathers, grandparents, and siblings were reported at relatively lower frequencies.

Individuals with a positive family history of osteoarthritis are often at a higher risk of developing the condition compared with those without such a background. Genetic predisposition may affect the structural integrity of cartilage, bone density, and the biochemical composition of joint tissues, thereby increasing the likelihood of early degeneration of articular cartilage. Research has shown that certain genetic factors may influence collagen synthesis, cartilage metabolism, and inflammatory responses within the joint. These genetic variations can make some individuals more vulnerable to cartilage breakdown and joint degeneration over time. However, hereditary influence alone is usually not sufficient to cause the disease. Environmental and lifestyle factors such as aging, obesity, joint overuse, trauma, and occupational stress on joints also play significant roles in the onset and progression of KOA.

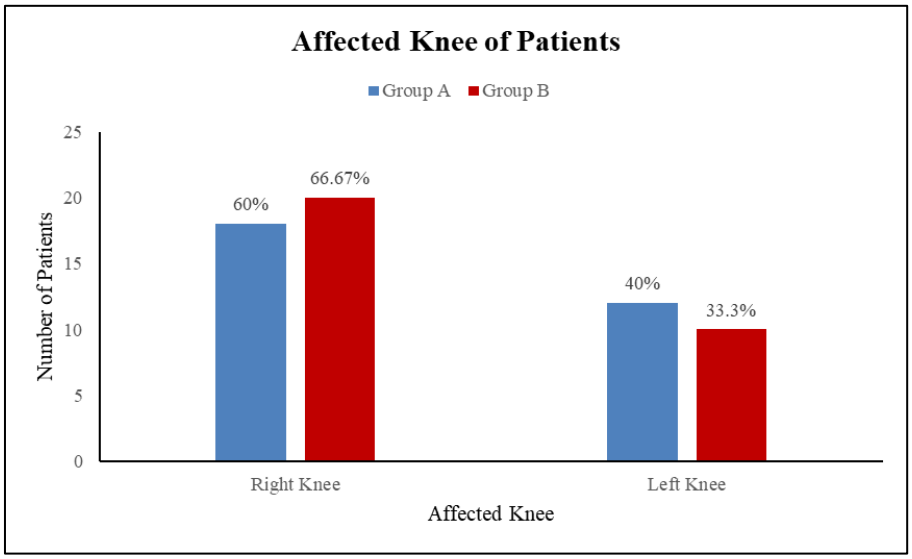

Figure 3 Distribution of affected Knees in both Group

Greater frequency of right knee joint pain was reported compared to left knee joint pain suggesting right knee pain was more prevalent among participants of the research.

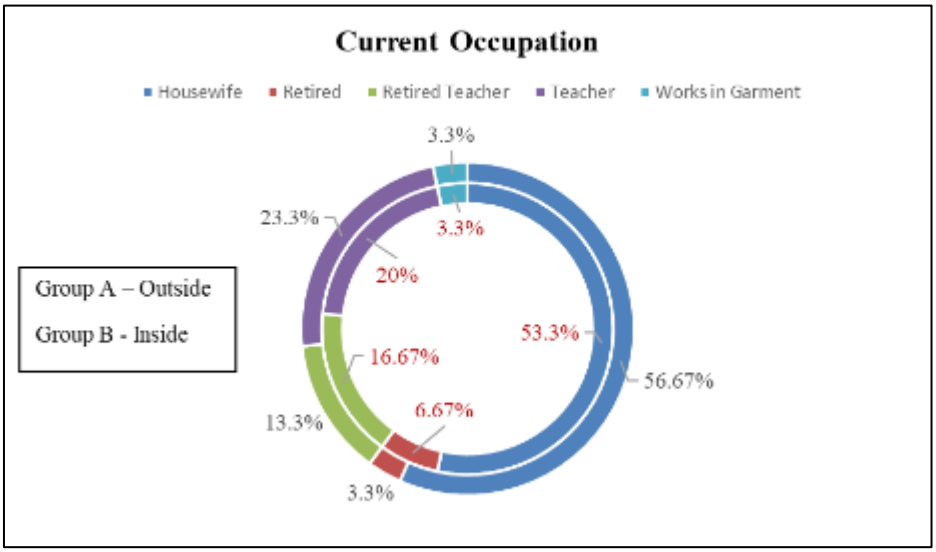

Figure 4 Current Occupation of patients in both groups

Majority of participants were housewives in both groups A- 56.67% and B- 53.3%. Education level and occupational background are important factors influencing the occurrence and management of knee osteoarthritis (KOA). Individuals engaged in occupations that involve prolonged standing, heavy physical labor, repetitive knee bending, or squatting are more prone to developing degenerative changes in the knee joint due to continuous mechanical stress. Similarly, the level of education may influence health awareness, health-seeking behavior, and adherence to treatment recommendations. Patients with better health knowledge are often more likely to seek early medical attention, follow therapeutic advice, and adopt lifestyle modifications. Therefore, education level and occupational activities may indirectly affect both disease progression and the overall prognosis of treatment outcomes in KOA patients.

3.2 Changes in BMI of patients

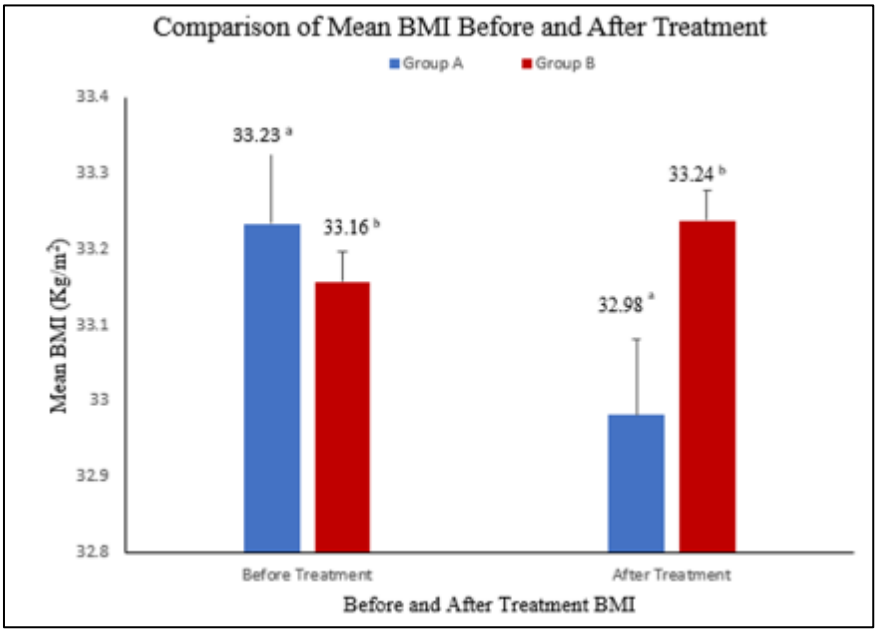

Figure 5 Comparison of mean BMI of both groups Before and After Treatment

Both treatment and control groups showed minimal changes in mean BMI following the intervention, with no statistically significant differences observed ($p > 0.05$). The relative stability of BMI in both groups suggests that body

weight did not substantially change during the study period. As BMI was not the primary outcome measure, these findings indicate that the observed clinical improvements in pain, stiffness, swelling, and functional status were unlikely to be influenced by changes in body weight. No significant changes in either group over the short study period

3.3 Pain (VAS Scores)

Test group: Significant reduction in VAS scores during standing (mean reduction 3.5 ± 0.6), walking (3.8 ± 0.7), and stair climbing (4.0 ± 0.8) — $p < 0.001$. Control group: Mild reductions (1.2–1.5 ± 0.5), not statistically significant.

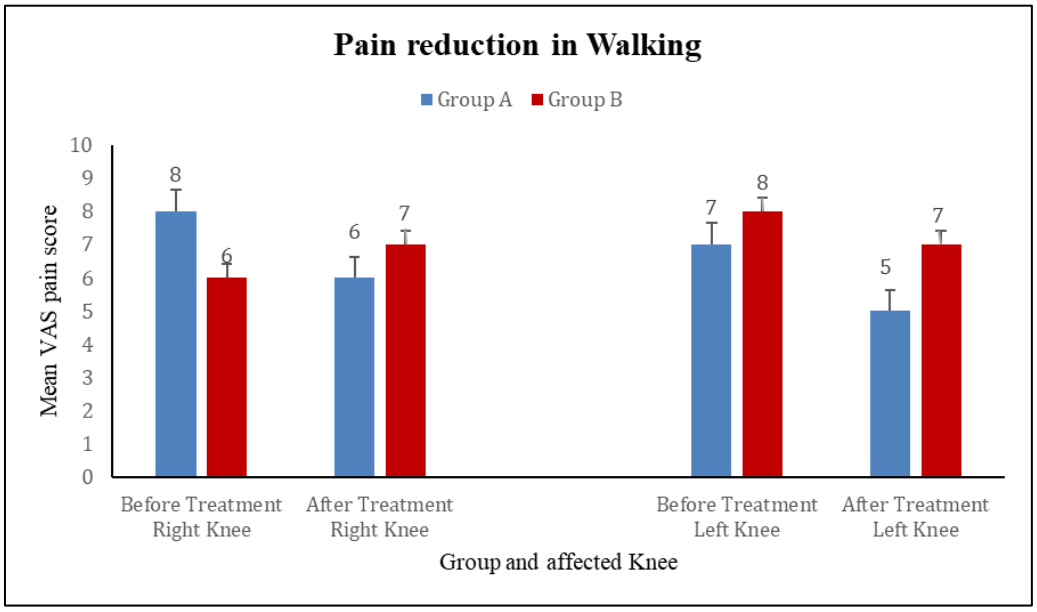

Figure 6 Pain reduction in Walking for Right and Left knees Before and After Treatment

Group A showed a reduction in pain during walking in both right and left knees, whereas the control group showed a mixed response. However, the observed changes were statistically significant ($p > 0.05$).

Each bar represents the Mean ± SEM of 30 patients in each group. Statistical analysis indicates that the differences between the groups are significant ($p < 0.05$). Since VAS scores start from zero and all values are positive, displayed only the upper error bars to avoid visual crowding, while the statistical analysis was performed using full data.

- Range of Movement
  Test group: Flexion increased by 10–12° ($p<0.01$); extension improved by 5–7° ($p<0.05$). Control group: Flexion increased 2–4°; extension 1–2°; not significant
- Tenderness
  Test group: Mean reduction 6.5 → 2.0. Control group: 6.2 → 4.8
- Oedema
  Test group: Score reduced 4 → 1.5 ($p<0.01$). Control group: 3.8 → 3.0; not significant
- Crepitus - Minimal improvement in both groups

The results showed a significant reduction in pain scores and improvement in joint mobility following treatment. The treatment group receiving *Balāsahacharādi Kashāya* and *Dashāngalēpaya* demonstrated comparatively greater improvement in pain reduction and range of movement compared to the control group. Changes observed in other clinical parameters such as tenderness, crepitus, and oedema also indicated improvement following treatment. Statistical analysis confirmed that several of these improvements were statistically significant ($p < 0.05$). Detailed numerical results are presented in the following table.

Table 1 Key Clinical Outcomes

Parameter	Test Group (n=30)	Control Group (n=30)
Pain VAS (mean ± SEM)	7.2 ± 0.5 → 3.5 ± 0.6	7.0 ± 0.6 → 5.5 ± 0.5
Flexion (°)	110 → 122	111 → 114
Extension (°)	5 → 12	6 → 8
Tenderness	6.5 → 2.0	6.2 → 4.8
Oedema	4 → 1.5	3.8 → 3.0
Crepitus	Minimal change	Minimal change

4 Discussion

Pain reduction observed in both groups indicates the potential analgesic and anti-inflammatory effects of the herbal formulations used. The comparatively greater improvement observed in the treatment group may be attributed to the pharmacological properties of the herbal ingredients present in *Balāsahacharādi Kashāya* and *Dashāngalēpaya*. Many medicinal plants used in Ayurvedic formulations possess anti-inflammatory, antioxidant, and analgesic activities, which may contribute to the reduction of joint inflammation and improvement of joint function.

Most prominent symptom of knee osteoarthritis is pain which significantly affects the quality of life of patients. In the present study, both treatment protocols showed a reduction in pain scores during daily activities such as standing, walking, and climbing stairs. However, comparatively greater improvement was observed in the group receiving *Balāsahacharādi Kashāya* with *Dashāngalēpaya.* This improvement may be attributed to the analgesic and anti-inflammatory properties of the herbal ingredients present in these formulations, which help reduce inflammation and relieve pain associated with degenerative joint conditions.

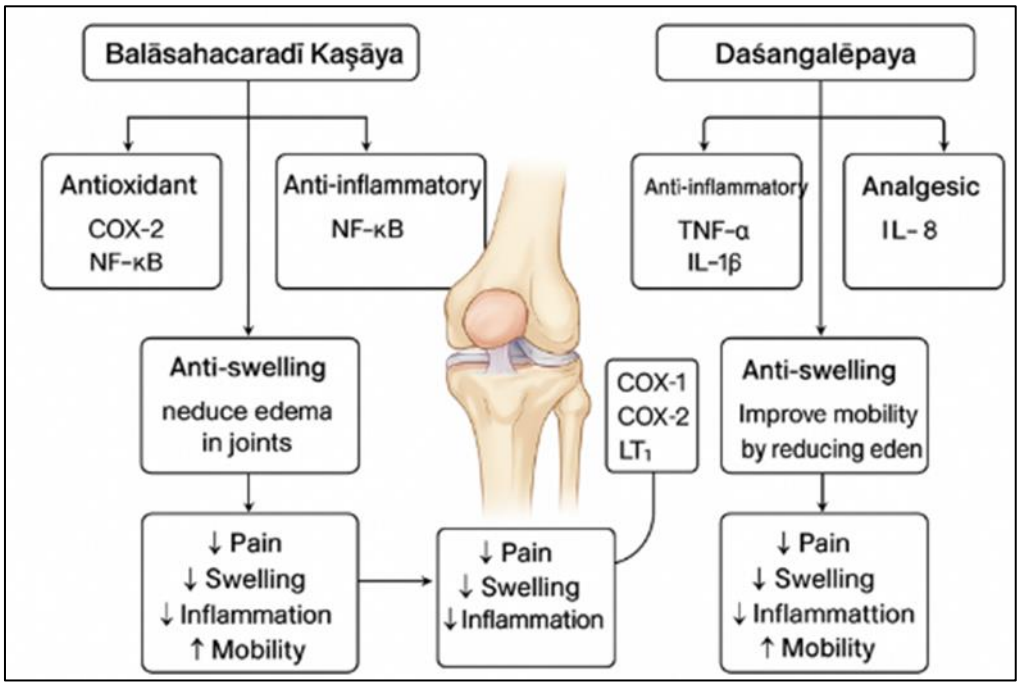

Figure 7 Mechanism of action of both formulae on knee joints

Tenderness of the knee joint is another common clinical feature observed in patients with knee osteoarthritis, usually resulting from inflammation of periarticular structures. The findings of the present study indicated a reduction in tenderness following treatment in both groups. The reduction of tenderness may be explained by the anti-inflammatory and *Vāta* pacifying actions of the herbal formulations used in the treatment protocols. Oedema or swelling around the knee joint is frequently associated with inflammatory processes within the joint. The results of the study demonstrated

improvement in oedema status following treatment, suggesting that the therapeutic interventions may help reduce inflammatory responses within the joint structures. Many herbal ingredients commonly used in Ayurvedic formulations possess anti-oedematous and anti-inflammatory properties, which may contribute to the reduction of swelling observed in the present study. (Rovati L., *t. al,* 2018).[10]

Crepitus is often considered a clinical indicator of degenerative changes in the articular cartilage. In the present study, improvement in crepitus was relatively limited compared to other clinical parameters. This finding may be explained by the fact that crepitus is often associated with structural degeneration of cartilage and joint surfaces, which may not be completely reversible within a short treatment duration. Therefore, although symptomatic relief was observed, structural changes within the joint may require a longer duration of treatment or additional therapeutic interventions. Range of movement of the knee joint is an important indicator of functional improvement in patients with knee osteoarthritis. The results of the present study demonstrated improvement in the range of motion following treatment in both groups. However, comparatively greater improvement was observed in the treatment group receiving *Balāsahacharādi Kashāya* and *Dashāngalēpaya*. This improvement may be associated with the reduction of pain and inflammation, which allows better joint mobility and functional activity. The findings of this study are consistent with previous research indicating that Ayurvedic herbal formulations can be beneficial in the management of degenerative joint disorders. By addressing the imbalance of *Vāta dōsha*, these formulations help to reduce symptoms such as pain, stiffness, and restricted movement associated with *Janu Sandhigata Vāta*.

Limitations

Include the small sample size, relatively short duration of treatment and limited follow-up period and limited imaging (no post-treatment MRI or X-ray follow-up) may not fully reflect the long-term effects of the therapies.

Recommendations

Future studies should consider longer treatment duration, larger cohorts, and biomarker assessment for more robust evidence. One of the strengths of this study is the comparative evaluation of two different treatment protocols in a clinical setting.

5 Conclusion

The findings of the present study indicate that Ayurvedic treatment protocols can effectively reduce the clinical signs and symptoms associated with knee osteoarthritis. Both treatment protocols demonstrated improvement in pain, tenderness, oedema, crepitus, and joint mobility. However, the treatment protocol consisting of *Balāsahacharādi Kashāya* with *Dashāngalēpaya* showed comparatively greater improvement in clinical outcomes. These results highlight the potential role of Ayurvedic therapeutic approaches in the management of degenerative joint disorders and support their clinical relevance in improving patient quality of life.

Compliance with ethical standards

Acknowledgments

Authors express their sincere gratitude to the staff of Rural Ayurveda Hospital, Kesbewa, for their support during the clinical study. Appreciation is also extended to all the patients who voluntarily participated in this research.

Disclosure of conflict of interest

There is no conflict of interest regarding the publication of this paper.

Statement of ethical approval

Ethical approval was taken from the University to conduct the research at the Rural Ayurveda Hospital – Kesbewa.

Statement of informed consent

Informed written consent was taken from all the participants after providing the information sheet and advising.

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