ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Research Article

EFFECT OF *DHANWANTARAM TAILAM MATRAVASTI* ALONG WITH PHYSIOTHERAPY IN POST-IMMOBILIZATION STIFFNESS OF COLLES' FRACTURE - A COMPARATIVE CLINICAL TRIAL

Silpa S S[1]*, Subi N H[2], S Aneesh[3]

*[1]PG Scholar, [2]Professor and HOD, Department of Shalyatantra, Government Ayurveda College, Thiruvananthapuram, Kerala.

[3]Professor and HOD, Department of Shalyatantra, Government Ayurveda College, Kannur, Kerala, India.

Article info

Article History:
Received: 13-09-2026
Accepted: 19-10-2026
Published: 07-11-2026

KEYWORDS:
Colles' Fracture, Post-Immobilization Stiffness, *Matravasti, Dhanwantaram tailam,* Physiotherapy, Wrist range of motion.

ABSTRACT

Post-immobilization stiffness of the wrist is a common and disabling complication of Colles' fracture. Acharya Susruta recommends *Anuvasana Vasti* for fractures of the limbs *(Sakhagata Bhagna),* and *Matravasti*- a minimal-dose *Sneha Vasti* (oil enema therapy) that can be safely administered to any age group. **Objectives:** To evaluate the effect of *Dhanwantaram tailam matravasti* as an add-on to physiotherapy. **Materials and Methods:** A comparative clinical study was conducted in 32 participants (16 per group) aged 30–60 years. Patients in the trial cohort received a daily 15-day regimen of 60 mL *Dhanwantaram tailam mezhukupakam Matra Vasti* combined with physical therapy, contrasted with control subjects who received physical therapy alone. Wrist flexion, extension, radial deviation, ulnar deviation, pronation and supination were measured by a long-arm goniometer on days 0, 14 and 28; pain was assessed by the Visual Analogue Scale (VAS) on days 0, 7, 14, 21 and 28. Non-parametric tests (Friedman test within groups; Mann–Whitney U test between groups) were used, with significance set at $p<0.05$. **Results:** Baseline parameters were comparable between the two groups ($p>0.05$ for all ROM parameters and pain). By day 14, the trial group showed significantly greater improvement than the control group in all six ROM parameters ($p\leq0.002$), and this advantage was sustained to day 28. Pain scores were comparable between groups at days 0, 7, 14 and 21, but were significantly lower in the trial group by day 28 (median VAS 0 vs 2; $p=0.003$). No adverse effects were reported during the study. **Conclusion:** *Dhanwantaram tailam matravasti* as an add-on procedure to physiotherapy produced significantly better restoration of wrist range of motion and pain relief than physiotherapy alone in post-immobilization stiffness following Colles' fracture, and appears to be a safe adjunct to conventional rehabilitation.

INTRODUCTION

Fractures have been described in detail in classical Ayurvedic literature, and the surgical school of Acharya Susruta, in particular, provides a systematic account of bone injuries and their management long before the advent of radiography[1]. Effective management of a fracture and its complications is essential for restoring function and quality of life, and stiffness is among the commonest complications encountered after fracture treatment, with an overall prevalence of post-fracture stiffness of 25.7%[2]. Despite its frequency, treatment options for post-immobilization stiffness remain limited.

Colles' fracture - a fracture of the distal radius occurring within about 2.5cm of the wrist joint, typically characterized by dorsal comminution, dorsal angulation, dorsal displacement and radial shortening, and often accompanied by a fracture of the ulnar styloid- is one of the commonest fractures encountered in orthopedic practice, accounting for approximately 17.5% of all adult fractures[3]. Because most fractures and dislocations require a period of immobilization for adequate healing, patients frequently develop joint

Access this article online

Quick Response Code

https://doi.org/10.47070/ijapr.v14i10.4472

Published by Mahadev Publications (Regd.) publication licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

contractures, intra-articular adhesions, pain-related guarding and periarticular fibrosis, all of which restrict wrist mobility, reduce muscle strength and impair daily activities.

Physiotherapy is central to contemporary rehabilitation of post-immobilization stiffness, employing range-of-motion exercises, joint mobilization, strengthening techniques and modalities such as heat, cold and electrical stimulation to relieve pain and restore function. It represents the primary evidence-based conservative intervention in musculoskeletal disease management, demonstrating efficacy in functional restoration, pain reduction, disability prevention, and health-related quality of life improvement both as a standalone modality and as an adjunct to pharmacotherapy. However, in routine clinical practice, prolonged physiotherapy can be inconsistent, and residual stiffness may persist or recur, particularly among elderly patients and those with comorbidities such as osteoporosis, diabetes or arthritis[4,5,6].

In Ayurveda, fractures are described under the term *Bhagna*, and Acharya Susruta devotes a dedicated chapter, *Bhagna Chikitsa*, to their management; for fractures affecting the limbs *(Sakhagata Bhagna), Anuvasana Vasti* is specifically indicated. *Matravasti*, a minimal-dose variant of *Anuvasana Vasti* that can be safely administered across all age groups- from birth to old age *("Ajanma maranam sastam")*- without the preparatory *Snehana* and *Swedana* required for other forms of *Vasti*, is traditionally used in states of general debility and *Vata* vitiation, and is indicated in *Bhagna* owing to its nourishing *(Brimhana)* and *Vata*-pacifying actions[7]. *Dhanwantaram tailam*, described in classical texts such as *Ashtanga Hridaya* and *Sahasrayogam*, is widely used in *Vata*-dominant disorders and in injuries to bone and vital structures *(Marma),* making it a rational choice of oil for *Matravasti* in this setting [8,9].

In contemporary practice, patients often cannot sustain the long duration of physiotherapy required, particularly when the fracture is complicated by arthritis, osteoporosis or age-related decline in mobility, and recurrence of stiffness after a completed course of physiotherapy has also been observed. This provided the rationale for evaluating an Ayurvedic adjunct that could be administered alongside physiotherapy without additional burden on the patient. The present comparative clinical study was therefore undertaken to evaluate whether *Dhanwantaram tailam matravasti*, given as an add-on to physiotherapy, improves wrist range of motion and reduces pain in post-immobilization stiffness following Colles' fracture in adults aged 30–60 years, compared with physiotherapy alone.

OBJECTIVES

To compare the effect of *Dhanwantaram tailam matravasti* as an add-on procedure to physiotherapy with physiotherapy alone in the management of post-immobilization stiffness of Colles' fracture.

Primary Objective- Wrist range of motion (flexion, extension, radial deviation, ulnar deviation, pronation and supination), assessed using a long-arm goniometer.

Secondary Objective- Pain, assessed using the Visual Analogue Scale (VAS).

MATERIALS AND METHODS

Study Design

A comparative clinical study with a trial group and a control group.

Study Setting

OPD and IPD of the Department of Shalyatantra, Government Ayurveda College, Thiruvananthapuram, Kerala.

Study Population

Participants aged 30–60 years, irrespective of gender, presenting with Colles' fracture after completion of the immobilization period, who satisfied the inclusion and exclusion criteria and attended the OPD/IPD of the study setting, were enrolled.

Selection Criteria

Diagnostic criteria: Colles' fracture (with callus formation) was confirmed radiologically (X-ray of the wrist joint), and stiffness was diagnosed by clinical examination and goniometric assessment of wrist range of motion.

Inclusion criteria: Age 30–60 years, irrespective of gender; Colles' fracture confirmed by X-ray (with callus formation), completed period of immobilization; fulfilled diagnostic criteria; written informed consent obtained.

Exclusion criteria: Fracture with an open wound; known major systemic illness such as tuberculosis or bone malignancy; prior surgical management of the Colles' fracture.

Sample Size and sampling procedure

The sample size was calculated using $n=(Z\alpha/2 + Z\beta)^2\times(2\sigma)^2\div d^2$, based on a previous study in which stiffness was the primary outcome measure[10]. With a 95% confidence level ($Z\alpha/2=1.96$), 80% power ($Z\beta=0.84$), an effect size (d) of 0.6 and a standard deviation (σ) of 0.6 for wrist flexion, the calculated sample size was approximately 16 participants per group. After adjusting for an anticipated 10% dropout (n adjusted = n ÷ [1 − dropout rate]), the sample size was set at 18 participants per group. Participants were recruited consecutively until the required sample size was reached; a total of 32 participants (16 per group, without dropout) completed the study.

Intervention

Trial group: *Dhanwantaram tailam mehukupakam matravasti* (60ml) administered along with physiotherapy for 15 days.

Control group: Physiotherapy for 15 days.

Details of intervention

***Matravasti* Procedure**

a) **Materials used:** 100ml glycerin syringe, 60ml *Dhanwantaram tailam mehukupakam*, surgical gloves, kidney tray, gas stove and lighter (for warming the oil), and cotton cloth for *Sweda*.

Time of procedure – Around 12.30 pm

b) ***Poorvakarma*:** Participants were advised to take a light meal, neither excessively unctuous *(Snigdha)* nor excessively dry *(Rooksha),* limited to about three-fourths of the usual quantity, followed by Abhyanga with *Dhanwantaram tailam* over the upper body *(Adhakaya)* and local sudation *(Adhakaya Sweda).*

c) ***Pradhanakarma*:** The participant was positioned in the left lateral position with the left lower limb extended and the right lower limb flexed at the hip and knee, the left hand placed below the head. The anus was lubricated with *Dhanwantaram tailam*. 60ml of lukewarm *Dhanwantaram tailam mehukupakam* was drawn into a glycerin syringe, the tip lubricated with the same oil, and introduced per rectum while the participant took a deep breath; the oil was gently instilled with sustained and even pressure.

d) ***Paschatkarma*:** The participant was placed supine, the buttocks were gently tapped and the legs raised a few times to elevate the pelvis, after which the participant was allowed to rest before getting up.

Details of the Interventional Drug

Dhanwantaram tailam, prepared here as the *Mehukupakam* variety, is a classical medicated oil widely used in the Kerala Ayurvedic tradition for neurological, musculoskeletal and obstetric conditions[11]. It is described in *Ashtanga Hridaya, Sahasrayogam* and *Ashtanga Sangraha*, and is included in the Ayurvedic Formulary of India and the Kerala Ayurvedic Formulary. Prepared under *Sneha Kalpana* using sesame oil *(Tila taila)* as the base and processed by the classical *Taila Paka Vidhi*, it is indicated in *Vatavyadhi*, in injury to bone *(Asthi)* and vital structures *(Marma),* in general debility, and specifically in *Bhagna* (fracture)[12]. The formulation used in this study contained a *Kalka* (herbal paste) of 46 constituent drugs, combined with *Tila taila, Kashaya* (decoction) and *Ksheera* (cow's milk) in the classical proportion of 1:4:4:¼.

The general pharmacodynamic properties *(Rasapanchaka)* of the formulation are summarized in Table 1[13].

Table 1: General pharmacodynamic properties *(Rasapanchaka)* of *Dhanwantaram tailam mehukupakam*

Property	Value	Implication
Rasa (taste)	*Madhura, Tikta, Kashaya*	Pacifies *Vata* and *Pitta*; reduces inflammation
Guna (physical quality)	*Snigdha, Guru, Sukshma*	Deep tissue penetration; nourishment; lubricates joints and nerves.
Veerya (potency)	*Ushna* (mild)	Activates metabolic channels; counteracts *Vata*
Vipaka (post-digestive effect)	*Madhura*	Promotes tissue anabolism; nourishes *Dhatus*
Prabhava (special effect)	*Vatahara, Balya, Brimhana*	Specific affinity for neuromuscular and musculoskeletal systems

Preparation of the Drug

Dhanwantaram tailam mehukupakam was prepared following the classical *Taila Paka Vidhi*[14]: the raw drugs were authenticated and processed (dried, powdered, or converted to *Kalka*); a *Kashaya* (decoction) was prepared by boiling the herbs in water and reducing it to one-fourth of the original volume; the *Kalka* was prepared separately; *Tila taila*, the *Kashaya, Ksheera* and *Kalka* were combined in the proportion 1:4:4:¼; the mixture was heated with continuous stirring until the aqueous content evaporated and the oil reached *Madhyama Paka* (confirmed by the *Varti Pariksha*, in which a wick rolled from the *Kalka* burns without crackling or smoke); the finished oil was filtered and stored in clean, airtight containers. The finished oil and the glycerin syringes used for administration were purchased from a GMP-certified manufacturer, and physiotherapy was supervised throughout by a qualified physiotherapist.

Physiotherapy Protocol

Both groups received active and passive movements for wrist stiffness for one hour daily for 15 days, comprising patient education, range-of-motion exercises, joint mobilization and progressive resistive exercises; participants were advised to avoid lifting weights until permitted[15]. The graded protocol followed is summarized in Table 1.

Table 2: Physiotherapy protocol followed by both groups[16]

Treatment Days	Components
Day 1–3	Gentle myofascial release (5 min); Grade 1 wrist mobilization- flexion and extension (20 min); ROM exercise with finger exerciser and isometric strengthening- flexion, extension, ulnar and radial deviation (30 min); passive stretching (5 min)
Day 4–7	Deep myofascial release (10 min); Grade 2 wrist mobilization- flexion, extension, radial and ulnar deviation (10 min); active ROM (10 min); active-assisted strengthening (10 min); grip strengthening (10 min); active stretching (10 min)
Day 8–12	Grade 3 wrist mobilization including wrist rotation (20 min); ROM exercise with 1kg dumbbell (10 min); active strengthening and active stretching (20 min); grip strengthening (10 min)
Day 13–15	Grade 3 wrist mobilization (20 min); strengthening with TheraBand and dumbbells (15 min); ROM exercise with 1 kg dumbbell (10 min); finger strengthening and full active stretching (15 min)

Outcome Measures

Objective Criteria: Wrist range of motion- flexion, extension, radial deviation, ulnar deviation, pronation and supination- was measured in degrees using a long-arm goniometer on days 0, 14 and 28. Normal reference ranges used were: flexion 0–73°, extension 0–71°, radial deviation 0–19°, ulnar deviation 0–33°, supination 0–140° and pronation 0–70°.

Subjective criteria: Pain was assessed using the Visual Analogue Scale (VAS) on days 0, 7, 14, 21 and 28.

Data Analysis

Statistical analysis was performed using Jamovi version 2.7.18, with significance set at $p<0.05$. Categorical variables were summarized as frequencies and percentages, and continuous variables as medians with interquartile ranges (IQR), as the Shapiro–Wilk test indicated that most outcome variables were not normally distributed. Within-group comparisons across time points were performed using the Friedman test (non-parametric repeated-measures ANOVA) with Durbin–Conover pairwise comparisons, and between-group comparisons at each time point were performed using the Mann–Whitney U test.

Ethical Consideration

Confidentiality of participant information was maintained throughout the study. Ethical clearance was obtained from the Institutional Ethics Committee, Government Ayurveda College, Thiruvananthapuram (IEC: 854/2/2024, dated 25/05/2024). The study was registered with the Clinical Trial Registry of India (CTRI/2024/08/073032, dated 28/08/2024). Informed consent obtained from all participants. After the study period those participants whose symptoms persisted got the standard treatment.

OBSERVATIONS AND RESULTS

Thirty-two participants with post-immobilization stiffness following Colles' fracture were selected consecutively from the OPD and IPD of the Department of Shalyatantra, Government Ayurveda College, Thiruvananthapuram, and allocated consecutively to the trial and control groups (16 each). *Dhanwantaram tailam mehukupakam matravasti* (60 mL) was administered daily for 15 days around 12.30 pm as an add-on to physiotherapy in the trial group; the control group received physiotherapy alone for 15 days. Range of motion was assessed on days 0, 14 and 28, and pain on days 0, 7, 14, 21 and 28. The first participant was enrolled on 25/10/2024 and the last on 12/02/2026.

Demographic and Baseline Clinical Profile

Both groups were broadly comparable at baseline. All participants fell within the 40–60-year age band despite the wider 30–60-year inclusion criteria, with the majority (65.6%) aged 51–60 years. Females predominated overall (78.1%), and housewives formed the largest single occupational group (53.1%). Most participants resided in rural areas (65.6%) and belonged to the middle socioeconomic class. Stiffness had persisted beyond six months (up to one year) in 59.4% of participants, and 65.6% had undergone eight weeks of prior immobilization; the type of immobilization was similarly distributed between groups (68.8% plaster-of-Paris cast, 31.3% splinted bandage). Diabetes was the most common comorbidity, present in 37.5% of participants in each group. Rehabilitation was delayed after removal of immobilization in 31 of 32 participants (96.9%). The demographic and baseline profile is summarized in Table 3.

Table 3: Demographic and baseline clinical profile of participants (n = 32)

Distribution	Category	Number	%
Age (years)	40–50	11	34.4
	51–60	21	65.6
Gender	Male	7	21.9
	Female	25	78.1
Domicile	Rural	21	65.6
	Urban	11	34.4
Occupation	Housewife	17	53.1
	Housemaid	4	12.5
	Others (carpenter, electrician, retired, plumber, sales, tailor, teacher, unemployed)	11	34.4
Chronicity of stiffness	≤ 6 months	13	40.6
	> 6 months (up to 1 year)	19	59.4
Duration of prior immobilization	6 weeks	11	34.4
	8 weeks	21	65.6
Type of immobilization	Plaster-of-Paris cast	22	68.8
	Splinted bandage	10	31.3
Comorbidity	Nil	11	34.4
	Diabetes mellitus	12	37.5
	Thyroid dysfunction	5	15.6
	Thyroid dysfunction with diabetes	3	9.4
	Osteoporosis	1	3.1
Delayed initiating of rehabilitation after immobilization	Yes	31	96.9
	No	1	3.1

Note: Percentages are of the total sample (n = 32).

Within-Group Comparison

Both groups showed statistically significant change over the study period for every parameter on the Friedman test (Table 4).

Table 4: Within-group comparison (Friedman test) of range of motion and pain scores

Parameter	Trial χ^2	df	Trial p	Control χ^2	df	Control p
Flexion	32	2	< 0.0001	30.88	2	< 0.0001
Extension	32	2	< 0.0001	30.88	2	< 0.0001
Radial deviation	32	2	< 0.0001	31.388	2	< 0.0001
Ulnar deviation	32	2	< 0.0001	30.88	2	< 0.0001
Pronation	32	2	< 0.0001	30.88	2	< 0.0001
Supination	32	2	< 0.0001	30.88	2	< 0.0001
Pain (VAS)	62.628	4	< 0.0001	62.808	4	< 0.001

Note: df = degrees of freedom. For all ROM parameters in the trial group, the day 14 vs day 28 pairwise (Durbin–Conover) comparison could not be computed as median values were unchanged between the two time points; in the control group, the corresponding day 14 vs day 28 comparison was statistically significant (p=0.0471) for every ROM parameter, indicating small continued improvement after day 14.

Effect on Wrist Range of Motion

At baseline, the trial and control groups were comparable for all six ROM parameters (p>0.05 for all comparisons; Table 5). By day 14, the trial group showed significantly greater improvement than the control group in flexion, extension, radial deviation, ulnar deviation, pronation and supination (p≤0.002 for all), and this advantage was maintained through day 28 (p≤0.001 for all). On within-group analysis (Friedman test), both groups improved significantly over time for every ROM parameter (p<0.0001; Table 4). In the trial group, median values reached by day 14 remained essentially unchanged at day 28 for every ROM parameter, indicating that maximum improvement was achieved within the 15-day treatment period and sustained through follow-up. In the control group, a small but statistically significant further improvement occurred between day 14 and day 28 for every ROM parameter (Durbin–Conover pairwise p=0.0471), indicating slower, still-ongoing recovery with physiotherapy alone that had not maintained by day 28.

Table 5: Comparison of wrist range of motion (degrees) between the trial and control groups at baseline, day 14 and day 28 (Mann–Whitney U test)

ROM Parameter	Day	Trial Group Median (IQR)	Control Group Median (IQR)	Z	p
Flexion	0	13.5 (10–21)	11 (10–20)	−0.85	0.39
	14	50 (47.5–52.5)	40 (40–45)	3.5	0.001
	28	50 (47.5–52.5)	40 (40–45)	3.7	0.001
Extension	0	11 (10–12)	10 (10–10)	−1.1	0.27
	14	57.5 (55–60)	42.5 (40–45)	4.5	0.001
	28	57.5 (55–60)	42.5 (40–45)	4.6	0.001
Radial deviation	0	5 (5–6)	5 (5–5)	−0.3	0.75
	14	15 (12–15)	10 (9–11)	3.2	0.002
	28	15 (12–15)	10 (9–11)	3.4	0.001
Ulnar deviation	0	10 (8–10)	9 (8–10)	−0.9	0.36
	14	23.5 (20.5–25)	18.5 (15–20)	3.3	0.001

	28	23.5 (20.5–25)	17 (15–19)	3.4	0.001
Pronation	0	20 (20–22)	20 (20–20)	−0.4	0.68
	14	60 (55–60)	42.5 (38–45)	4.1	0.001
	28	60 (55–60)	40 (38–45)	4.1	0.001
Supination	0	20 (20–22)	20 (20–20)	−0.3	0.76
	14	60 (50–60)	40 (38–45)	4.0	0.001
	28	60 (50–60)	40 (38–45)	4.0	0.001

Note: p < 0.05 = Statistically Significant. IQR = Interquartile Range.

Effect on Pain (VAS)

Pain scores were comparable between the two groups at baseline (p=0.816) and remained comparable at days 7 (p=0.890), 14 (p=0.557) and 21 (p=0.236), although both groups showed progressive reduction in pain on within-group analysis (Friedman test, p<0.0001 for both groups; Table 4). By day 28, the trial group showed significantly lower pain scores than the control group (median VAS 0 vs 2; p=0.003; Table 6). Pairwise within-group comparisons showed that pain continued to reduce significantly in the trial group between day 21 and day 28 (p<0.0001), whereas in the control group the reduction in pain between day 21 and day 28 was not statistically significant (p=0.1077).

Table 6: Comparison of pain (VAS score) between the trial and control groups at different assessment days (Mann–Whitney U test)

Day	Trial Group Median (IQR)	Control Group Median (IQR)	Z	p
0	6 (5–7)	6 (5–7)	−0.232	0.816
7	4.5 (4–5)	4 (4–5)	−0.138	0.890
14	3 (2–3.3)	3 (2–4)	−0.588	0.557
21	1 (0.8–2)	2 (1–3)	−1.184	0.236
28	0 (0–1)	2 (1–2.3)	−2.928	0.003

Note: p < 0.05 = Statistically Significant. IQR = Interquartile Range.

DISCUSSION

Distal radius fractures are among the commonest fractures in adults, and stiffness is a well-recognized complication even when the bone unites satisfactorily[16]. Post-immobilization stiffness after Colles' fracture arises from a combination of joint contracture, intra-articular adhesion, muscle weakness and pain-related avoidance of movement, all of which restrict wrist mobility and function[17]. Physiotherapy remains the standard of care, using active and passive exercise, joint mobilization, strengthening and heat-based modalities to restore function and limit long-term disability[18], but many patients continue to have incomplete recovery, particularly with prolonged immobilization or comorbidities such as diabetes, osteoporosis or thyroid dysfunction. This study therefore examined whether adding *Dhanwantaram tailam matravasti* to standard physiotherapy improves outcomes compared with physiotherapy alone.

Demographic and Baseline Profile

The age distribution- confined to the 40–60-year band despite the wider 30–60-year inclusion window, with most participants in the 51–60-year range- reflects the typical epidemiology of Colles' fracture in middle-aged and older adults[3]. The marked female preponderance (78.1%) is consistent with the higher fracture incidence reported in postmenopausal women, secondary to oestrogen-deficiency-related bone loss[19,20]. Housewives and manual-labour occupations predominated in both groups, and most participants were of rural residence and middle socioeconomic status, suggesting that many participants may have faced practical difficulties to sustained outpatient physiotherapy. Delay in initiating rehabilitation after removal of immobilization was near-universal (31 of 32 participants), consistent with the recognized importance of early rehabilitation in preventing joint

stiffness[21,22]. The duration (predominantly 8 weeks) and type of immobilization (68.8% plaster-of-Paris, 31.3% splinted bandage), in line with conservative management protocols that recommend prolonged immobilization for unstable or displaced Colles' fractures[23], and the proportion with diabetes (37.5% in each group) were similar between groups, supporting baseline comparability and the internal validity of the between-group comparisons.

Effect on Range of Motion

Both groups improved significantly over time on within-group testing across all six ROM parameters. However, on between-group comparison, the trial group showed significantly greater median gains than the control group by day 14 in flexion, extension, radial deviation, ulnar deviation, pronation and supination, and this advantage was sustained without loss through day 28. In the trial group, the median values reached by day 14 were essentially unchanged at day 28, suggesting that maximum benefit was achieved within the 15-day treatment period and maintained through the follow-up period. The control group, in contrast, showed a small but statistically significant further improvement between day 14 and day 28 for every parameter, consistent with slower, more gradual recovery under physiotherapy alone that had not maintained by day 28. The magnitude of these differences appears clinically relevant- for example, flexion improved to a median of 50° in the trial group versus 40° in the control group, and pronation and supination each improved to 60° in the trial group versus 40–42.5° in the control group by day 14- differences that are likely to be meaningful for daily activities such as gripping, lifting and handling objects that require coordinated wrist and forearm movement.

Effect on Pain

Pain scores fell progressively in both groups on within-group analysis, and no between-group difference was evident at days 0, 7 or 14, indicating that physiotherapy contributed substantially to early pain relief in both arms. A trend favouring the trial group emerged by day 21, which became statistically significant by day 28, while the control group's pain reduction had stable between days 21 and 28. This pattern suggests that *Dhanwantaram tailam matravasti* may produce a cumulative, sustained analgesic effect that becomes clinically apparent later in the treatment course rather than immediately.

These findings led to rejection of the null hypothesis: *Dhanwantaram tailam matravasti* as an add-on procedure to physiotherapy produced a statistically and clinically meaningful difference in wrist range of motion and pain compared with physiotherapy alone.

Probable Mode of Action

In Ayurvedic terms, post-immobilization stiffness can be interpreted as a state of aggravated *Vata* arising from *Dhatu Kshaya* and *Margavarodha*, manifesting as *Rukshata* (dryness), *Sheetata* (coldness) and *Sthambha* (stiffness). *Matravasti*, administered as a small quantity of medicated oil such as *Dhanwantaram tailam*, acts predominantly by regulating *Apana Vata* and restoring overall *Vata* balance; its *Snehana* property improves tissue lubrication and flexibility, reducing capsular stiffness, while its *Brimhana* effect nourishes muscle and connective tissue affected by disuse[27]. The formulation is also credited with anti-inflammatory and analgesic properties that facilitate active participation in physiotherapy, and with enhancing microcirculation and neuromuscular function[28]. Because it seems like *Matravasti* principally addresses the soft-tissue consequences of immobilization in addition to the bone union, its benefit would be expected mainly during the remodeling phase of fracture healing, which is consistent with the pattern of improvement observed in this study.

These findings are broadly consistent with earlier Ayurvedic clinical reports. Case reports by Koriya and Dudhamal, and by Alias Benny et al., described improvement in wrist mobility and function with lukewarm *Murivenna taila Parisheka*, or *Murivenna* bandaging combined with internal Abha Guggulu, in post-fracture stiffness, although without control groups[29,30]. In a study of *Sandhigatavata, Shah* et al. reported that *Bala taila matravasti* produced a significant reduction in pain and stiffness with continued improvement on follow-up, attributed to *Vata Shamana* and improved local circulation- mechanisms similar to those proposed here[31]. Biomechanical studies indicate that forearm position (pronation/supination) influences ulnar variance and carpal ligament tension[32], and the marked improvement in pronation and supination observed in the trial group in the present study suggests that the combination of *Matravasti* and physiotherapy benefits not only simple flexion–extension but also the more complex rotational movements important for grip and fine-motor tasks. External oleation therapies such as *Murivenna* and *Jingini taila* bandaging have similarly been reported to reduce pain and promote early functional recovery in fracture management[33].

Overall, the evidence from this comparative study, together with prior Ayurvedic case reports, interventional studies and biomechanical literature, supports integrating *Dhanwantaram tailam matravasti* with conventional physiotherapy in the rehabilitation of post-immobilization stiffness following Colles' fracture.

CONCLUSION

Dhanwantaram tailam matravasti, when combined with structured physiotherapy, produced significantly greater improvement in wrist flexion, extension, radial deviation, ulnar deviation, pronation and supination at day 14 and day 28 ($p<0.05$) than physiotherapy alone, in patients with post-immobilization stiffness following Colles' fracture. Both groups were comparable at baseline, supporting the reliability of these findings. By day 28 the trial group had achieved considerable pain relief while the control group still reported mild pain. No adverse events attributable to the *Matravasti* procedure were observed during the study, confirming its safety. This indicates that *Dhanwantaram tailam matravasti* can be considered a safe and effective adjunct to physiotherapy in the rehabilitation of post-immobilization wrist stiffness after Colles' fracture.

Limitations and Strengths

The sample size was relatively small, limiting generalizability; some patients showed reluctance to consent to *Matra Vasti* therapy; individual variation in pain tolerance may have influenced VAS-based pain outcomes; and the follow-up period was relatively short.

REFERENCES

1. Susruta. Susruta Samhita, Chikitsa Sthana, Bhagna Chikitsa Adhyaya. Acharya YT, editor. Varanasi: Chaukhambha Surbharati Prakashan; 2019. p.45–58.
2. Court-Brown CM, Caesar B. Epidemiology of adult fractures: a review. Injury. 2006; 37(8): 691–7.
3. Nellans KW, Kowalski E, Chung KC. The epidemiology of distal radius fractures. Hand Clin. 2012; 28(2): 113–25
4. Grewal R, MacDermid JC. The risk of adverse outcomes in extra-articular distal radius fractures is increased with malalignment in patients of all ages but mitigated in older patients. J Hand Surg Am. 2007; 32(7): 962–70.
5. Kisner C, Colby LA, Borstad J. Therapeutic Exercise: Foundations and Techniques. 7th ed. Philadelphia: F.A. Davis Company; 2017. p.120–45.
6. Michlovitz SL, Nolan TP Jr. Modalities for Therapeutic Intervention. 6th ed. Philadelphia: F.A. Davis Company; 2012. p.210–35.
7. Vagbhata. Ashtanga Hridaya, Sutra Sthana, Basti Vidhi Adhyaya, Chapter 19, Verse 67. Murthy KRS, translator. Varanasi: Chaukhambha Krishnadas Academy; 2012. p.235.
8. Sharma PV. Sahasrayogam. Varanasi: Chaukhambha Sanskrit Series Office; 2015. p.312–5.
9. Vagbhata. Ashtanga Hridaya, Chikitsa Sthana. Paradakara HS, editor. Varanasi: Chaukhambha Orientalia; 2016. p.731–5.
10. Lee DY, Choi YL. Risk factors of wrist stiffness after treatment for distal radius fractures. J Korean Orthop Assoc. 2015; 50(6): 456–63.
11. Srikantha Murthy KR. Ashtanga Hridaya of Vagbhata, Vol. I (Sutrasthana). Varanasi: Chaukhambha Krishnadas Academy; 2012. p.190–2.
12. Krishnan Vaidyan KV, Pillai S. Sahasrayogam. 3rd ed. Alappuzha: Vidyarambham Publishers; 2013. p.129–31.
13. Government of India, Ministry of Health and Family Welfare. The Ayurvedic Formulary of India. Part I. 2nd ed. New Delhi: Controller of Publications; 2003. p.98–9.
14. Sharma PV. Dravyaguna Vijnana. Vol. I. Varanasi: Chaukhambha Bharati Academy; 2013. p.45–9.
15. Physiopedia. Colles' fracture post-operative rehabilitation protocol [Internet]. Physiopedia; [cited 2026 May 23]. Available from: https://www.physio-pedia.com/Colles_Fracture_Post-Operative_Rehabilitation_Protocol
16. Jayant Joshi, Prakash Kotwal, Essentials of orthopaedics and applied physiotherapy. Second ed. Elsevier 2011 p no 119-121
17. Ikpeze TC, Smith HC, Lee DJ, Elfar JC. Distal radius fracture outcomes and rehabilitation. Orthop Clin North Am. 2016; 47(2): 299–309.
18. Kong L, Zhai Y, Zhang Z, Lu J, Zhang B, Tian D. Radiocarpal joint stiffness following surgical treatment for distal radius fractures: the incidence and associated factors. J Orthop Surg Res. 2020; 15(1): 274.
19. Meijer HAW, Graafland N, Obdeijn MC, Goslings JC, Schep NWL. Rehabilitation after distal radius fractures: opportunities for improvement. Open Orthop J. 2023; 17: 1–10.
20. Cummings SR, Melton LJ. Epidemiology and outcomes of osteoporotic fractures. Lancet. 2002; 359(9319): 1761–7.
21. Riggs BL, Melton LJ. The worldwide problem of osteoporosis: insights afforded by epidemiology. Bone. 1995; 17(5 Suppl): 505S–11S.
22. Valdes K. Effective mobilization after cast immobilization for distal radius fractures. J Hand Ther. 2009; 22(1): 5–12.
23. Wakefield AE, McQueen MM. The role of physiotherapy and clinical predictors of outcome after fracture of the distal radius. J Bone Joint Surg Br. 2000; 82(7): 972–6.
24. Handoll HHG, Madhok R. Conservative interventions for treating distal radial fractures in adults. Cochrane Database Syst Rev. 2003; (2): CD000314.

25. Huda A, Prasad MR, Chandrakumar G, Sivakumar CS. A comparative study to evaluate the efficacy of splinted bandage with Murivenna and plaster of Paris in the management of Colles fracture. Int Ayurvedic Med J. 2018; 2(3): 991–7.
26. Loder RT. The influence of diabetes mellitus on the healing of closed fractures. Clin Orthop Relat Res. 1988; (232): 210–6.
27. Biondi B, Cooper DS. The clinical significance of subclinical thyroid dysfunction. Endocr Rev. 2008; 29(1): 76–131.
28. Sreekumar T. Ashtanga Hridaya Sutrasthana. Thrissur: Harisree Hospital Publication Department; 2008. p.188–94, 512–26.
29. Nishteswar K, Vidyanath R. Sahasrayogam with Sujanapriya commentary. Alappuzha: Vidyarambham Publishers; 2012. p.287–9.
30. Koriya H, Dudhamal TS. Management of post-fracture stiffness following Colles' fracture through Ayurvedic interventions: a case report. Ayurlog. 2020; 8(4): 1–5.
31. Alias Benny G, Varghese T, Vijayakumar S, Robin DT. Effective management of Colles fracture using Murivenna and Abha Guggulu- a case report. J Ayurveda Integr Med. 2023; 14(4): 100786.
32. Shah MR, Patel RM, Prajapati PK. Clinical evaluation of matrabasti and indigenous compound in Sandhigatavata. AYU. 2012; 33(2): 222–6.
33. Epner RA, Bowers WH, Guilford WB. Ulnar variance- the effect of wrist positioning and roentgen filming technique. J Hand Surg Am. 1982; 7(3): 298–305.
34. Sharma RK, Gupta N, Singh V. Effect of Jingini taila bandaging in the management of fractures and soft tissue injuries. AYU. 2016; 37(3–4): 210–4.

Cite this article as:
Silpa S S, Subi N H, S Aneesh. Effect of Dhanwantaram Tailam Matravasti Along with Physiotherapy in Post-Immobilization Stiffness of Colles' Fracture - A Comparative Clinical Trial. International Journal of Ayurveda and Pharma Research. 2026;14(10):140-149.
https://doi.org/10.47070/ijapr.v14i10.4472
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Silpa S S
PG Scholar
Department of Shalyatantra,
Government Ayurveda College,
Thiruvananthapuram, Kerala.
Email: shilpasreekumar189@gmail.com

Disclaimer: IJAPR is solely owned by Mahadev Publications - dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJAPR cannot accept any responsibility or liability for the articles content which are published. The views expressed in articles by our contributing authors are not necessarily those of IJAPR editor or editorial board members.