

# Efficacy Of *Prachanna Karma* Using a Derma Roller in *Khalitya* Vis-À-Vis Androgenetic Alopecia: An Open-Label Randomized Controlled Clinical Study

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**Abstract—Background:** *Khalitya* is an Ayurvedic description of progressive hair loss and has been correlated in the present study with androgenetic alopecia (AGA). *Prachanna Karma*, a form of *Shastrakrita Raktamokshana*, is traditionally used for localized pathological conditions. A Derma Roller provides multiple controlled punctures over a wider scalp area and may offer a standardized alternative to individual puncture using an insulin needle. **Objective:** To evaluate the efficacy of *Prachanna Karma* performed using a Derma Roller in patients with *Khalitya* and compare its efficacy with *Prachanna Karma* performed using an insulin needle. **Methods:** An open-label, randomised controlled clinical study was conducted on 40 patients diagnosed with *Khalitya*. Participants were randomly allocated into two groups of 20 each. Group A received *Prachanna Karma* using a Derma Roller, while Group B received *Prachanna Karma* using an insulin needle. Procedures were performed on days 0, 7, 14 and 21, and assessments were conducted on days 0, 28 and 56. Subjective parameters included *Kesha Bhoomi*, *Kesha Bhoomi Rukshata*, *Kesha Bhoomi Kandu*, *Darunaka* and Pull Test. Objective parameters included the Modified Norwood–Hamilton Scale, hair density, hair diameter and hair root gap. **Results:** Both groups showed improvement in most assessed outcomes by day 56. *Kesha Bhoomi* improved by 43.90% in Group A and 36.84% in Group B, with statistically significant within-group improvement in both groups ( $P < 0.001$ ); however, the between-group difference was not statistically significant ( $P = 0.1898$ ; rank-biserial correlation = 0.19). *Kesha Bhoomi Rukshata* improved by 48.72% in Group A and 48.39% in Group B, with no statistically significant between-group difference ( $P = 0.2542$ ). *Kesha Bhoomi Kandu* improved by 83.33% in Group A and

66.67% in Group B. The between-group difference was statistically significant during the first 28 days ( $P = 0.0381$ ; rank-biserial correlation = 0.35), but not over the overall 0–56-day period ( $P = 0.2842$ ). Hair density increased by 11.78% in Group A and 7.64% in Group B, with no statistically significant between-group difference ( $P = 0.1103$ ; Cohen's  $d = 0.52$ ). Hair diameter increased by 12.66% in Group A and 9.52% in Group B ( $P = 0.5737$ ; Cohen's  $d = 0.18$ ). Modified Norwood–Hamilton scores improved by 23.45% in Group A and 22.58% in Group B, with no statistically significant between-group difference ( $P = 0.1619$ ). The Pull Test remained unchanged in both groups. Overall, 80% of participants in Group A (10% marked and 70% moderate improvement) and 25% in Group B demonstrated moderate or marked improvement. **Conclusion:** Both Derma Roller and insulin-needle *Prachanna Karma* were associated with improvement in clinical and objective parameters of *Khalitya* over 56 days. Derma Roller treatment demonstrated a faster improvement in scalp itching and numerically greater improvement in several hair-growth measures, but the study did not demonstrate statistically significant overall superiority of the Derma Roller over the insulin needle.

**Index Terms—**Androgenetic Alopecia, Derma Roller, Hair diameter, Hair density, *Khalitya*, Microneedling, *Prachanna Karma*. Trial registration: Clinical Trials Registry–India, CTRI/2025/06/088614.

## I. INTRODUCTION

Hair has important protective, thermoregulatory, sensory, aesthetic and psychosocial functions. Hair loss and progressive thinning can adversely affect

appearance, self-esteem and psychological well-being, particularly when it occurs in young adults.

Androgenetic alopecia is a chronic, progressive disorder characterised by patterned scalp hair loss and follicular miniaturisation. The pathophysiology of androgenetic alopecia is related to genetic susceptibility, androgen activity, altered hair-cycle dynamics and local follicular changes.<sup>1-4</sup>

Ayurveda describes Khalitya in several classical texts. Sushruta places Khalitya among the Kshudra Rogas, while Vagbhata describes it among Kapalagata Rogas and differentiates the gradual hair loss of Khalitya from the more abrupt loss described in Indralupta. Charaka discusses Khalitya in relation to Urdhvajatrugata disorders and also identifies dietary factors such as excessive consumption of Lavana and Kshara as relevant etiological factors.<sup>5,6</sup>

According to the Ayurveda, pathogenesis of Khalitya is, vitiated Pitta and Vata reach the Romakupa and contribute to hair fall, while Kapha and Rakta produce obstruction that interferes with further hair regeneration. Prachanna Karma, a form of Shastra-krita Raktamokshana involving multiple small punctures or incisions over a wider area, is therefore proposed as a suitable intervention for relieving local obstruction and stimulating the scalp. Microneedling and related procedures have also been investigated in modern dermatology for hair-loss disorders. Controlled microtrauma may produce a wound-healing response and local tissue stimulation, and clinical studies have reported potential benefits of microneedling in AGA.<sup>9-11</sup>

Although an insulin needle is used clinically for localized Prachanna Karma, a Derma Roller can produce multiple punctures over a broader scalp surface in a relatively uniform manner.

The integration of *Prachanna Karma* with derma roller technology represents a convergence of classical *Ayurvedic* principles and modern dermatological techniques. The present study was therefore designed to compare Derma Roller *Prachanna Karma* with insulin-needle *Prachanna Karma* in patients with Khalitya.

## II. AIMS AND OBJECTIVES

**Aim:** To determine the significance of Derma Roller as *Prachanna Karma* Instrument in the management of *Khalitya*.

**Primary Objective:** To understand the efficiency of the Derma Roller as *Prachanna Karma* Instrument in the management of *Khalitya*

**Secondary Objective:** To compare the efficiency of Derma Roller and Insulin needle as a tool for *Prachanna Karma* in the management of *Khalitya*.

## III. METHODS

**Study design and Open Science Commitments Design:** open-label, Parallel-group, Double-arm, randomized controlled clinical study.

**Open Science and Data Availability:** Complete raw datasets, scoring sheets and analytical codes

**Eligibility Criteria:** Patients presenting with patterned scalp hair loss compatible with Khalitya were screened for eligibility.

### Inclusion Criteria

Participants were eligible if they:

- Had patterned hair loss involving the scalp.
- Were of either sex.
- Were aged 18–60 years.

### Exclusion Criteria

Patients were excluded if they had:

- Alopecia areata, alopecia totalis or alopecia universalis, Tinea capitis, Trichotillomania or Traumatic alopecia.
- Abnormal clotting or bleeding time.
- Immunocompromised conditions, including HIV or HBsAg positivity.

**Settings and Locations Conducted at** Muniyal Institute of Ayurveda Medical Sciences, Manipal, Karnataka, India. Participants were recruited from the outpatient and inpatient departments of Shalya Tantra and Shalakya Tantra.

**Interventions** Group A: *Prachanna Karma* using a Derma Roller. Group B: *Prachanna Karma* using an insulin needle.

**Trial Instrument:** Derma Roller as standardized to ZGTS 192 model, model number ZGTS 100

**No. of needles:** 192 needles total in 8 rows, with 24 needles per row (8 x 24 = 192).

**Needle length:** 1.0mm

Needle diameter / thickness: ~0.25mm - 0.3mm  
 Derma roller dimensions: 13cm L x 6cm W x 6cm H  
 Weight: 80g – 100g.  
 Creating ~15 Pricks/puncture per cm<sup>2</sup> per 1 roll.

Controlled Instrument: Insulin Syringe (Fixed needle)  
 Needle length: 8mm, 30G sized, 30 units capacity  
 syringe with ~10cm total length

#### Administration:

Before treatment, in both the groups the scalp was examined and cleansed with povidone-iodine solution. In Group A, the Derma Roller was made aseptic using spirit and allowed to dry. The Derma Roller was rolled over the affected scalp with moderate pressure until drops of blood appeared which was considered the procedural endpoint.

In Group B, Prachanna karma was performed using a sterile insulin needle, with approximately 10 punctures/cm<sup>2</sup> and an approximate depth of 1–2 mm until drops of blood appeared.

Treatment was performed on days 0, 7, 14 and 21. Assessments were performed at baseline, day 28 and day 56.

Outcomes and Measurement Subjective Outcomes: The following clinical parameters were assessed: Kesha Bhoomi, Kesha Bhoomi Rukshata, Kesha Bhoomi Kandu, Darunaka and Pull Test.

Objective Outcomes: Objective assessment included: Modified Norwood-Hamilton Scale, Hair density, Hair diameter and Hair root gap.

Hair density, hair diameter and hair root gap were assessed using a Folliscope-based hair analyser. Pain during each treatment sitting was assessed using the Visual Analog Scale (VAS).

#### Sample-Size Considerations:

The dissertation estimated an initial sample size of 374 using an expected prevalence of 42%, a 95% confidence level and a 5% margin of error. Because of the limited duration of the postgraduate research programme, the final sample was reduced to 40 participants. These participants were randomized into two groups of 20 using a randomization table.

#### Randomization and Sequence Generation:

Participants were randomly assigned in a 1:1 ratio to either Group A or Group B using a simple computer-generated random allocation sequence.

#### Allocation Concealment and Implementation:

Allocation sequence was implemented using sequentially numbered, opaque, sealed envelopes (SNOSE) opened only upon signed informed consent and baseline confirmation

#### Harms & Adverse Event Protocol

Standardized monitoring for adverse device reactions, localized allergic contact dermatitis, excessive burning, or secondary infection spread was executed at every sitting.

### IV. RESULTS

#### Participant Flow

Assessed for Eligibility: N = 43

Excluded: N = 3 (declined to participate and others).

Drop out: N=0

Randomized (N = 40):

#### ➤ Allocated to Group A (Derma roller): n = 20

- Received allocated intervention: n = 20
- Lost to follow-up: n = 0
- Completed study & analyzed: n = 20

#### ➤ Allocated to Group B (Insulin needle): n = 20

- Received allocated intervention: n = 20
- Lost to follow-up: n = 0
- Completed study & analyzed: n = 20

A total of 40 participants were included in the study, with 20 participants each in Group A, who received Prachanna Karma using a derma roller, and Group B, who received Prachanna Karma using an insulin needle.

The outcomes were assessed at baseline and on follow-up, with the final assessment performed on Day 56. Within-group changes were evaluated using the Wilcoxon signed-rank test or paired *t*-test, as appropriate, while between-group comparisons were performed using the Mann–Whitney U test or unpaired *t*-test. A *P* value of less than 0.05 was considered statistically significant.

### Baseline Data

At baseline, the two groups were statistically comparable with respect to Kesha Bhoomi ( $P = 0.3787$ ), Kesha Bhoomi Rukshata ( $P = 0.1007$ ), Kesha Bhoomi Kandu ( $P = 0.8587$ ), Pull Test ( $P = 1.0000$ ), hair density ( $P = 0.8424$ ), hair diameter ( $P = 0.5118$ ), and hair root gap ( $P = 0.2347$ ). The baseline Darunaka comparison was also reported as statistically nonsignificant ( $P = 0.3930$ ).

In contrast, statistically significant baseline differences were observed in scalp photography scores ( $P = 0.0041$ ) and Modified Norwood–Hamilton Scale scores ( $P = 0.0067$ ). Group A had higher mean scores for both parameters than Group B at baseline.

### Participants Characteristics

The population was predominantly young: 42.5% were aged 21–23 years, 22.5% were aged 24–26 years, 25% were aged 27–29 years and 10% were aged 30–32 years. No participant was older than 32 years.

A positive family history of hair loss was reported in 62.5% of participants overall, including 70% in Group A and 55% in Group B.

All the subjects in the study were male. No female participant volunteered for the study. As the treatment was interventional, many females refused to participate in the study, adding on prevalence rate in females is also low.

### Numbers Analyzed

Forty participants ( $n = 20$  in Group A;  $n = 20$  in Group B) who completed the full 56-day evaluation protocol were included in the primary and secondary statistical syntheses.

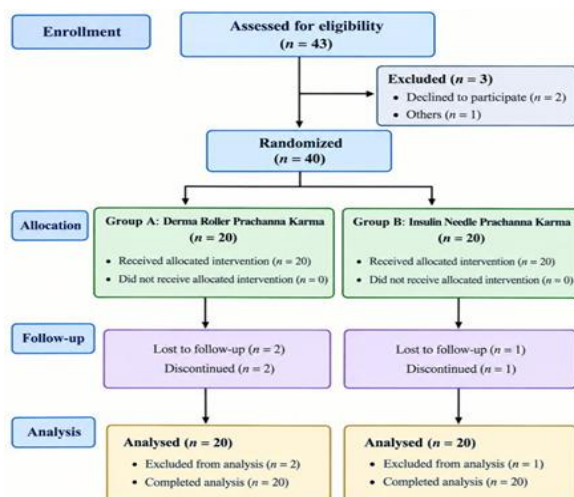


Figure I - CONSORT Flow chart

### Clinical and Objective Outcomes:

#### Within-Group Clinical Outcomes

Both groups demonstrated statistically significant improvements in most subjective clinical parameters over the 56-day study period. In Group A, the mean Kesha Bhoomi score decreased from  $2.05 \pm 0.60$  to  $1.15 \pm 0.37$ , representing a 43.90% reduction ( $P < 0.001$ ). In Group B, the score decreased from  $1.90 \pm 0.45$  to  $1.20 \pm 0.41$ , corresponding to a 36.84% reduction ( $P < 0.001$ ).

The mean Kesha Bhoomi Rukshata score decreased from  $1.95 \pm 0.76$  to  $1.00 \pm 0.65$  in Group A (48.72%;  $P < 0.001$ ) and from  $1.55 \pm 0.83$  to  $0.80 \pm 0.70$  in Group B (48.39%;  $P < 0.001$ ). Similarly, Kesha Bhoomi Kandu scores decreased from  $1.50 \pm 0.69$  to  $0.25 \pm 0.64$  in Group A (83.33%;  $P < 0.001$ ) and from  $1.50 \pm 0.83$  to  $0.50 \pm 0.61$  in Group B (66.67%;  $P < 0.001$ ). Darunaka scores decreased from  $1.60 \pm 0.68$  to  $0.40 \pm 0.68$  in Group A (75.00%;  $P < 0.001$ ), while Group B showed a reduction from  $2.25 \pm 2.40$  to  $0.55 \pm 0.60$  (75.56%;  $P < 0.001$ ). The latter finding requires cautious interpretation because the baseline Darunaka entry in Group B needs verification. Pull Test changes were not statistically significant in Group A ( $P = 0.3173$ ), while Group B had no observed change.

#### Objective Clinical Outcomes:

Scalp photography scores decreased from  $1.45 \pm 0.76$  to  $1.25 \pm 0.55$  in Group A, representing a 13.79% reduction ( $P = 0.0455$ ). In Group B, the score decreased from  $1.00 \pm 0.00$  to  $0.95 \pm 0.22$  (5.00%), but the change was not statistically significant ( $P = 0.3173$ ). Modified Norwood–Hamilton Scale scores decreased significantly in both groups: from  $2.50 \pm 1.15$  to  $1.90 \pm 0.79$  in Group A (24.00%;  $P < 0.001$ ) and from  $1.55 \pm 0.60$  to  $1.25 \pm 0.72$  in Group B (19.35%;  $P = 0.0143$ ).

#### Folliscope Parameters:

Hair density increased significantly from  $0.798 \pm 0.248$  to  $0.892 \pm 0.241$  in Group A (11.78%;  $P < 0.001$ ) and from  $0.786 \pm 0.128$  to  $0.846 \pm 0.165$  in Group B (7.64%;  $P = 0.0043$ ).

Hair diameter increased from  $0.0395 \pm 0.0123$  to  $0.0445 \pm 0.0105$  in Group A (12.66%;  $P < 0.001$ ) and from  $0.0420 \pm 0.0115$  to  $0.0460 \pm 0.0099$  in Group B (9.52%;  $P = 0.0075$ ). Hair root gap decreased from  $1.168 \pm 0.323$  to  $1.087 \pm 0.319$  in Group A (6.90%;  $P$

$< 0.001$ ) and from  $1.042 \pm 0.337$  to  $0.967 \pm 0.316$  in Group B (7.15%;  $P < 0.001$ ).

#### Between-Group Comparison

Changes in folliscope parameters were also not significantly different between groups. For hair density, the between-group comparison from baseline to Day 56 yielded a mean difference of 0.0340 ( $t = 1.64$ ;  $P = 0.1103$ ). For hair diameter, the mean difference was 0.0010 ( $t = 0.57$ ;  $P = 0.5737$ ), while for hair root gap it was  $-0.0060$  ( $t = -0.38$ ;  $P = 0.7058$ ).

**Overall Clinical Response and Procedural Pain:** At Day 56, moderate or marked improvement was observed in 16 participants (80%) in Group A compared with 5 (25%) in Group B. Marked improvement occurred in 2 participants (10%) in Group A and none in Group B, while moderate improvement was observed in 14 (70%) and 5 (25%), respectively.

Mean procedural pain scores across the four sittings were 7.05, 5.90, 5.30, and 4.70 in Group A, compared with 5.40, 4.90, 5.10, and 4.70 in Group B. The overall mean VAS scores were 5.74 and 5.03, respectively. Overall, both interventions were associated with significant within-group improvement in most clinical and folliscope outcomes. Although Group A showed numerically greater improvement in several parameters and a higher proportion of moderate or

marked clinical responses, most between-group comparisons did not reach statistical significance.



Figure II

Figure III

Fig. Prachanna karma with Derma roller (fig II), Insulin needle (fig III)



Figure IV – End point of Prachanna karma

TABLE I - BASELINE COMPARABILITY OF SUBJECTIVE AND OBJECTIVE OUTCOME MEASURES BETWEEN THE TWO TREATMENT GROUPS

| Outcome measure                 | Group A, Mean $\pm$ SD | Group B, Mean $\pm$ SD | Test                | Test statistic | P value | Interpretation |
|---------------------------------|------------------------|------------------------|---------------------|----------------|---------|----------------|
| Kesha Bhoomi                    | $2.05 \pm 0.60$        | $1.90 \pm 0.45$        | Mann-Whitney U      | U=225.5        | 0.3787  | NS             |
| Kesha Bhoomi Rukshata           | $1.95 \pm 0.76$        | $1.55 \pm 0.83$        | Mann-Whitney U      | U=255.5        | 0.1007  | NS             |
| Kesha Bhoomi Kandu              | $1.50 \pm 0.69$        | $1.50 \pm 0.83$        | Mann-Whitney U      | U=194.0        | 0.8587  | NS             |
| Darunaka                        | $1.60 \pm 0.68$        | $2.25 \pm 2.40$        | Mann-Whitney U      | U=171.0        | 0.3930  | NS             |
| Pull Test                       | $0.05 \pm 0.22$        | $0.00 \pm 0.00$        | Fisher's exact test | —              | 1.0000  | NS             |
| Scalp Photography               | $1.45 \pm 0.76$        | $1.00 \pm 0.00$        | Mann-Whitney U      | U=270.0        | 0.0041  | S              |
| Modified Norwood-Hamilton Scale | $2.50 \pm 1.15$        | $1.55 \pm 0.60$        | Mann-Whitney U      | U=295.0        | 0.0067  | S              |
| Hair Density                    | $0.798 \pm 0.248$      | $0.786 \pm 0.128$      | Unpaired t test     | $t=0.200$      | 0.8424  | NS             |

|               |                 |                 |                        |                  |        |    |
|---------------|-----------------|-----------------|------------------------|------------------|--------|----|
| Hair Diameter | 0.0395 ± 0.0123 | 0.0420 ± 0.0115 | Unpaired <i>t</i> test | <i>t</i> =-0.662 | 0.5118 | NS |
| Hair Root Gap | 1.168 ± 0.323   | 1.042 ± 0.337   | Unpaired <i>t</i> test | <i>t</i> =1.208  | 0.2347 | NS |

TABLE II - WITHIN-GROUP CHANGES IN SUBJECTIVE CLINICAL OUTCOME MEASURES FROM BASELINE TO DAY 56

| Outcome               | Group | Baseline, Mean ± SD | Day 56, Mean ± SD | Mean change | Improvement, % | Wilcoxon W | P value | Interpretation |
|-----------------------|-------|---------------------|-------------------|-------------|----------------|------------|---------|----------------|
| Kesha Bhoomi          | A     | 2.05 ± 0.60         | 1.15 ± 0.37       | -0.90       | 43.90          | 0.0        | <0.001  | S              |
|                       | B     | 1.90 ± 0.45         | 1.20 ± 0.41       | -0.70       | 36.84          | 0.0        | <0.001  | S              |
| Kesha Bhoomi Rukshata | A     | 1.95 ± 0.76         | 1.00 ± 0.65       | -0.95       | 48.72          | 0.0        | <0.001  | S              |
|                       | B     | 1.55 ± 0.83         | 0.80 ± 0.70       | -0.75       | 48.39          | 0.0        | <0.001  | S              |
| Kesha Bhoomi Kandu    | A     | 1.50 ± 0.69         | 0.25 ± 0.64       | -1.25       | 83.33          | 0.0        | <0.001  | S              |
|                       | B     | 1.50 ± 0.83         | 0.50 ± 0.61       | -1.00       | 66.67          | 0.0        | <0.001  | S              |
| Darunaka              | A     | 1.60 ± 0.68         | 0.40 ± 0.68       | -1.20       | 75.00          | 0.0        | <0.001  | S              |
|                       | B     | 2.25 ± 2.40         | 0.55 ± 0.60       | -1.70       | 75.56          | 0.0        | <0.001  | S              |
| Pull Test             | A     | 0.05 ± 0.22         | 0.00 ± 0.00       | -0.05       | 100.00         | 0.0        | 0.3173  | NS             |
|                       | B     | 0.00 ± 0.00         | 0.00 ± 0.00       | 0.00        | —              | —          | —       | NS             |
| Scalp Photography     | A     | 1.45 ± 0.76         | 1.25 ± 0.55       | -0.20       | 13.79          | 0.0        | 0.0455  | S              |
|                       | B     | 1.00 ± 0.00         | 0.95 ± 0.22       | -0.05       | 5.00           | 0.0        | 0.3173  | NS             |

TABLE III - WITHIN-GROUP CHANGES IN OBJECTIVE AND FOLLISCOPE OUTCOME MEASURES FROM BASELINE TO DAY 56

| Outcome                         | Group | Baseline, Mean ± SD | Day 56, Mean ± SD | Mean change | Improvement, % | Test statistic   | P value | Interpretation |
|---------------------------------|-------|---------------------|-------------------|-------------|----------------|------------------|---------|----------------|
| Modified Norwood–Hamilton Scale | A     | 2.50 ± 1.15         | 1.90 ± 0.79       | -0.60       | 24.00          | W=0              | <0.001  | S              |
|                                 | B     | 1.55 ± 0.60         | 1.25 ± 0.72       | -0.30       | 19.35          | W=0              | 0.0143  | S              |
| Scalp Photography               | A     | 1.45 ± 0.76         | 1.25 ± 0.55       | -0.20       | 13.79          | W=0              | 0.0455  | S              |
|                                 | B     | 1.00 ± 0.00         | 0.95 ± 0.22       | -0.05       | 5.00           | W=0              | 0.3173  | NS             |
| Hair Density                    | A     | 0.798 ± 0.248       | 0.892 ± 0.241     | +0.094      | 11.78          | <i>t</i> =-9.926 | <0.001  | S              |

|               |   |                 |                 |         |       |            |        |   |
|---------------|---|-----------------|-----------------|---------|-------|------------|--------|---|
|               | B | 0.786 ± 0.128   | 0.846 ± 0.165   | +0.060  | 7.64  | $t=-3.241$ | 0.0043 | S |
| Hair Diameter | A | 0.0395 ± 0.0123 | 0.0445 ± 0.0105 | +0.0050 | 12.66 | $t=-4.359$ | <0.001 | S |
|               | B | 0.0420 ± 0.0115 | 0.0460 ± 0.0099 | +0.0040 | 9.52  | $t=-2.990$ | 0.0075 | S |
| Hair Root Gap | A | 1.168 ± 0.323   | 1.087 ± 0.319   | -0.0805 | 6.90  | $t=5.961$  | <0.001 | S |
|               | B | 1.042 ± 0.337   | 0.967 ± 0.316   | -0.0745 | 7.15  | $t=9.131$  | <0.001 | S |

TABLE IV - BETWEEN-GROUP COMPARISON OF CHANGE SCORES IN SUBJECTIVE AND ORDINAL OUTCOME MEASURES

| Outcome                         | Interval   | Group A Mean Rank | Group B Mean Rank | Mann-Whitney U | Z value | P value | Rank-biserial $r$ | Interpretation |
|---------------------------------|------------|-------------------|-------------------|----------------|---------|---------|-------------------|----------------|
| Kesha Bhoomi                    | 0-28 days  | 19.00             | 22.00             | 170.0          | -1.122  | 0.2620  | 0.15              | NS             |
|                                 | 28-56 days | 20.00             | 21.00             | 190.0          | -0.316  | 0.7521  | 0.05              | NS             |
|                                 | 0-56 days  | 18.65             | 22.35             | 163.0          | -1.329  | 0.1838  | 0.19              | NS             |
| Kesha Bhoomi Rukshata           | 0-28 days  | 17.40             | 23.60             | 138.0          | -1.961  | 0.0499  | 0.31              | S              |
|                                 | 28-56 days | 21.73             | 19.27             | 224.5          | 0.758   | 0.4485  | -0.12             | NS             |
|                                 | 0-56 days  | 18.70             | 22.30             | 164.0          | -1.156  | 0.2475  | 0.18              | NS             |
| Kesha Bhoomi Kandu              | 0-28 days  | 17.05             | 23.95             | 131.0          | -2.089  | 0.0367  | 0.35              | S              |
|                                 | 28-56 days | 21.80             | 19.20             | 226.0          | 0.817   | 0.4141  | -0.13             | NS             |
|                                 | 0-56 days  | 18.80             | 22.20             | 166.0          | -1.087  | 0.2770  | 0.17              | NS             |
| Darunaka                        | 0-28 days  | 20.80             | 20.20             | 206.0          | 0.178   | 0.8588  | -0.03             | NS             |
|                                 | 28-56 days | 20.65             | 20.35             | 203.0          | 0.098   | 0.9223  | -0.02             | NS             |
|                                 | 0-56 days  | 20.80             | 20.20             | 206.0          | 0.178   | 0.8587  | -0.03             | NS             |
| Pull Test                       | 0-28 days  | 20.00             | 21.00             | 190.0          | -1.000  | 0.3173  | 0.05              | NS             |
|                                 | 28-56 days | 20.50             | 20.50             | 200.0          | 0.000   | 1.0000  | 0.00              | NS             |
|                                 | 0-56 days  | 20.00             | 21.00             | 190.0          | -1.000  | 0.3173  | 0.05              | NS             |
| Scalp Photography               | 0-28 days  | 20.50             | 20.50             | 200.0          | 0.000   | 1.0000  | 0.00              | NS             |
|                                 | 28-56 days | 19.00             | 22.00             | 170.0          | -1.416  | 0.1567  | 0.15              | NS             |
|                                 | 0-56 days  | 19.00             | 22.00             | 170.0          | -1.416  | 0.1567  | 0.15              | NS             |
| Modified Norwood-Hamilton Scale | 0-28 days  | 20.50             | 20.50             | 200.0          | 0.000   | 1.0000  | 0.00              | NS             |
|                                 | 28-56 days | 17.50             | 23.50             | 140.0          | -1.883  | 0.0597  | 0.30              | NS             |
|                                 | 0-56 days  | 17.50             | 23.50             | 140.0          | -1.883  | 0.0597  | 0.30              | NS             |

TABLE V - BETWEEN-GROUP COMPARISON OF CHANGE SCORES IN CONTINUOUS FOLLISCOPE MEASURES

| Outcome      | Interval   | Mean difference (A-B) | SD     | SE     | t value | P value | Cohen's $d$ | Interpretation |
|--------------|------------|-----------------------|--------|--------|---------|---------|-------------|----------------|
| Hair Density | 0-28 days  | 0.0180                | 0.0326 | 0.0103 | 1.74    | 0.0892  | 0.55        | NS             |
|              | 28-56 days | 0.0160                | 0.0399 | 0.0126 | 1.27    | 0.2119  | 0.40        | NS             |

|               |            |         |        |        |       |        |       |    |
|---------------|------------|---------|--------|--------|-------|--------|-------|----|
|               | 0–56 days  | 0.0340  | 0.0658 | 0.0208 | 1.64  | 0.1103 | 0.52  | NS |
| Hair Diameter | 0–28 days  | –0.0005 | 0.0035 | 0.0011 | –0.45 | 0.6573 | –0.14 | NS |
|               | 28–56 days | 0.0015  | 0.0049 | 0.0016 | 0.97  | 0.3398 | 0.31  | NS |
|               | 0–56 days  | 0.0010  | 0.0056 | 0.0018 | 0.57  | 0.5737 | 0.18  | NS |
| Hair Root Gap | 0–28 days  | 0.0025  | 0.0227 | 0.0072 | 0.35  | 0.7291 | 0.11  | NS |
|               | 28–56 days | –0.0085 | 0.0364 | 0.0115 | –0.74 | 0.4644 | –0.23 | NS |
|               | 0–56 days  | –0.0060 | 0.0499 | 0.0158 | –0.38 | 0.7058 | –0.12 | NS |

TABLE VI - OVERALL CLINICAL RESPONSE AT THE END OF THE 56-DAY STUDY PERIOD

| Overall clinical response      | Group A, n (%) | Group B, n (%) |
|--------------------------------|----------------|----------------|
| Marked improvement             | 2 (10.0)       | 0 (0.0)        |
| Moderate improvement           | 14 (70.0)      | 5 (25.0)       |
| Mild improvement               | 2 (10.0)       | 13 (65.0)      |
| No improvement                 | 2 (10.0)       | 2 (10.0)       |
| Moderate or marked improvement | 16 (80.0)      | 5 (25.0)       |
| Total                          | 20 (100.0)     | 20 (100.0)     |

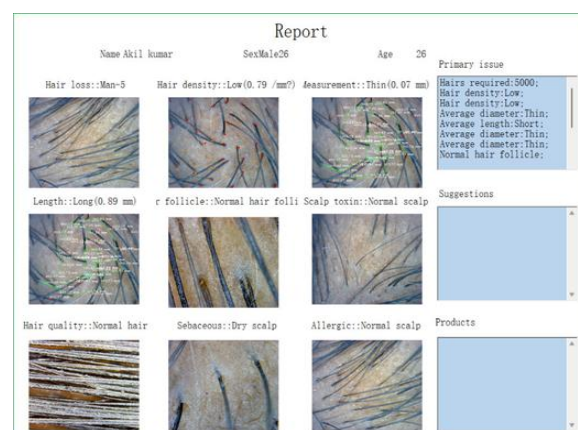


Figure VI - Hair Report Before Treatment

TABLE VII - MEAN PROCEDURAL PAIN SCORES DURING THE FOUR TREATMENT SITTINGS

| Treatment sitting | Group A: Mean VAS | Group B: Mean VAS |
|-------------------|-------------------|-------------------|
| 1st sitting       | 7.05              | 5.40              |
| 2nd sitting       | 5.90              | 4.90              |
| 3rd sitting       | 5.30              | 5.10              |
| 4th sitting       | 4.70              | 4.70              |
| Overall mean VAS  | 5.74              | 5.03              |

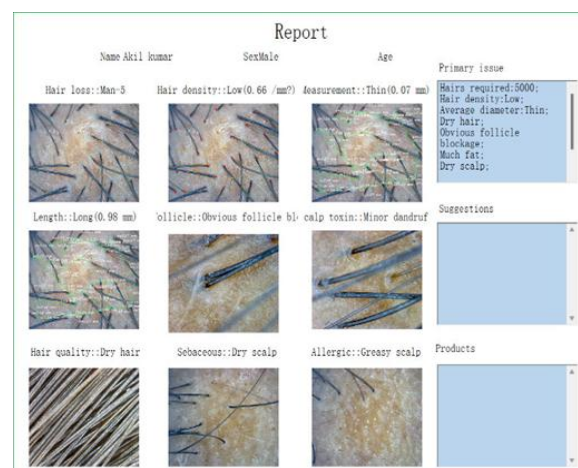


Figure VII - Hair Report After Treatment

The present study evaluated two methods of performing Prachanna Karma in patients with Khalitya: Derma Roller and insulin needle. Both interventions produced improvement in subjective scalp parameters and objective hair-growth parameters.

The principal finding was that both techniques were effective, while statistically demonstrable superiority of one technique over the other was not established.

## V. DISCUSSION

From the Ayurvedic perspective, Khalitya involves the participation of Pitta and Vata for hairfall, Kapha and Rakta, with obstruction of the Romakupya. Prachanna Karma is therefore considered relevant because

controlled superficial bloodletting may address local obstruction and stimulate the affected tissues. The contemporary micro needling concept provides a parallel explanation through controlled micro trauma, local circulation and tissue-repair responses.

The greater numerical improvement seen in Group A in Kesha Bhoomi, Kandu, hair density, hair diameter and Norwood–Hamilton grading may be related as the derma roller creates multiple uniform micro channels over a larger scalp surface area,

producing controlled micro trauma. This stimulates local blood circulation, release of growth factors such as platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), and fibroblast growth factor (FGF), thereby enhancing follicular nourishment and scalp rejuvenation. The wider coverage of derma roller may explain the earlier and slightly greater improvement observed and achieved statistically significant results earlier than Group B, insulin-needle Prachanna produces more localized punctures and may therefore exert a more gradual effect.

The response of scalp itching is particularly notable. Group A demonstrated an 83.33% reduction compared with 66.67% in Group B, derma roller provides uniform stimulation over a larger scalp area, facilitating quicker removal of inflammatory mediators, improving local circulation, and reducing follicular congestion. Enhanced tissue remodeling may explain the significantly earlier relief from itching observed during the first 28 days. However, by the end of treatment, the difference between the groups was no longer statistically significant. This suggests that the Derma Roller may have produced a faster initial symptomatic response, while the insulin needle produced a more gradual response.

Both interventions produced nearly identical improvements in scalp dryness. The similarity of these findings supports the possibility that the two procedures share common therapeutic pathways. Within the Ayurvedic framework, the study attributes improvement to correction of Dosha-related scalp pathology, improved Rakta circulation and Dhatu Poshana.

The improvement in Darunaka was also substantial in both groups, with 75.00% improvement in Group A and 75.56% in Group B. Since no significant intergroup difference was identified, neither procedure

can be considered superior for this particular parameter. The significant improvement observed in both groups may be attributed to the ability of the interventions to alleviate Vata-Kapha vitiation, improve scalp nourishment, and restore normal scalp physiology.

The unchanged Pull Test result is important when interpreting the study. All participants were Pull Test negative at baseline and remained negative throughout the study. Consequently, the parameter had limited discriminatory value in this study population. As androgenetic alopecia is primarily characterized by follicular miniaturization rather than marked active shedding.

Objective measures provide stronger evidence of changes in hair growth, the delayed improvement in photographic appearance and Norwood–Hamilton grading is also biologically relevant. Changes in hair density and visible scalp coverage require time because hair-follicle cycling and hair-shaft growth are gradual processes.

The study therefore suggests that a longer follow-up period might provide a better assessment of sustained hair-growth outcomes.

The pain findings demonstrate a practical consideration. The mean VAS score was higher with Derma Roller (5.74) than with insulin needle (5.03). Nevertheless, the dissertation appropriately regards pain as a measure of procedural comfort rather than a direct measure of efficacy.

#### LIMITATIONS:

The study has several limitations inherent in its design. The final sample consisted of only 40 participants, the treatment and observation period were limited to 56 days, and the study was open-label. The study itself notes that the small sample size and relatively short follow-up may have reduced the statistical power to detect differences between groups and may not have been sufficient to capture longer-term changes in hair density and growth.

#### VI. CONCLUSION

In this open-label randomized controlled study of 40 patients with Khalitya corresponding to androgenetic alopecia, both Derma Roller and insulin-needle Prachanna Karma were associated with significant

improvements in multiple clinical and objective parameters over 56 days.

Derma Roller Prachanna demonstrated greater numerical improvement in Kesha Bhoomi, Kesha Bhoomi Kandu, hair density, hair diameter and Modified Norwood-Hamilton scores, and produced significantly greater improvement in scalp itching during the first 28 days. However, these differences were not statistically significant between groups at the final assessment.

Therefore, the present findings support the clinical usefulness of both Prachanna Karma techniques, but do not establish Derma Roller Prachanna Karma as statistically superior to insulin-needle Prachanna Karma. Larger, adequately powered, blinded or assessor-blinded trials with longer follow-up and prespecified primary outcomes are required to determine whether the Derma Roller provides a clinically meaningful advantage.

#### OTHER INFORMATION

##### Ethical Statement

The study was approved by the Institutional Ethics Committee of Muniyal Institute of Ayurveda Medical Sciences, Manipal, prior to study commencement. IEC Certificate number - IEC/MIAMS/ST/03/24, dated 20 May 2024.

The study was registered with the Clinical Trials Registry-India

Under CTRI/2025/06/088614 on 11 June 2025. Written informed consent obtained from all participants

##### Conflict Of Interest

The author declares no conflicts of interest related to this study.

##### Funding & Support:

The authors declare no external funding.

Data Availability: De-identified participant datasets are accessible for meta-analyses upon institutional review.

Photo Publication Consent- Taken from both the participants. Will be shared on request.

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GENERATIVE AI: AI tools like Chatgptwere used in this article preparation for paraphrasing and typing only strictly.

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