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Original Research Article

Comparative efficacy of topical hair growth serums on hair density and shedding: a double-blinded and randomized clinical trial

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ABSTRACT

Background: This clinical evaluation conducted with the objective of comparing the efficacy of two topical hair growth serum formulations on healthy Indian adults (men and women) suffering from hair loss, by randomized, double blinded controlled study.
Methods: Two topical formulations (product A - Indulekha Bringha scalp serum and product B – 3% Redensyl in serum vehicle) were evaluated over 3 months, with a 2-week regression phase. The study included a wash out period, following which subjects were randomized in one of the treatment groups. Subjects visited the study centre once every month for their follow-up assessments during treatment period. Efficacy endpoints included anagen hair density, A:T ratio, hair pull test, hair fall assessments, scalp barrier function, and hair thickness evaluation.
Results: The Indulekha Bringha scalp serum (product A) was found to be significantly efficacious in reducing hair shedding, improving hair density in all the subjects in comparison to baseline and was significantly superior to product B in the studied hair growth parameters.
Conclusions: Both test products demonstrated statistically significant improvements from baseline across all evaluated hair growth parameters. However, Indulekha Bringha scalp serum (product A) showed significantly superior efficacy compared to the product B in improving Anagen density, reducing hair fall.

Keywords: Alopecia, Bhringaraj, Hair fall, Hair growth, Hair loss, Phototrichogram, Clinical dermatology

INTRODUCTION

Hair fall and hair loss are among the most common beauty and dermatological concerns affecting both women and men globally.[1,2] These conditions have been prevalent for decades across all age groups, irrespective of ethnicity, gender, or socioeconomic background.[3] Under normal physiological conditions, an individual sheds approximately 50–100 hair per day, which is considered a part of the natural hair cycle.[4-6] However, when the equilibrium between daily hair shedding and new hair growth is disrupted due to intrinsic or extrinsic factors, it can result in visible hair thinning and progressive hair loss, collectively classified as alopecia.[7-9]

Alopecia poses not only a cosmetic challenge but also a substantial psychological burden, often leading to reduced self-esteem and diminished quality of life.[10-12] Multiple forms of alopecia have been identified, including androgenetic alopecia, alopecia areata, and telogen effluvium, with androgenetic alopecia being the most widespread subtype.[13-15] Given the multifactorial causes of hair loss, ranging from hormonal imbalance and genetics to nutritional deficiencies, stress, and environmental triggers, there is increasing consumer demand for effective and convenient hair growth solutions.[16] Topical hair growth serums have gained significant popularity due to their ease of application, targeted scalp delivery, and consumer-friendly formats.

In this study, we evaluate and compare the efficacy of two hair growth serums: product A (Indulekha Bringha scalp serum) and product B (3% Redensyl in serum vehicle). The study specifically addresses improvement in hair density, hair fall and hair loss concerns among Indian male and female volunteers who do not have severe medical conditions but exhibit self-perceived hair thinning and low hair density. This comparative assessment aims to generate real-world evidence on the performance of popular hair growth serums within an Indian population where hair fall remains a highly prevalent concern.

METHODS

Ethics and informed consent

The present clinical study was conducted in accordance with Good Clinical Practices (GCP) and ICH guidelines and fully complied with applicable local regulatory requirements. The protocol was reviewed and approved by an independent ethics committee in India, and written informed consent was obtained from all participants. The study was prospectively registered on the Clinical Trials Registry of India (CTRI/2025/07/091083). It was executed at Mascot Spincontrol India Pvt. Ltd., Mumbai, under the supervision of a dermatologist serving as the principal investigator, with an Ayurvedic physician as the co-investigator. The study period spanned from July 2025 to December 2025.

Study design

This was a randomized, double blind, single center study conducted to evaluate the safety and efficacy of the test products in adults with hair fall concerns. A total of 80 participants (female to male ratio 2:1; 54 females and 26 males), aged 20–45 years, were enrolled after meeting all inclusion and exclusion criteria and 74 subjects (50 females and 24 males) completed the study (Table 1). The overall study duration was four months, comprising a two-week acclimatization period, three-month treatment phase, and a two-week regression follow up.

Table 1: Demographics and volunteers' characteristics at baseline.

Test group	Number of male volunteers	Number of female volunteers	Average age (in years)
Product A	13	27	30.7
Product B	13	27	30.6

Subjects were instructed to apply the product daily once (1-3 ml which is a leave-on product), depending on need and requirement, which was to be followed by a gentle scalp massage. The test product was permitted to remain on the scalp and did not require immediate washing. However, participants were instructed to use a gentle shampoo provided by the study sponsor for routine hair cleansing at least twice weekly throughout the duration of the study. On the days of hair wash, product was applied post hair wash, on dry scalp.

During the screening visit, participants were assessed according to the defined inclusion and exclusion criteria. Eligible male and female volunteers aged between 20 and 45 years (both inclusive), with a hair density of less than 125 follicles per square centimetre as determined by phototrichogram analysis, were selected for enrolment in the study. Participants underwent a two-week washout period using a neutral shampoo no more than three times per week. After this period, baseline assessments were conducted and test products were assigned following randomization.

Inclusion criteria

Healthy males and females (20–45 years) with baseline hair density <125 hairs/cm² and clinically confirmed hair thinning were enrolled. Male participants met Hamilton–Norwood class II–IV criteria, and females met Ludwig grades I 2 to II 2. All volunteers were medically healthy, provided informed consent, and agreed to study following for restrictions, including avoiding other scalp/hair treatments, cosmetic products during the study period.

Exclusion criteria

Individuals who had participated in any scalp or hair studies within the previous four weeks, or were currently enrolled in one, were not eligible. Participants with a history of allergy to Ayurvedic, herbal, or cosmetic products, those with prior hair transplants, severe androgenic alopecia, or severe hair fall were excluded. Women who were pregnant, planning pregnancy, breastfeeding, or recently ceased breastfeeding (within three months) were also excluded.

Additional exclusions included significant scalp or skin disease, self-perceived sensitive skin, chronic illness, major surgery within the past year, or ongoing treatment for dermatological conditions. Volunteers taking oral antibiotics within eight weeks, topical corticosteroids or NSAIDs within four weeks, oral corticosteroids or NSAIDs within eight weeks, or any medication/supplement that could affect study outcomes (including diabetes or hypertension) were not eligible. Participants unwilling to provide informed consent were also excluded from the study.

Test products

Product A (Indulekha Bringha scalp serum) Indulekha Bringha scalp serum is an ayurvedic, aqueous based scalp serum formulated with 100% Ayurvedic active

ingredients. The formulation contains standardized extracts of Bhringaraj, Amla, Brahmi, Aloe Vera, Curry Leaves, Rosemary Oil, and Pudina Sattva. These Ayurvedic actives are well known in Ayurveda for improving scalp health, providing nourishment to hair follicles, and helping promote hair growth. The serum is designed for daily topical applications and is free from mineral oils and synthetic color and perfume.

Product B (hair growth serum with 3% Redensyl) is prepared in vehicle serum using Redensyl (NV Organic Pvt. Ltd., Batch#: VO00008415; Mfg Date: 24 January 2025) in-house well within design guidance of supplier.

Methodology

Hair density and A:T ratio was assessed using Phototrichogram imaging analysis.[17] Hair fall was evaluated by counting hair fallen from roots by combing test.18 Hair anchorage was assessed by performing hair pull test (dermatologist), Deno-lite microscopic imaging method used to assess the improvement of hair fibre thickness. There was a total of 15 visits (including shaving visits) for phototrichogram imaging.[14] During the visit to the site the participants were acclimatized at a temperature of 22°C + 5°C and relative humidity of 50% - 60% for 15 minutes prior to scalp imaging and assessments.

Phototrichogram analysis

This technique involved capturing high resolution photographs of a small, shaved scalp area measuring approximately 1.5–2 cm^2 under strictly controlled and reproducible lighting conditions.[17] At each study time point, two consecutive photographs were taken with a two-day interval between them to allow accurate visualization and differentiation of hair in anagen (A), telogen (T), and undetermined (U) phases.

Hair pull test

The hair pull test was conducted to evaluate hair strength and shedding. In this method, a small group of hairs was gently grasped between the thumb, index, and middle fingers close to the scalp and pulled with a firm but non forceful motion. The number and percentage of hairs released during the pull were then counted and documented, providing insights into hair resilience and the extent of active hair shedding.[14]

Hair combing test

Physical counting of shed hair after standardized combing was performed to assess the effect of the test product on hair fall reduction. The total number of fallen hairs was recorded, including those collected from the comb, the floor, the subject's shoulders and back, the table surface, and hairs shed from the roots. A significant reduction in the number of fallen hairs; both with roots (indicating hair shedding) and without roots (indicating breakage) was considered indicative of the product's efficacy in reducing overall hair fall.[18,19]

Hair thickness assessment

Hair thickness measurement was conducted using Deno-lite microscopic imaging, which enabled precise assessment of hair fibre diameter. The grading of hair density was determined visually by the dermatologist.[19]

Statistical analysis

All statistical tests were performed at two-sided 5% level of significance and 95% confidence interval and Statistical software 'PAST 4.03' and 'SigmaStat 3.5' were used for the analysis of the data. Paired t-test was used to evaluate the efficacy of the product vs baseline while the comparison between the products is performed using either a two-sample t-test or a Mann-Whitney U test, depending on the distribution of the data.

RESULTS

Improvement in anagen hair density

Both the test products demonstrated statistically significant improvements from baseline at every assessment time point, with sustained and progressive benefits observed throughout the 3-month treatment period and the 2-week regression assessment. Indulekha Bringha scalp serum (product A) showed a consistent incremental increase in anagen hair density, with improvements of 5.6%, 10.1%, 12.1%, and 13.4% at 1, 2, 3 months, and at the 2-week regression evaluation, respectively. Product B demonstrated corresponding increases 4.6%, 5.9%, 6.2%, and 8.0% at the same assessment points (Figure 1).

Improvement in anagen: telogen (A/T) ratio

In a healthy scalp, the majority of hair follicles (approximately 80–90%) remain in the anagen phase, while about 10–20% are in the telogen phase and only 1–2% in catagen. Therefore, the anagen: telogen (A:T) ratio serves as a reliable indicator of overall hair cycle health, with a higher proportion of anagen follicles reflecting a more robust and active hair growth.

Both the test products (product A and product B) demonstrated a statistically significant increase in the A:T ratio from baseline at all assessment time points, including month 1, month 2, month 3, and the 2-week post treatment regression visit.

Product A consistently showed superior efficacy compared to product B. Product A exhibited significantly greater improvements in the A:T ratio at month 1, month 2, month 3, and at the regression assessment in comparison to product B (Figure 2).

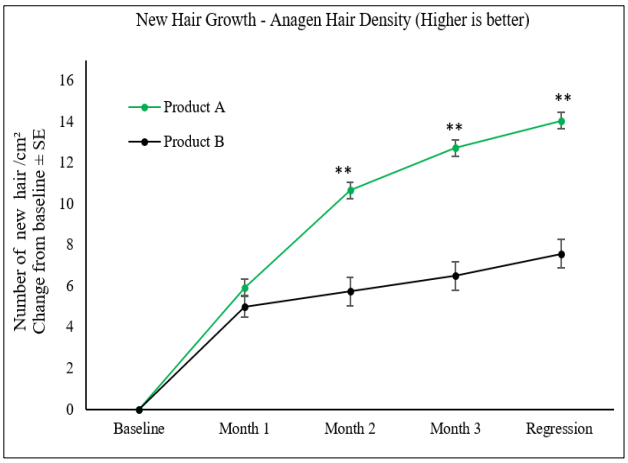

Figure 1: Improvement in anagen hair density (test product A is significantly better than product B; **p<0.05).

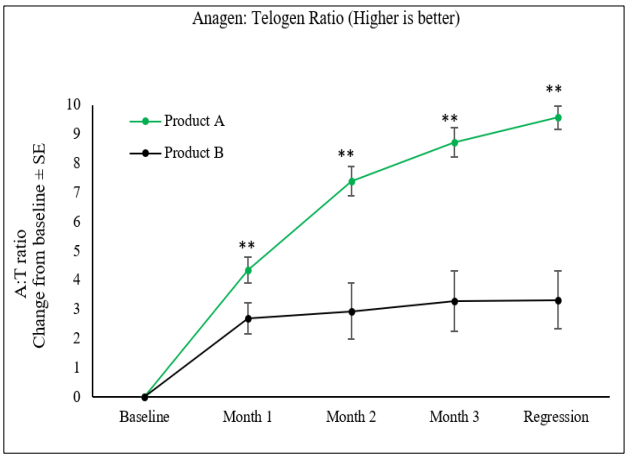

Figure 2: Improvement in anagen: telogen (A/T) ratio (product A is significantly better than product B; **p<0.05).

Hair anchorage/ hair loss from roots - hair pull test

Hair pull test determines the health of hair cycle balance and hair anchorage. Scalps with alopecia or hair loss problems show more hair being pulled off from scalps with pull test. There is a significant reduction in the number of hairs pulled off (with roots) compared to baseline from month 1 onward till the 3 months assessment (Figure 3), indicating the improvement in hair cycle balance and hair anchorage upon using the leave-on treatment with more hair being anchored strongly to dermal papilla.

Both the test products (product A and product B) demonstrated statistically significant improvement in hair strength from the roots at 1, 2, and 3 months of treatment, as well as at the 2-week regression assessment compared with baseline. Product A showed significantly greater enhancement in hair strength from root compared to product B at 2 and 3 months of treatment and at the 2-week regression time point.

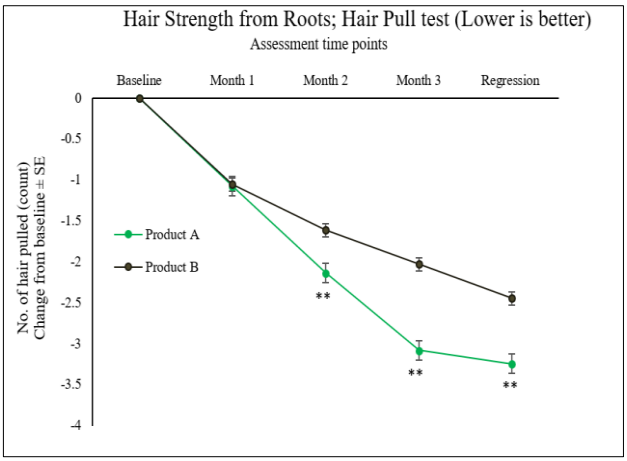

Figure 3: Improvement in hair strength from root - hair anchorage assessment – hair pull test (test product A is significantly better than product B; **p<0.05).

Reduction in hair fall from roots (hair shedding)

Hair fall from roots (with hair bulb) was determined by combing test results indicated a significant reduction in hair fall as early as 2 weeks, with significant and sustained reduction till 3 months assessment compared to baseline (Figure 4). At the end of the study there is a mean reduction in hair fall from roots by 44.3% for test product A and 37% for product B when compared to baseline and product A is significantly superior to test hair fall reduction from roots product B.

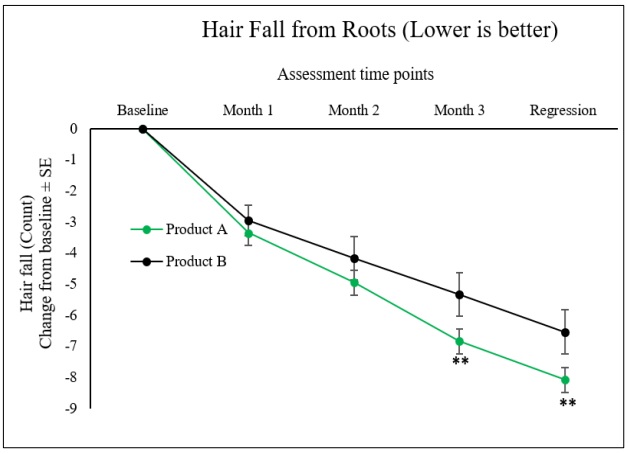

Figure 4: Hair shedding – hair fall from roots assessment (product A is significantly better than product B in reducing the hairfall from roots; **p<0.05).

Improvement in hair thickness

Hair fiber thickness was assessed by Deno-lite microscopic imaging. Both the products demonstrated a statistically significant improvement in hair thickness (diameter) from baseline at 1, 2, and 3 months of treatment,

as well as at the 2-week regression assessment. Product A showed significantly greater increase in hair thickness compared to product B at all evaluated time points (Figure 5).

Improvement in scalp barrier property: trans-epidermal water loss assessment

Both test products demonstrated a statistically significant reduction in trans epidermal water loss (TEWL) from baseline at 1, 2, and 3 months of treatment and at the 2-week regression assessment, indicating improved scalp barrier function across all products. Test product A showed significantly greater reduction in TEWL (19.5%) compared to product B (14.6%) at 3-month assessment (Figure 6).

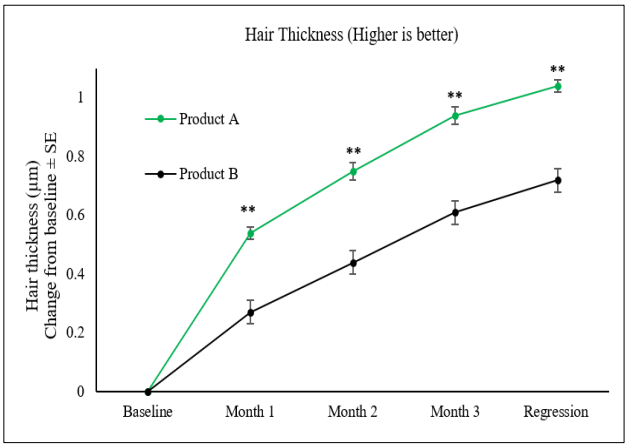

Figure 5: Hair thickness assessment (product A is Significantly better than product B; **p<0.05).

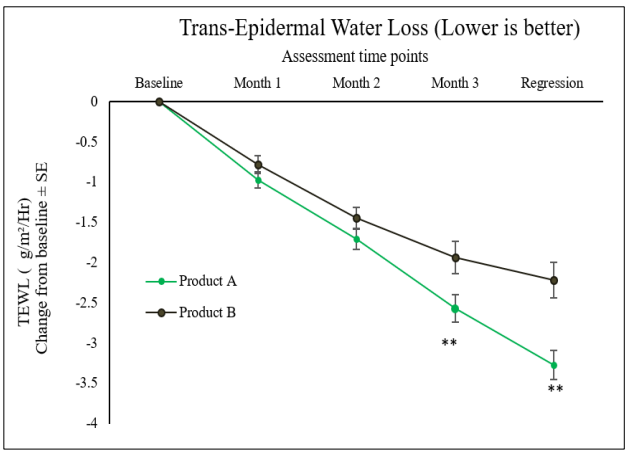

Figure 6: Trans-epidermal water loss assessment (product A is significantly better than product B; **p<0.05).

DISCUSSION

The present randomized, double blind, comparative clinical study evaluated the efficacy of topical hair growth serum formulations, product A (Indulekha Bringha scalp serum), product B (3% Redensyl in serum vehicle), in healthy Indian adults presenting with hair shedding, thinning and reduced hair density. Both the formulations showed statistically significant improvements from baseline across critical hair growth parameters; however, product A consistently demonstrated superior performance throughout the study duration.

Product B, hair growth serum containing 3% Redensyl, demonstrated consistent and meaningful clinical benefits across the study duration. Redensyl is a well-established, hair growth active known to promote hair growth. Redensyl contains four key active components: dihydroquercetin-glucoside (DHQG), Epigallocatechin gallate-glucoside (EGCG2), glycine, and zinc. Glycine is vital for building the hair shaft structure since it is a direct component of keratin-associated proteins. Zinc is included to further strengthen the hair shaft and is also necessary for incorporating cystine into keratin.[20-23]

Product A (Indulekha Bringha scalp serum) is developed by combining traditional Ayurvedic wisdom with modern scientific methods. This water-based Ayurvedic formula is enriched with standardized extracts of Bhringaraj, Amla, Brahmi, aloe vera, curry leaves, rosemary oil, and Pudina Sattva.

The improvements observed in anagen hair density across all treatment arms align with the established role of targeted topical actives in stimulating follicular activity and promoting the transition of hair follicles into the anagen phase. Product A delivered the highest increase in anagen density at each assessment point, suggesting enhanced follicular activation and possibly due to its Ayurvedic actives such as Bhringaraj. Bhringaraj is a well-known Ayurvedic ingredient used in traditional Ayurvedic recipes of oils such as Bringhadi Tailam and Nilibringhadi Tailam, which are commonly recommended for hair fall concerns in Ayurveda.[24] Experimental studies using Bhringaraj extracts have shown increased proliferation of hair matrix keratinocytes, an important process for maintaining hair in the anagen phase and supporting hair thickness.[25,26] In line with these reported hair growth-promoting properties, the present clinical study found that product A, formulated with functional levels of Bhringaraj extract, demonstrated a higher A:T ratio and increased hair thickness compared with product B.

Oxidative stress is one of the principal factors contributing to hair loss and hair thinning.[9,27,28] Amla, or Indian gooseberry, is widely recognized for its scalp health benefits because of its high antioxidant properties. Studies on dermal papilla cells have shown that Amla extract can increase cell proliferation and reduce 5-α reductase expression, indicating potential benefits for managing hair thinning.[29] In the present study, Indulekha scalp serum, formulated with functional levels of amla, achieved 44.3% reduction in hair fall and a 13.4% increase in anagen density, consistent with the higher anagen-to-telogen ratio observed compared with product B. The superior clinical

outcome of Indulekha Bringha serum may therefore be attributed to the combined activity of amla and Bhringraj used at optimal levels in the formulation.

Hair growth is cyclical and occurs in three main phases: anagen, catagen, and telogen.[30] Each hair follicle is supported by a vascular network that supplies oxygen and nutrients. This capillary network is denser during the anagen phase and becomes reduced during catagen and telogen, highlighting the close relationship between vascular support and hair growth.[31,32] Several cell-based studies have also demonstrated the importance of growth factors such as vascular endothelial growth factor (VEGF), which is upregulated during anagen and expressed by dermal papilla cells.[33] Because anagen hair is more firmly anchored to the scalp, whereas telogen hair is more loosely attached and can be removed more easily by traction, the hair pull test is a useful indicator for assessing reduction in hair shedding. Although both test serums improved hair health in the present study, Indulekha Bringha serum showed better efficacy. This may be explained by the Ayurvedic ingredient combination used in the serum, which has been shown in in-vitro studies on dermal papilla cells to increase VEGF levels, thereby supporting improved Anagen-to-Telogen ratio and reduced hair shedding.[34] In comparison, green tea-derived epigallocatechin-3-gallate (EGCG), associated with Redensyl, has also been reported to promote hair growth and dermal papilla cell proliferation through an increased Bcl-2/Bax ratio.[35]

In addition to the mechanisms described above, Indulekha Bringha serum also contains functional levels of curry leaf and rosemary. Rosemary extract is well known for its antioxidant benefits and is commonly used in hair care formulations with reported clinical benefits.[36] Curry leaf is recognized for its antioxidant and cytoprotective properties.[37,38]

Another important observation is the significant improvement in scalp barrier function, indicated by reduced trans-epidermal water loss (TEWL). A healthier scalp barrier creates an optimal environment for follicular regeneration and may enhance the penetration and efficacy of actives. While both formulations met this criterion, product A consistently showed greater TEWL reduction, underscoring its potential benefit in improving overall scalp physiological health.

CONCLUSION

Both the topical hair growth serums demonstrated statistically significant improvements in anagen hair density, hair anchorage, scalp barrier, with reduced hair fall when compared to respective baselines. Among the tested products, Indulekha Bringha scalp serum (product A) consistently delivered superior sustained efficacy throughout the treatment and regression phases. Based on the present comparative clinical study, we propose need for multi-prong approach (with different mechanism of action) to treat hair fall and hair thinning concerns for perceivable clinical outcomes.

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Conflict of interest: None declared
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