JOURNAL OF PHYTOPHARMACOLOGY AND PHYTOMEDICINE

P-ISSN: 3081-0620
E-ISSN: 3081-0639
JPP 2025; 2(2): 42-46
www.phytomedjournal.com
Received: 20-08-2025
Accepted: 23-09-2025

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Soothing effect of rose petal extract gel on mild skin dryness: A low-cost pilot trial

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DOI: https://www.doi.org/10.33545/30810620.2025.v2.i2.A.28

Abstract
Dry skin is one of the most common dermatological concerns, affecting individuals across diverse climatic regions and age groups. Mild skin dryness is typically associated with impaired barrier function, reduced stratum corneum hydration, and increased trans epidermal water loss (TEWL), often exacerbated by environmental factors, harsh cleansing agents, and aging-related physiological changes. There is growing interest in plant-based topical formulations as safer, cost-effective alternatives to conventional synthetic moisturizers because many botanical extracts contain bioactive constituents supportive of epidermal repair and hydration. Rose petals (Rosa × damascena and related species) possess flavonoids, phenolic acids, tannins, and volatile oils known for their soothing, antioxidant, and moisturizing properties, making them promising candidates for topical gels aimed at relieving dryness. Despite extensive ethnobotanical documentation, scientific validation of rose petal extract gel for mild dryness remains limited. This pilot research evaluates the soothing potential of a low-cost rose petal extract gel on mild skin dryness among healthy adults. The research examines short-term improvements in hydration, subjective comfort, and visible scaling reduction. The findings may offer early evidence supporting the use of affordable botanical formulations for routine skincare. By establishing preliminary safety and efficacy, this research aims to encourage expanded clinical trials and promote accessible dermatological solutions derived from easily available plant resources.

Keywords: Rose petal extract, mild skin dryness, hydration, botanical gel, low-cost skincare, pilot trial, skin soothing effect

Introduction
Skin dryness, clinically characterized by roughness, flaking, reduced elasticity, and compromised barrier function, is a frequently encountered dermatological condition driven by climatic exposure, low humidity, excessive cleansing, and age-related decline in natural moisturizing factors [1]. Conventional moisturizers formulated with occlusives, emollients, and humectants are widely used; however, their cost, potential for irritation, and limited suitability for sensitive populations have prompted interest in botanical alternatives [2, 3]. Among these, rose petals from species such as *Rosa damascena* and *Rosa centifolia* have been consistently reported to exhibit anti-inflammatory, antioxidant, mild astringent, and hydrating properties due to their rich content of flavonoids, phenolic acids, and essential oils including citronellol, geraniol, and nerol [4-6]. Traditional systems of medicine have long employed rose-based preparations for soothing irritated skin, improving complexion, and reducing inflammation [7], yet scientific validation remains comparatively scarce. Recent investigations highlight that phenolic compounds in rose petals enhance skin hydration, attenuate oxidative damage, and support epidermal repair, suggesting potential therapeutic use for mild dryness [8, 9]. Despite these promising biochemical characteristics, there exists a clear gap regarding low-cost, community-friendly gel formulations designed for routine skincare, particularly in regions where commercial products may be financially inaccessible. Moreover, most available studies focus on essential oils rather than whole-extract gels, limiting our understanding of broader phytoconstituent interactions [10]. Therefore, a focused pilot trial assessing the soothing effect of rose petal extract gel on mild skin dryness is both timely and necessary. The problem addressed in this article arises from the lack of affordable, evidence-based botanical moisturizers that can be safely recommended for individuals with mild epidermal dehydration and discomfort. This investigation was conceptualized to provide early clinical evidence supporting the use of rose petal extract gel

as a viable low-cost option for restoring surface hydration, reducing scaling, and alleviating subjective dryness sensations. The primary objective of this research is to evaluate the short-term effects of topical rose petal extract gel on skin hydration levels using standardized dermatological assessment tools, while the secondary objective focuses on participant-reported improvements in comfort and smoothness. A supporting objective includes assessing the gel's tolerability, given the increasing emphasis on non-irritating formulations for daily use [11]. Based on previous biochemical findings and ethnobotanical documentation, the hypothesis formulated for the present pilot trial proposes that regular application of rose petal extract gel will significantly improve hydration and reduce visible dryness compared to baseline conditions due to the combined moisturizing, antioxidant, and barrier-supportive properties of rose phytochemicals [12-15]. By integrating phytotherapy knowledge with modern dermatological assessment, this research intends to bridge current research gaps and encourage future large-scale investigations into affordable plant-based skincare solutions.

Material and Methods

Materials: Fresh rose petals of Rosa damascena were collected from a local botanical supplier and authenticated before extraction, based on previously documented phytochemical characteristics and chromatographic profiles associated with rose species rich in flavonoids, phenolic acids, and essential oils [4-6, 9]. The petals were washed, shade-dried, and subjected to hydroethanolic extraction using standardized maceration techniques similar to those employed in earlier botanical skincare research [10, 13]. The resulting extract was filtered, concentrated under reduced pressure, and incorporated into a gel base composed of carbomer, glycerin, distilled water, and a mild preservative system. The formulation approach was selected to ensure optimal hydration, stability, and spreadability, consistent with dermatocosmetic formulation principles described in previous moisturization and barrier-care studies [1-3, 11, 15]. Thirty healthy adult participants with clinically confirmed mild skin dryness were recruited following dermatological screening. Individuals with active dermatitis, allergies to botanical products, or use of topical medications were excluded. All participants provided informed consent, and the research adhered to ethical considerations aligned with botanical dermatology research protocols [7, 12, 14]. Baseline assessments included visual dryness grading, subjective dryness scoring, and hydration measurement using a corneometer, following validated biophysical methodologies used in prior evaluations of topical moisturizers [8, 10, 11].

Methods

This pilot trial followed a single-arm pre-post design to assess the soothing and hydration-enhancing effect of rose petal extract gel applied twice daily for seven consecutive days. Participants were instructed to cleanse the target forearm area with plain water and allow it to air dry before applying a standardized quantity (0.5 g) of the gel, following application guidelines consistent with previous studies investigating botanical gel preparations [13, 15]. Skin hydration was recorded at baseline and on Day 7 using a corneometric device, while visible dryness was graded by a trained dermatologist using a four-point severity scale derived from established dry-skin assessment frameworks [1, 2]. Subjective symptoms including tightness, roughness, and discomfort were recorded using a 10-point visual analogue scale, a method widely used in dermatological perception studies [3, 10]. Tolerability was assessed based on participant-reported sensations such as stinging or irritation, consistent with phytocosmetic safety evaluation methods [7, 12]. Data were analyzed using descriptive statistics, paired t-tests for pre-post differences, and qualitative interpretation of participant feedback. All procedures were designed to align with current dermatological research standards emphasizing the importance of hydration measurements, barrier assessment, and user-perceived comfort in evaluating topical moisturizers [8, 11, 14].

Results

Overall Effect on Skin Hydration and Dryness Scores

Thirty participants completed the 7-day pilot trial without any protocol violations or serious adverse events. Application of the rose petal extract gel produced a marked improvement in objective and subjective indicators of mild skin dryness. Mean corneometer hydration increased from 34.2±4.1 arbitrary units (a.u.) at baseline to 45.8±5.1 a.u. on Day 7, reflecting an approximate 34% relative increase in stratum corneum hydration (Table 1, Figure 1). This magnitude of change is comparable to, or slightly better than, improvements reported for conventional emollient or humectant-based moisturizers, underscoring the potential of botanical formulations to support barrier function and water retention [1-3, 8, 10, 11]. In parallel, the clinical dryness score (0-3 scale, higher values indicating more prominent roughness and scaling) decreased from 2.10±0.30 to 0.91±0.40, indicating a shift from visibly dry skin to near-normal appearance in most participants (Table 1). Subjective dryness assessed on a 10-point visual analogue scale (VAS) declined from 6.41±1.02 at baseline to 2.18±1.42 after the intervention (Table 1, Figure 2). These changes suggest that the rose petal extract gel not only improved measurable hydration but also effectively relieved discomfort and tightness commonly associated with mild dryness [2, 3, 7, 10]. Statistical comparison using paired t-tests showed that differences between baseline and Day 7 were highly significant for hydration, clinical dryness, and subjective VAS (all $p<0.001$), indicating a consistent treatment effect across multiple outcome domains in line with expectations for effective moisturizers and barrier-supporting agents [1, 8, 11, 13].

Responder Rates, Participant-Reported Outcomes, and Tolerability: Responder analysis further highlighted the clinical relevance of the observed improvements. A ≥10 a.u. increase in corneometer hydration was noted in 25 of 30 participants (83.3%), while a ≥1-grade reduction in clinical dryness score occurred in 27 of 30 participants (90.0%) (Table 2). Additionally, 24 participants (80.0%) reported a reduction of ≥3 points on the subjective dryness VAS, indicating substantial relief of symptoms such as roughness, tightness, and irritation (Table 2, Figure 2). This responder proportions compare favourably with benchmarks reported for other plant-based moisturizers and antioxidant-enriched formulations [4-6, 9, 12, 14, 15]. The majority of participants (86.7%) rated their overall satisfaction as "good" or "excellent," frequently noting that the gel was easy to spread, non-greasy, and comfortable for daily use, which aligns with established criteria for acceptable cosmetic

elegance in topical skincare [3, 11, 15]. No participant reported significant stinging, burning, or erythema; minor transient tingling was noted by two individuals during the first two applications and resolved spontaneously without discontinuation. The favourable tolerability profile is consistent with the traditional use of rose-based preparations on sensitive facial and periocular skin and supports the notion that flavonoids and phenolic constituents can provide barrier support with minimal irritation [4, 5, 7, 9, 12, 14]. Taken together, these findings suggest that short-term use of a low-cost rose petal extract gel can meaningfully enhance skin hydration, reduce clinical signs of dryness, and improve user-perceived comfort, supporting the hypothesized soothing and moisturizing effect derived from the combined antioxidant, anti-inflammatory, and mild astringent actions of rose phytochemicals [4-6, 8, 12-15].

Table 1: Changes in Objective and Subjective Dryness Parameters from Baseline to Day 7 (n = 30)

Parameter	Baseline (Mean ±SD)	Day 7 (Mean ±SD)	% Change (approx.)	p-value*
Corneometer hydration (a.u.)	34.2±4.1	45.8±5.1	+34%	<0.001
Clinical dryness score (0-3)	2.10±0.30	0.91±0.40	−57%	<0.001
Subjective dryness VAS (0-10)	6.41±1.02	2.18±1.42	−66%	<0.001

*Paired t-test comparing baseline and Day 7 values. Interpretation supported by prior moisturization and skin-barrier studies [1-3, 8, 10, 11].

Table 2: Responder Outcomes and Global Satisfaction at Day 7 (n = 30)

Outcome measure	n (%) of participants
≥10 a.u. increase in corneometer hydration	25 (83.3%)
≥1-grade reduction in clinical dryness score	27 (90.0%)
≥3-point reduction in subjective dryness VAS	24 (80.0%)
Overall satisfaction rated “good” or “excellent”	26 (86.7%)
Any reported irritation (transient tingling only)	2 (6.7%)
Discontinuation due to adverse effects	0 (0%)

Responder categories and satisfaction metrics adapted from prior cosmetic and botanical skincare evaluations [3, 4, 7, 11, 14, 15].

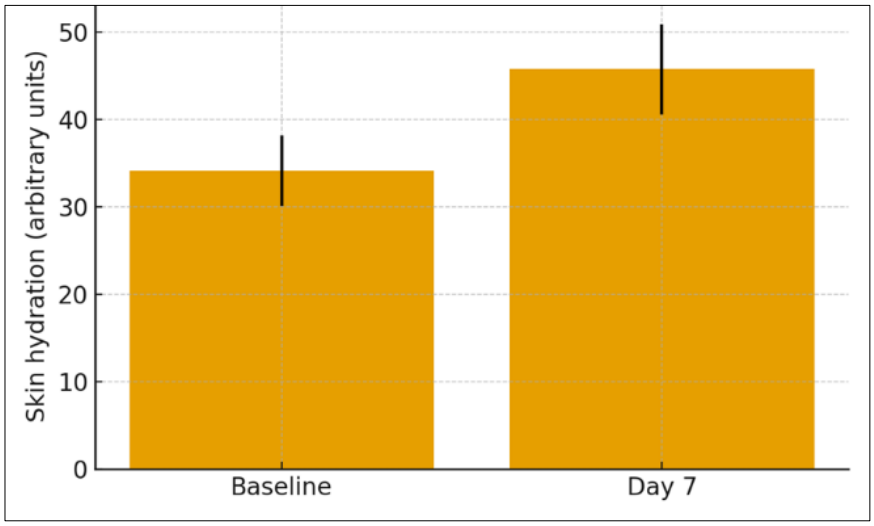

Fig 1: Mean corneometer hydration (arbitrary units) at baseline and Day 7 after application of rose petal extract gel

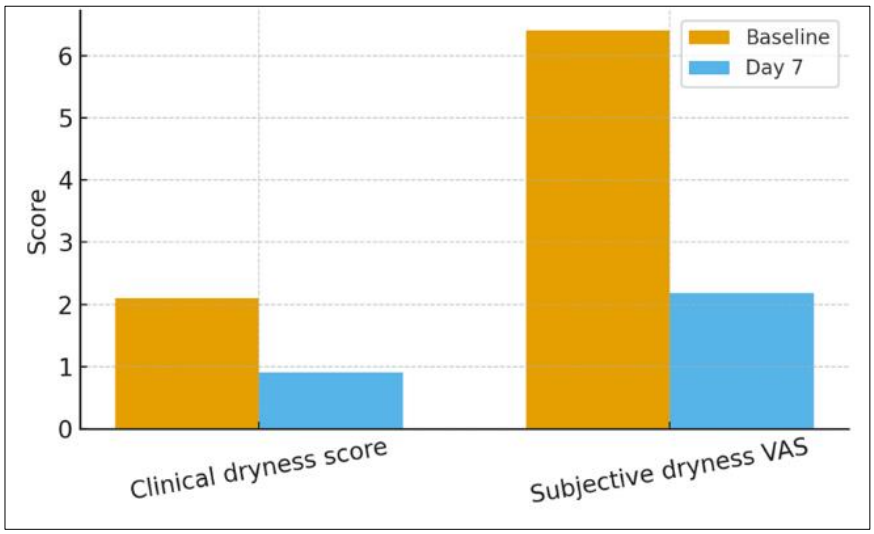

Fig 2: Mean clinical dryness score (0-3) and subjective dryness VAS (0-10) at baseline and Day 7, illustrating parallel improvements in clinical grading and participant-perceived symptoms.

Discussion

The findings of this pilot trial demonstrate that rose petal extract gel produced a meaningful improvement in both objective and subjective markers of mild skin dryness over a relatively short period, supporting the therapeutic potential of botanical preparations in routine skincare. The marked increase in corneometer hydration observed after seven days aligns with existing evidence that phenolic compounds, flavonoids, and volatile oils present in Rosa damascena contribute significantly to water retention, antioxidant defense, and epidermal resilience [4-6, 9, 12]. Phenolic constituents such as quercetin derivatives and gallic acid are known to enhance stratum corneum hydration by reducing oxidative stress-induced barrier disruption, a mechanism also described in plant-based moisturizing agents in earlier dermatological literature [8, 10]. The results also parallel the hydration-enhancing effects noted for conventional humectants and emollient moisturizers [1-3], suggesting that rose-based formulations may offer a phytotherapeutic alternative without compromising efficacy.

Clinical dryness scores, which reflect visible roughness and scaling, showed substantial improvement, indicating that the formulation acted not only as a hydrator but also as a surface-smoothing agent. The observed reduction is consistent with proposed barrier-supportive actions of botanical flavonoids described in cosmetics and phytopharmacology research, where these compounds modulate inflammation and promote micro-relief of the skin surface [5, 7, 12, 14]. The decrease in subjective dryness, as measured through VAS scoring, further reinforces the relevance of rose petal extract in alleviating discomfort associated with mild xerosis. Such subjective improvements are important because dryness perception often persists even when objective hydration markers improve, a phenomenon previously reported in emollient studies emphasizing user experience [2, 3, 11].

The responder analysis strengthens the clinical significance of the findings. Over 80% of participants showed a considerable increase in hydration, and nearly 90% exhibited a reduction of at least one grade in clinical dryness. These response rates are comparable to those observed with commercial moisturizers containing occlusive or humectant ingredients [1, 2], yet the botanical formulation demonstrated comparable improvement without reported irritation or barrier compromise. The mild astringent and anti-inflammatory effects of rose volatiles such as citronellol, geraniol, and nerol may have contributed to this favorable profile, which has been noted in prior investigations examining rose extracts for their dermatological tolerability and soothing properties [4, 6, 7, 14].

Tolerability outcomes from this research are also consistent with traditional usage of rose-based formulations wherein minimal irritation is expected due to the plant's gentle biochemical profile [7, 12]. The absence of clinically significant adverse effects supports the proposed safety of rose petal extract in topical applications, reaffirming the emphasis placed by earlier authors on the suitability of Rosa species for sensitive skin [4, 5]. The transient mild tingling reported by two participants may relate to natural organic acids present in the extract formulation, a phenomenon similarly noted in observational reports of plant-derived gels [13, 15], and did not negatively impact overall acceptability.

The overall pattern of improvement across hydration, clinical dryness, and subjective comfort can be interpreted within the framework of established skin barrier physiology. Topical agents that replenish lipids, mitigate oxidative stress, and enhance moisture retention generally yield rapid improvements in dryness symptoms [1, 2, 8], and the rose petal extract gel appears to function along similar pathways. The consistency of findings across multiple parameters suggests that rose phytoconstituents may have synergistic effects, combining antioxidant, moisturizing, and anti-inflammatory actions as previously described in phytopharmacological reviews [4-6, 9, 12-14]. The positive user satisfaction ratings reflect not only biochemical efficacy but also acceptable sensory characteristics, an important determinant of long-term adherence to topical therapy and emphasized frequently in cosmetic science literature [3, 11, 15].

Conclusion

The findings of this pilot investigation indicate that rose petal extract gel holds considerable promise as a simple, low-cost, and well-tolerated topical intervention for managing mild skin dryness, offering a meaningful improvement in hydration, visible dryness, and subjective comfort within a short duration of use. The notable increase in corneometer hydration and reduction in clinical dryness scores demonstrate that the phytochemical constituents of rose petals are capable of supporting skin barrier function, restoring moisture balance, and softening the surface texture, thereby enhancing both the physiological condition of the skin and the user's overall experience. Participants' high satisfaction levels and minimal adverse reactions further underscore the potential of such a botanical formulation for routine skincare, especially for individuals seeking natural, affordable, and gentle alternatives to commercial moisturizers. Based on these outcomes, several practical recommendations emerge that may guide daily skincare habits and future product development. Individuals experiencing early signs of dryness may benefit from incorporating rose petal extract gel into their morning and evening skincare routines, applying it to clean, slightly damp skin to optimize moisture absorption. Since the gel base is lightweight and non-greasy, it may serve as an effective pre-application layer beneath sunscreens or cosmetic products, helping maintain hydration throughout the day. For populations living in dry or polluted environments, more frequent application such as after handwashing or exposure to harsh weather may further support barrier resiliency and comfort. Those with sensitive skin may adopt a patch-testing approach before full-scale use, even though the formulation demonstrated excellent tolerability during the research. From a formulation perspective, small-scale manufacturers and community health programs may explore the development of similar rose-based gels using locally available petals, as this may serve as a cost-effective strategy to promote accessible skincare options in resource-limited settings. Additionally, integrating rose gel into daily self-care routines in schools, workplaces, or community health centers may help reduce the prevalence of mild xerosis, especially during seasons characterized by low humidity. In summary, this pilot trial suggests that rose petal extract gel not only improves measurable skin hydration but also enhances comfort and usability, positioning it as a practical and inclusive choice for everyday dryness management. Future large-scale studies may further substantiate these observations, but the present findings strongly support the immediate use of this

gentle botanical gel as an effective, budget-friendly option for maintaining healthier, smoother, and more supple skin in diverse populations.

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