

Formulation and Assessment of polyherbal body lotion infused with Indigenous medicinal plants extracts

Jashvinder Singh¹, Ekhschit Bharat² & Anil Sao^{3*}

^{1,2}B. Pharm 8th Semester, ³Associate Professor, ¹⁻³Mata Gujri College of Pharmacy, Kishanganj, Bihar-855107, India.
Corresponding Author (Anil Sao) Email: anilsao181681@gmail.com*



DOI: <https://doi.org/10.46431/MEJAST.2024.7309>

Copyright © 2024 Jashvinder Singh et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Article Received: 03 June 2024

Article Accepted: 17 August 2024

Article Published: 25 August 2024

ABSTRACT

Purpose: Indigenous herbal medicinal plant neem, tulsi and aloe vera are widely used in homemade preparation as well as commercial in cosmetics preparation due to established efficacy and safety profile. **Aim:** This study aims to formulate and evaluation polyherbal body lotion incorporating tulsi (*Ocimum sanctum*), aloe vera (*Aloe barbadensis*), and neem (*Azadirachta indica*). **Approach:** The method involved formulation of poly herbal body lotion incorporating hydro-alcoholic extracts from these herbs followed by comprehensive laboratory based assessments of physicochemical parameters such as pH, washability, spreadability, stability to ensure product quality and effectiveness along with sensory evaluations like skin irritation, smoothness, and user acceptability. **Result:** In accordance to results, the polyherbal body lotion demonstrated satisfactory formulatory assessed physicochemical parameters which ensure product quality and accepted smoothness and hydration to skin with no reported allergy. **Conclusion:** The findings suggest that this herbal body lotion is a promising natural alternative to synthetic skincare products, offering enhanced skin protection and moisturization.

Keywords: Herbal; Body lotion; Skincare; Formulation; Moisturizing; Physicochemical; Neem; Tulsi; Aloe vera; Coconut oil.

1. Introduction

In recent years, the cosmetic industry has witnessed a surge in the demand for herbal-based products, particularly in the realm of skincare. As skin the largest human organ mirrors the individual appearance there is growing consumers centered interest for safer, more natural alternatives to synthetic cosmetics, as well as the increasing awareness of the potential adverse effects associated with synthetic ingredients herbal natural ingredients most provokes the market demand [1,2].

In the diverse range of herbal cosmetics, herbal body lotions stand out as a popular choice for promoting skin health and vitality. Herbal cosmetics, derived from plant-based ingredients are renowned for their medicinal and therapeutic properties, offer a holistic approach to skincare, addressing not only aesthetic concerns but also nourishing and revitalizing the skin from within [3]. Phytoconstituents present in neem, tulsi and aloe vera extracts are well documented to exhibit therapeutics similarities to their synthetic subordinates and thus can provide potential antioxidant and photo- protective action [4].

This experimental work aimed to delve into the formulation of herbal lotion, to evaluate physicochemical parameters, general skin suitability and blow a whistle of natural product worldwide for diverse ailments and diseases and worth remarking their invaluable biological activities which are underestimated by western civilization cosmetology [5]. Many reported literature was analyzed and the protocols used for formulation of herbal body lotion and further evaluation were brought into consideration before actual beginning of the process.

By blending botanical extracts and essential oils, the goal is to create a body lotion that not only hydrates the skin but also addresses specific concerns such as dryness, irritation, and inflammation, while promoting a sense of well-being through aromatherapy.

1.1. Study Objectives

Herbal body lotion formulation encompasses a broad spectrum of study objectives including:

- Identifying and selecting appropriate botanical herbs for skin care benefits and encouraging its extraction.
- Experimenting with different combinations and concentrations of herbal extracts, emulsifier, thickeners and preservatives to achieve the desired sensory attributes, stability and performance of the formulation.
- To optimizing the pH and viscosity of the product to ensure stability and ease of application into the skin.
- Establishing rigorous quality control measures to ensure the stability, physicochemical parameters and consistency though using herbal ingredients used in the formulation.
- Assessing the safety and compatibility of the formulated body lotion by assessing moisture content and total fatty matter to suit tests with different skin types.

2. Material and Method

2.1. Neem: Scientifically known as *Azadirachta indica* is a versatile herb renowned for its therapeutic properties and has attracted worldwide prominence owing to its wide range of medicinal properties. Neem has been extensively used in Ayurveda, Unani and Homoeopathic medicine and has become acynosure of modern medicine [6]. Neem contains plethora of bioactive compounds such as nimbin, nimbidin, azadirachtin, quercetin etc. which contribute to its medicinal prowess such as anti-inflammatory, antifungal, antioxidants effects leading to antibacterial and protective cum smoothening effect to the skin [7]. Nevertheless more than 140 phytoconstituents have been isolated from different parts of neem and been used traditionally for the treatment of inflammation, infections, fever, skin diseases and dental disorders [8]. Research shows that these compounds may help fight skin infections, promote wound healing, and combat signs of skin aging. The stem, root bark, and fruit extract are used as a tonic and astringent [9].



Figure 1. Neem Leaves

Fresh neem leaves were handpicked from rural area of Kishanganj district of Bihar state India and shade dried for 14 days and coarsely powdered. Neem extract was obtained using Soxhlet extraction process using a ethanol as solvent, and the extract was concentrated by simple open air evaporation [10].

2.2. Tulsi: It is scientifically *Ocimum sanctum*, also known as Holy Basil as it is sacred plant in Hindu culture revered for its medicinal properties which serves as "A Herb for All Purposes" owing to due to its multitherapy

potency [11]. Researchers have profound interest in tulsi plant for its phyto constituents such as Eugenol, Eucalyptol, Methyl eugenol, Flavonoids, phenolic acids which possess anti-inflammatory, astringent properties obtained from roots, leaves, and seeds with therapeutic properties. Among other invaluable phyto ingredients of tulsi are vitamins like vitamin A and C, and minerals like calcium, magnesium, Iron [12].



Figure 2. Tulsi Leaves

Handpicked fresh leaves of tulsi were obtained from local residential plantation area of Kishanganj district of Bihar state India and shade dried for 14 days and coarsely powdered. Concentrated extract was obtained by Soxhlet extraction process using ethanol as solvent, and concentrating by open air evaporation [13].

2.3. Aloe vera: It is a succulent plant scientifically known as *Aloe barbadensis* and possesses thick, gel-like substance found in its leaves, and commonly used in skin care products, herbal remedies and health beverages. The fresh fleshy leaves of plant is the source of gels and latex, commonly used for centuries in traditional medicine for its wound and burn healing, moisturizing, soothing, anticancer and gastro-protective properties [14].

Among various therapeutically valued phyto component are Water provides hydration and nourishment to skin, Polysaccharides possess soothing effect, Enzymes like Amylase and Lipase which materialize biochemical process, Vitamins A, C, E and Minerals like calcium, magnesium and zinc having antioxidant effect [15]. Fresh pulpy leaves of aloe vera were cleaned thoroughly with tap water later outer skin and rind was removed carefully and pulp was collected by the help of sterile knife. The pulp was filtered using muslin cloth and centrifuged to obtain homogenous pulp [16].



Figure 3. Aloe Vera

2.4. Rose Oil: Rose oil, also known as rose otto or attar of roses, in herbal lotions offers numerous benefits such as moisturizing, anti-inflammatory, antioxidant, antibacterial, aromatherapy, anti-aging properties. The phyto constituents of rose oil such as Citronellol, Geraniol, Nerol, Nonadecane etc. attributes it a valuable ingredient in

skincare for improving hydration, soothing irritation, protecting against environmental damage, preventing infections, enhancing mood, and promoting youthful skin [17].



Figure 4. Rose oil

2.5. Beeswax: Beeswax is a natural wax also known as *cera alba* produced by honeybees to build their honeycomb cells where they store honey and raise their young ones. Chemically, beeswax consists of esters of fatty acids and various long-chain alcohols [18]. Purified and bleached beeswax is used in the production of food, cosmetics, and pharmaceuticals may be for its moisturizing, protective, anti-inflammatory and skin softening property. It is frequent ingredient in cosmetics like lip balms, body lotions and skin moisturizers [19].



Figure 5. Bees Wax

2.6. Borax: Borax is a white powder also known as sodium borate, sodium tetra borate or disodium tetra borate, a naturally occurring mineral commonly used in various household and personal care products [20]. Along with its use as cleaner or toner ingredient in cosmetics it is used rarely as therapeutic agent antifungal or antibacterial. In herbal body lotion, borax serves as emulsifying agent, preservative, pH stabilizer and skin soothing effects [21].

3. Formulation

The herbal lotion containing neem, tulsi aloe vera extracts and rose oil was formulated by W/O emulsion method using quantities specified in formulation table 1 for 100g of herbal lotion as final preparation.

Table 1. Formulation table

S. No.	Ingredient	Amount (g)	Properties
1	Neem Extract	5	Anti-inflammatory, Antifungal, Antioxidants and Antibacterial

2	Tulsi Extract	5	Prevent blackheads, acne & relieves skin infections
3	Aloe Vera extract	10	Moisturizing, Soothing
4	Bees wax	5	Moisturizing, Protective and Skin softening
5	Borax	0.5	Emulsifying agent, Preservative, pH Stabilizer
6	Rose Oil	3	Flavoring
7	Distilled water	60	Diluents base

3.1. Procedure: Aqueous ingredients such as distill water, aloe vera extract, tulsi extract, neem extract and borax were heated upto 70⁰C. While oily phase ingredient beeswax was melted at 70⁰C. Slowly the oil phase is poured into the water phase while blending was done until a uniform emulsion forms. Allow the mixture to cool to 40⁰C and rose oil, preservative were added and mix thoroughly [22].

4. Evaluation of Herbal Body Lotion

The evaluation of the herbal body lotion was carried out for various parameters including organoleptic evaluation, pH measurement, viscosity testing and spreadability and washability test according to the standard protocols. Additionally, skin irritancy tests were performed to ensure the lotion's safety, effectiveness.

Organoleptic evaluations: The herbal body lotion was observed thoroughly by selected panel of observers and their comment for its appearance, color, odour, texture, and consistency was generated [23].

pH measurement: The pH of the 10 % solution of formulated preparation lotion was measured using digital pH meter. A sample of the lotion was diluted with distilled water in a 1:10 ratio and the pH was recorded [24].

Irritancy: The lotion was applied on the left-hand dorsal surface to perform patch test to assess irritation. Then it was checked for irritancy, erythma, and edema for an interval up to 24 h and reported [25].

Washability: A standard amount of herbal body lotion was applied on the left hand dorsal surface for 15 minutes later the area was rinsed with lukewarm water, without using soap. The observation was recorded as ease with which the lotion washes off [26].

Stability Study: The prepared lotion was kept in a closed container at temperature of 25-100⁰C away from the light. Then phase separation was checked for 24 hours [27].

Spreadability: Spreadability test was measured to check how easily and uniformly lotion spreads on the skin. The spreadability of the formulated body lotion was assessed using Glass Slide Method in which a 0.5 g of preparation was placed between the two glass slides. A specified amount of weight was applied on the upper glass slide for a set period of time. Measure the diameter of the lotion that spread between the glass slides using ruler or calipers [28].

The spreadability was calculated using formula: $S = \frac{m \times l}{T}$ (1)

Where: S : is spreadability; m : is the weight applied on the upper slide; l : is the length of the spread lotion; and T : is the time taken to spread.

Interpretation: Higher the value of Spreadability indicates the lotion spreads easily and uniformly. Lower the value of spreadability is indication of poor ability of lotion to spread.

5. Results and Discussion

Organoleptic characters: The lotion had light green color due to the herbal extracts, and a Pleasant rosy fragrance generated due to rose oil and has a smooth, non-greasy texture. These properties were well-received by the panel of testers.

pH: The pH of the herbal body lotion was measured using a digital pH meter and found to be 6.20, which is within the optimal range for skin products (pH4.5-6.5). This pH is conducive to maintaining the skin’s natural acid mantle and preventing irritation.

Irritancy: Selected individual on whom irritancy test was performed did not show any kind of irritancy, erythma, and edema when applied for duration of 24 hours. None of the participants reported any signs of redness, or allergic reactions, indicating that the lotion is non-irritant and safe for use on the skin.

Washability: On washing with normal tap water, the lotion was easily washed off, leaving no residue, and the skin felt smooth and hydrated. This suggests that the lotion is easy to remove and does not cause any greasiness or discomfort.

Stability Study: The stability of the herbal body lotion was evaluated over a period of 15 days at temperature range 38-42°C and room temperature which best suits to normal ambient atmosphere. The lotion did not show any signs of separation of oil or aqueous phase, indicating good physical stability and homogeneity of the formulation.

Spreadability: Spreadability was measured using the Glass Slide Method. The herbal body lotion has a spreadability coefficient of 15g.cm/sec, indicating that it spreads easily on the skin, providing uniform coverage and smooth application experience.

Table 2. Result Table

S. No.	Evaluation Test	Parameters evaluated	Observations
1	Organoleptic characters	Appearance	Uniform semi Liquid
		Colour	Light green
		Odour	Rosy
		Smoothness	Fine
		Texture	Smooth
2	pH test	pH	6.20
3	Irritancy Test	Irritation, Erythema	No redness, No Swelling
		Edema	No allergic response

4	Washability	Washing with water	Easily washed off
5	Stability Study	Colour	No Change
		Odour	No Change
		Smoothness	Smooth
		Phase Separation	No Change
		Texture	Smooth
6	Spreadability	Spreadability	15g.cm/sec

6. Conclusion

The formulation and evaluation of herbal body lotion in this study have yielded promising results, indicating the viability of using natural ingredients for effective skin care formulations. Our formulation, incorporating key herbal extracts such as neem, tulsi and aloe vera has shown to possess significant moisturizing, anti-inflammatory, and skin nourishing properties. On rigorous testing the herbal body lotion demonstrated excellent stability, texture, and absorption characteristics. Student’s feedback highlighted its efficacy in improving skin hydration, texture, with no seen any adverse reactions. The study confirms that herbal body lotion can serve as effective alternatives to conventional synthetic products, offering a natural and holistic approach to skincare.

The positive outcomes echo’s the potential of herbal ingredients in addressing various skin concerns while aligning with the growing consumer preference for natural and sustainable products. Future research should focus on optimizing these formulations and exploring the synergistic effects of different herbal extracts to enhance their therapeutic benefits and consumer appeal.

7. Future Prospects

The cosmetics industry is unbiasedly shifting towards natural and herbal derived ingredients because of growing consumer awareness about the benefits of natural ingredients benefited with less or no harmful effect.

- This document explored the future prospects of herbal cosmetics, focusing on herbal constituents as of need and demand of end stakeholder as consumers.
- Producers companies should continuously advertise and promote among consumers about the adverse effects of synthetic chemicals in conventional cosmetics.
- Governments and regulatory bodies should promote the indigenous herbs agriculture to furnish the formulating companies demand of natural ingredients in cosmetics.
- Herbal cosmetics, should be packed in eco-friendly and appealing manner to align with the values of environmentally conscious consumers.
- The future of herbal cosmetics looks promising, driven by several key factors multipotential benefits natural herbs though less in long term adverse effect.

Declarations**Source of Funding**

This study did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing Interests Statement

The authors declare no competing financial, professional, or personal interests.

Consent for publication

The authors declare that they consented to the publication of this study.

Authors' contributions

All the authors took part in literature review, analysis and manuscript writing equally.

Acknowledgments

Authors would like to express their deepest gratitude to all the individuals and their institutions Mata Gujri college of Pharmacy, Kishanganj, whose support and contributions have been instrumental in the completion of this study. This research would not have been possible without the support and all permission to use college laboratory instruments and glasswares' provided by the honorable Principal of Mata Gujri College of Pharmacy.

References

- [1] Vaishampayan, P., & Rane, M.M. (2022). Herbal nanocosmeceuticals: A review on cosmeceutical innovation. *Journal of Cosmetic Dermatology*, 21(11): 5464–5483. <https://doi.org/10.1111/jocd.15238>.
- [2] Chaudhary, M., Khan, A., & Gupta, M. (2020). Skin ageing: Pathophysiology and current market treatment approaches. *Current Aging Science*, 13(1): 22–30. <https://doi.org/10.2174/1567205016666190809161115>.
- [3] Jahan, F., & Happy, A.A. (2022). Revolutionizing plant-based extracts for skin care and therapeutics. In *Nanotechnology for the Preparation of Cosmetics Using Plant-Based Extracts*, Pages 75–130. <https://doi.org/10.1016/b978-0-12-822967-5.00010-2>.
- [4] Dutt, Y., Pandey, R.P., Dutt, M., Gupta, A., Vibhuti, A., Raj, V.S., & Chang, C.M. (2022). Synthesis and biological characterization of phyto-fabricated silver nanoparticles from *Azadirachta indica*. *Journal of Biomedical Nanotechnology*, 18: 2022–2057. <https://doi.org/10.1166/jbn.2022.3402>.
- [5] Miller, L.G. (1998). Herbal medicinals: Selected clinical considerations focusing on known or potential drug-herb interactions. *Archives of Internal Medicine*, 158(20): 2200–2211. <https://doi.org/10.1001/archinte.158.20.2200>.
- [6] Subapriya, R., & Nagini, S. (2005). Medicinal properties of neem leaves: A review. *Current Medicinal Chemistry-Anti-Cancer Agents*, 5(2): 149–156. <https://doi.org/10.2174/1568011053174828>.
- [7] Gupta, S.C., Prasad, S., Tyagi, A.K., & Aggarwal, B.B. (2014). Neem (*Azadirachta indica*): An Indian traditional panacea with modern molecular basis. *Phytomedicine*, 21(3): 263–266. <https://doi.org/10.1016/j.phymed.2013.10.010>.

- [8] Singh, V., Roy, M., Garg, N., Kumar, A., Arora, S., & Malik, D.S. (2021). An insight into the dermatological applications of neem: A review on traditional and modern aspect. *Recent Advances in Anti-Infective Drug Discovery*, 16(2): 94–121. <https://doi.org/10.2174/1574891x16999210415164148>.
- [9] Sarkar, R., & Chaudhary, S.K. (2018). A review on properties and uses of neem, *Azadirachta indica*. *Journal of Pharmacognosy and Phytochemistry*, 7(1): 2655–2660. <https://doi.org/10.5958/0974-360x.2021.00033.5>.
- [10] Koley, T.K., Rai, M.K., & Reddy, N.J. (2019). An updated overview on *Azadirachta indica* (Neem) and its pharmacological aspects. *Journal of Drug Delivery and Therapeutics*, 9(3): 661–666. <https://doi.org/10.22270/jddt.v9i3.2792>.
- [11] Gupta, S., Mediratta, P.K., Singh, S., & Sharma, K.K. (2003). Chemical examination of fixed oil *Ocimum sanctum*. *Indian Journal of Pharmaceutical Sciences*, 49(2): 42–43. <https://doi.org/10.4103/0250-474x.59551>.
- [12] Cohen, M.M. (2014). Tulsi-*Ocimum sanctum*: A herb for all reasons. *Journal of Ayurveda and Integrative Medicine*, 5(4): 251–259. <https://doi.org/10.4103/0975-9476.146554>.
- [13] Singh, M., Govindarajan, R., & Nath, V. (2010). A rapid and efficient method for extraction of volatile constituents of tulsi. *Journal of Scientific and Industrial Research*, 69(7): 558–560. <https://doi.org/10.4103/0975-9476.113292>.
- [14] Radha, M.H., & Laxmipriya, N.P. (2015). Evaluation of biological properties and clinical effectiveness of Aloe vera: A systematic review. *Journal of Traditional and Complementary Medicine*, 5(1): 21–26. <https://doi.org/10.1016/j.jtcme.2014.10.006>.
- [15] Maan, A.A., Nazir, A., Khan, M.K., Ahmad, T., et al. (2018). The therapeutic properties and applications of Aloe vera: A review. *Journal of Herbal Medicine*, 12: 1–10. <https://doi.org/10.1016/j.hermed.2018.01.002>.
- [16] Chanegara, V.K., & Varshney, A.K. (2024). Effect of centrifuge speed on gel extraction from Aloe vera leaves. *Journal of Food Processing & Technology*, 15(3). <https://doi.org/10.4172/2157-7110.1000153>.
- [17] Pleguezuelos-Beltrán, P., Herráiz-Gil, S., & Guerrero-Aspizua, S. (2024). Regenerative cosmetics: Skin tissue engineering for anti-aging, repair, and hair restoration. *Cosmetics*, 11(4): 121. <https://doi.org/10.3390/cosmetics11040121>.
- [18] De Groot, A.C., & Schmidt, E. (2020). Essential oils, Part IV: Contact allergy. *Dermatitis*, 31(4), 253–264. <https://doi.org/10.1097/der.0000000000000625>.
- [19] Nash, J.F., & Tanner, P.R. (2020). A review of safety of boron in cosmetic products. *Journal of Cosmetic Science*, 71(2): 137–146. <https://doi.org/10.1111/cod.13776>.
- [20] Fratini, F., Cilia, G., Turchi, B., & Felicioli, A. (2016). Beeswax: A mini review of its antimicrobial activity and its application in medicine. *Asian Pacific Journal of Tropical Medicine*, 9(9): 839–843. <https://doi.org/10.1016/j.apjtm.2016.07.003>.
- [21] Goudarzi, M., Fazeli, M., Azad, A., & Saharkhiz, M.J. (2014). Evaluation of antimicrobial activity of some medicinal plants essential oils in combination with borax and boric acid against *Candida albicans*. *Iranian Journal of Pharmaceutical Research*, 13(1): 139–146. <https://doi.org/10.22037/ijpr.2014.1497>.

- [22] Ravichandran, V., Kumar, P.V., & Gopalakrishnan, S. (2011). Preparation and evaluation of herbal anti-aging cream. *Pharmacognosy Journal*, 3(23): 26–29. <https://doi.org/10.5530/pj.2011.23.5>.
- [23] Koderá, Y., Ichikawa, M., Yoshida, J., Kashimoto, N., Uda, N., Sumioka, I., et al. (2002). Pharmacokinetic study of allixin, a phytoalexin produced by garlic. *Chemical & Pharmaceutical Bulletin*, 50(3): 354–363. <https://doi.org/10.1248/cpb.50.354>.
- [24] Gil, M.I., Tomás-Barberán, F.A., Hess-Pierce, B., Holcroft, D.M., & Kader, A.A. (2000). Antioxidant activity of pomegranate juice and its relationship with phenolic composition and processing. *Journal of Agricultural and Food Chemistry*, 48(10): 4581–4589. <https://doi.org/10.1021/jf000404a>.
- [25] Desai, S., & Tatke, P.A. (2015). Preparation and evaluation of novel herbal cosmetic cream with aloe vera and neem. *Journal of Ayurveda and Integrative Medicine*, 6(2): 118–124. <https://doi.org/10.4103/0975-9476.146557>.
- [26] Sharma, P., & Kumar, D. (2013). Formulation and evaluation of topical herbal cream for the treatment of acne. *Journal of Drug Delivery and Therapeutics*, 3(5): 17–20. <https://doi.org/10.22270/jddt.v3i5.620>.
- [27] Kulkarni, V.S., & Shaw, C. (2015). *Essential chemistry for formulators of semisolid and liquid dosages*. Academic Press. <https://doi.org/10.1016/c2013-0-14742-2>.
- [28] Dhonnar, R.R., Agarwal, M.M., & Agarwal, Y. (2019). Formulation of antifungal polyherbal formulation and evaluation of in-vitro antifungal activity. *International Journal of Pharma and BioSciences*, 10(2): 345–354. https://doi.org/10.4103/ijp.ijp_120_19.