WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 5, 635-645. Research Article ISSN 2277–7105

FORMULATION AND EVALUATION OF POLYHERBAL KOKUM BUTTER BASED-BODY BUTTER ENRICHED WITH NATURAL EXTRACTS AND ESSENTIAL OILS FOR SKIN HYDRATION AND NOURISHMENT

[1]Deepthi U. P., [2]Sona S., [3*]Meenu Sreekumar

[1,2]UG Scholars, Department of Pharmaceutics, The Dale View College of Pharmacy and Research Centre, (Autonomous) Punalal, P O, Poovachal, Thiruvananthapuram.

[3]Assistant Professor Department of Pharmaceutics, The Dale View College of Pharmacy and Research Centre, (Autonomous) Punalal, P O, Poovachal, Thiruvananthapuram.

Article Received on 30 Jan. 2026,
Article Revised on 19 Feb. 2026,
Article Published on 01 March 2026,

https://doi.org/10.5281/zenodo.18797363

***Corresponding Author**

Meenu Sreekumar

Assistant Professor Department of Pharmaceutics, The Dale View College of Pharmacy and Research Centre, (Autonomous) Punalal, P O, Poovachal, Thiruvananthapuram.

How to cite this Article: [1]Deepthi U. P., [2]Sona S., *[3]Meenu Sreekumar (2026). Formulation And Evaluation Of Polyherbal Kokum Butter Based-Body Butter Enriched With Natural Extracts And Essential Oils For Skin Hydration And Nourishment. World Journal of Pharmaceutical Research, 15(5), 635–645.

ABSTRACT

The aim of the present study was to develop and evaluate a Polyherbal kokum-based body butter using kokum butter (*Garcinia indica*), shea butter (*Vitellaria paradoxa*), aloe vera (*Aloe barbadensis*), vitamin E, coconut oil, olive oil, and lavender oil. For providing a deep hydration and nourishment to the skin. The formulated product was evaluated for physicochemical parameters, moisturizing efficacy and sensory characteristics. To ensure stability and consumer acceptability. The polyherbal kokum-based body butter was assessed by using organoleptic properties, pH, viscosity, homogeneity, spread ability and stability studies. The organoleptic evaluation included assessment of Color, Odor, appearance, and texture. The optimized formulation shown acceptable organoleptic properties, suitable pH close to skin pH and good spread ability. The ex vivo skin retention studies shows the results indicate that kokum butter– based body butter exhibits good skin retention properties, making it suitable for prolonged topical application. The study conclude that the formulated kokum butter-based body butter is safe, effective and has good moisturizing, nourishing properties for skin application.

KEYWORDS: Polyherbal, *Garcinia indica, Vitellaria paradoxa*, Body butter, Deep hydration, Nourishment.

INTRODUCTION

Body butter is a rich and nourishing moisturizer that deeply hydrates the skin. Crafted with a blend of natural ingredients like shea butter, cocoa butter, and plant oils, it provides long lasting moisture and locks in hydration. Its thick and creamy consistency allows it to be smoothly massaged, leaving the skin feeling soft and smooth. It is particularly beneficial for dry, rough, and flaky areas, while also helping to reduce irritation and soothe sensitive skin. Body butter can be applied to specific areas such as the hands, feet, elbows, and knees, or used over the entire body to enhance a healthy, natural glow. With continued use, it helps maintain long-lasting moisture, improves skin texture, and promotes a soft and radiant appearance.[1]

Kokum butter is a rich, creamy plant- based butter extracted from the seeds of the Garcinia indica tree. Each kokum fruit contains 5-10 black seeds, which are cleaned and pressed to extract the oil. After the process the oil get transforms into the kokum butter, a nutrient rich ingredient similar to shea butter. The composition of saturated fats, including stearic acid and oleic acids it is an excellent moisturizer, healer and protector in skin care and cosmetics.

Its benefits make it nourishing and protecting the skin. They have antioxidant, anti-inflammatory and anti-microbial activity.[2]

Skin is our first line of defense against the environment and helps control our body temperature. Keeping it well- moisturized is essential for it to stay healthy and function properly. When the skin has enough moisture, it stays soft, strong, and able to renew itself, giving it a healthy, glowing appearance. But when it lacks moisture, it can become dry, flaky, sensitive, and can even worsen existing skin issues.[3]

MATERIALS AND METHODS

KOKUM BUTTER (*Garcinia indica*)[4]

Kokum is basically a natural fat that we get by pressing the seeds of the *Garcinia indica* or *Garcinia purpurae*, belonging to the family Guttiferae. It is obtained from the seeds of the kokum fruit, which contain about 23-26% edible oil. In its crude form, kokum butter appears yellow, but it becomes white after refining.

Uses

- It deeply moisturizes and hydrates skin.
- Antioxidant and anti-inflammatory properties.
- It helps to heal and soothe inflamed and damaged skin.

SHEA BUTTER (*Vitellaria paradoxa*)[5]

Shea butter is a natural fat obtained from the seeds of the shea tree (*Vitellaria paradoxa),* which belongs to the family sapotaceae. It has a solid texture at room temperature but melts easily when applied on the skin. Its color ranges from ivory to light yellow. Unrefined shea butter has a characteristic, natural aroma, while refined shea butter is almost odorless or has very little scent.

Uses

- It nourishes the skin and prevents dryness.
- Sun protecting property at a mild level due to the presence of vitamin A and vitamin E

ALOE VERA (*Aloe barbadensis miller*)[6]

It consists of dried juice of the leaf of (*Aloe barbadensis),* which belongs to the family Liliaceae. The plant has fleshy leaves, triangular with serrated edges, yellow tubular flowers and fruits that contain numerous seeds.

Uses

- Soothes sunburns
- Skin irritation
- It nourishes, hydrates and moisturizes skin
- Treat wounds and inflammation.

OLIVE OIL (*Olea europaea L.)*[7]

It is obtained by the expression of the ripe fruits of Olea europoea Linn. Which belongs to the family Oleaceae. Pale yellow to greenish yellow colour and have characteristic odour.

Uses

- Used as emollient and soothing agent for skin
- It acts against eczema and psoriasis
- Used in manufacturing of creams, moisturizers, soaps etc.…

- It has demulcent and laxative action

COCONUT OIL[8]

Coconut oil is extracted from dried solid part of endosperm pf coconut, *Cocos nuceifera L.*, which belongs to the family Palmae. Colorless at or above 30 °C white when solid. Typical smell of coconut if not refined, bleached and deodorized.

Uses

- Helps to keep skin soft and smooth.
- It helps the body heat and repair fast.
- Used for soap, cream and other cosmetic products for skin.
- Function as protective antioxidant.
- Used as antifungal agent.

LAVENDER OIL[7]

Lavender oil is the essential oil obtained by steam distillation of fresh flowering tops of Lavendulan officinalis Chaix which belongs to the family Labiatae. Colorless or yellow liquid. Characteristic pleasant aroma.

Uses

- Aromatic
- Carminative
- Flavoring agent in perfumy and cosmetic industry.

VITAMIN E[9]

A nutrient that the body needs in small amounts to say healthy and work the way it should, it is fat soluble and found in seeds, nuts, leafy green vegetables and vegetable oils.

Uses

- Antioxidant property
- Moisturizing property
- It helps your skin produce collagen, a protein that gives your skin strength and elasticity
- Used for scar reduction
- Anti-inflammatory property

METHODOLOGY

- Weigh the kokum butter, Shea butter and carrier oils.
- Place the kokum butter and Shea butter in the china dish set over a water bath.
- After cooling, add carrier oils and natural extracts.
- Allow the mixture to cool about 35-40℃, then use a hand mixer or whisk to whip the mix until it be become light and fluffy
- Pour it into storage container and set at room temperature.

FORMULATION TABLE

INGREDIENTS	F1	F2	F3	F4	F5
Kokum butter	9g	10g	11g	12g	13g
Shea butter	5g	4g	3g	2.5g	2g
Aloe Vera extract	1g	1g	1g	1g	1g
Olive oil	6.6 ml	6.6 ml	6.6 ml	6.6 ml	6.6 ml
Coconut oil	4.3 ml	4.3 ml	4.3 ml	3.8 ml	3.3 ml
Lavender oil	2 drops	2 drops	2 drops	2 drops	2drops
Vit E	2 drops	2 drops	2 drops	2 drops	2 drops

EVALUATION[1,10,11,12,18]

1. **Organoleptic evaluation**: The body butter was evaluated for its colour, odour, texture, consistency and appearance.
2. **Homogeneity:** One gram of body butter on the top, middle and the bottom is taken, then smeared on a piece of transparent glass. It is observed that is not homogenous if there is a phase separation.
3. **pH:** The pH of different formulation of body butter was evaluated by using pHmeter. pH meter was calibrated using standard buffer solution. About 0.5gm of lotion was weighed and dissolved in 50 ml distilled water and its pH was measured.
4. **Viscosity**: Viscosity of the formulation was determined in Brookfield or Ostwald viscometer at 100 RPM, using spindle no.7 and keeps the temperature at 25℃.
5. **Spreadability:** Weigh small amount of body butter. About 0.5g is taken and place them on top of the glass and place another glass on the top of the body butter. Measure the diameter of the butter by measure the length of several sides. The spreadability was calculated by using the formula.

$$\text{Spreadability} = M \times I/T$$

Were,

M = weight placed on the slide L = length of glass slide in cm T = time in sec

6. Accelerated stability study

It was performed on at room temperature for 7 days and elevated temperature on 20 days. The formulations were monitored on days 0, 5, 10, 15 and 20 for colour, phase separation and other physical parameters in both conditions.[48]

7. Adhesions test: Tape stripping method[43]

Modified cross cut method using glass slide- A clean dry glass slide is taken a substrate. A fixed quantity of body butter was uniformly spread over a defined area of glass slide. The applied formulation was allowed to stand for 10-15 min at room temperature for film forming. Then a cross-cut pattern is formed on the formulation using the edge of another glass slide. A piece of normal adhesive tape was pressed over the cross-cut area. The tape was removed in simple motion. The glass slide was observed for the extend of formulation removed.

$$\% \text{ Adhesion} = \frac{Area\ removed}{Total\ cross\ cut\ area} \times 100 = \frac{Ar}{At} \times 100$$

8. Ex vivo skin retention study[12,13,14]

Ex vivo skin retention study of the prepared kokum butter–based body butter formulations was carried out using a Franz diffusion cell. Excised animal skin area (~2–3 cm^2) was used as the diffusion membrane. The skin was carefully cleaned to remove adhering fat and hair and washed with normal saline. The prepared skin was then mounted between the donor and receptor compartments of the Franz diffusion cell, with the stratum corneum side facing the donor compartment. The receptor compartment was filled with phosphate buffer (pH 7.4) and maintained at a temperature of 37 ± 0.5°C with continuous stirring using a magnetic stirrer to simulate physiological conditions. A fixed quantity of 1 g of body butter formulation was uniformly applied over the epidermal surface of the mounted skin in the donor compartment. The donor compartment was covered to prevent evaporation. The study was carried out for a period of 6 hours. At predetermined time intervals of 2, 4, and 6 hours, the experiment was stopped for retention evaluation. After completion of the study, the formulation remaining on the skin surface was gently removed, and the skin was washed with phosphate buffer to remove any loosely adhered formulation. The skin was then blotted dry. The retained formulation within the skin was assessed by cutting the skin into small pieces and extracting with a suitable solvent (methanol). The extract was filtered, and the amount of formulation retained was determined. The skin retention was expressed as the percentage of formulation remaining on the skin surface at different time intervals.

RESULT AND DISCUSSION

1. ORANOLEPTIC PROPERTIES

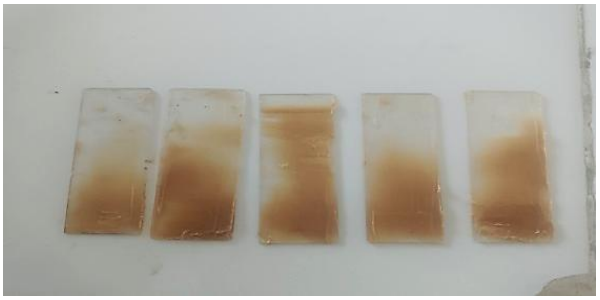
SL NO	EVALUATION PARAMETER	F1	F2	F3	F4	F5
1	Appearance	Semisolid	Semisolid	Semisolid	Semisolid	Semisolid
2	Odour	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
3	Colour	Light brown	Light brown	Light brown	Very light brown	Very light brown
4	Consistency	Homogenous smooth	Homogenous smooth	Homogenous smooth	Homogenous smooth	Homogenous smooth

F1 **F2** **F3**

F4 **F5**

2. HOMOGENITY

EVALUATION PARAMETER	F1	F2	F3	F4	F5
Homogenity	Good	Good	Good	Very Good	Good



3. PH

EVALUATION PARAMETER	F1	F2	F3	F4	F5
pH	5.55	5.60	5.70	5.91	5.90

4. VISCOSITY

EVALUATION PARAMETER	F1	F2	F3	F4	F5
Viscosity	5000 ±300	12,00 ±500	22,000 ±800	35,000 ±1,000	48,000 ±1,500

5. SPREADABILITY

EVALUATION PARAMETER	F1	F2	F3	F4	F5
Spreadability	3.6 g.cm/sec	4.1 g.cm/sec	4.9 g.cm/sec	6.6 g.cm/sec	5.7 g.cm/sec

F4

6. ACCELERATED STABILITY

Parameter	Initial	1st month	2nd month	3rd month
Colour	No change	No change	No change	No change
Odour	Characteristic	Characteristic	Characteristic	Characteristic
Consistency	Smooth	Smooth	Smooth	Smooth
pH	5.91	5.92	5.92	5.92

7. ADHESION TEST

Formulation	Adhesion grade	%Area removed	Interpretation
F1	2B	22%	Fair adhesion
F2	3B	12%	Good adhesion
F3	3B	9%	Good adhesion
F4	5B	0-2%	Excellent Adhesion
F5	4B	4%	Very good adhesion

8. Ex-vivo Retention study

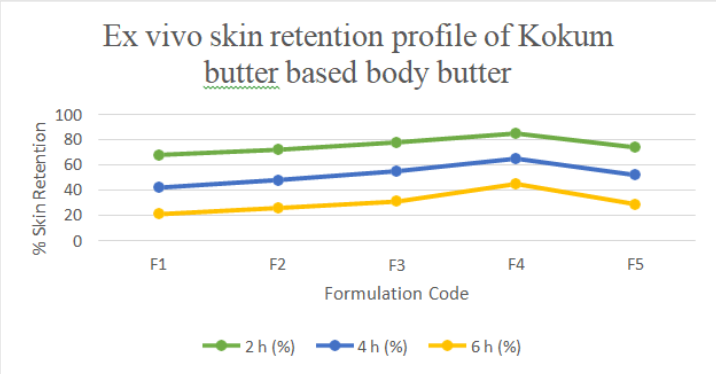
The ex vivo skin retention study was performed to evaluate the ability of kokum butter–based body butter formulations to remain on the skin surface over time. The study was carried out

for **6 hours**, and retention was evaluated at **2, 4, and 6 hours**.

Table: Ex Vivo Skin Retention of Kokum Butter Body Butter.

Formulation	2 h (%)	4 h (%)	6 h (%)	Skin retention at 6hrs
F1	68 ± 2.1	42 ± 1.8	21 ± 1.2	Low
F2	72 ± 1.9	48 ± 2.0	26 ± 1.4	Moderate
F3	78 ± 2.3	55 ± 1.6	31 ± 1.5	Good
F4	85 ± 2.0	65 ± 1.9	45 ± 1.7	Very good
F5	74 ± 2.2	52 ± 1.7	29 ± 1.3	Good

(% of formulation remaining on skin surface, Mean ± SD).



DISCUSSION

In the study, we prepared a kokum butter-based body butter that promotes moisturizing, healthy and radiant skin. Blending natural ingredient like kokum butter, shea butter, oils, essential oil, it delivers deep hydration and rich texture.

The body butter was prepared in five different concentrations F1, F2, F3, F4, F5 and subjected to evaluation of various parameters. The Odor and appearance of five formulation was characteristics and its consistency was semisolid. The preparation F1, F2, F3, F4, F5 showed pH range from 5-7. This pH is compactable with skin and suitable for topical application. Decrease in viscosity increased the spread ability of formulation. F4 Formulation had low viscosity, showing high spread ability.

The stability study was conducted for 3 months and result showed F4 formulation was stable and retained its physical characteristics. F4 formulation showed good homogeneity, spread ability (6.6 g.cm/sec) and moisturizing effect as body butter. After analysis of all batches of formulations for their evaluation parameters like pH (5.91), viscosity (35000 ± 1000), spread ability, homogeneity and stability, the formulation F4 showed satisfactory results. The ex vivo

skin retention study demonstrated a gradual decrease in formulation retention with increasing time for all formulations. Among the tested formulations, F4 showed the highest retention throughout the study period, with 45% of the formulation remaining on the skin surface even after 6 hours. The enhanced retention of F4 may be attributed to the optimized concentration of kokum butter, which forms an occlusive and emollient layer over the skin, thereby improving substantivity and adherence to the skin surface. Lower retention observed with other formulations may be due to comparatively reduced lipid content and weaker interaction with the skin surface. Overall, the results indicate that kokum butter–based body butter exhibits good skin retention properties, making it suitable for prolonged topical application.

CONCLUSION

The polyherbal kokum butter-based body butter offers a powerful, natural solution for intense skin hydration and healing. Large number of people prefers herbal based body butter; because of many benefits they offer over chemical based ones. Using this product on a regular basis result in deep hydration and non-greasy texture. And also, the user can be adjusting the ratio of the product according to climate or skin type.

The cons of the other body butter have limited shelf life and may cause allergic reaction and require some texture adjustment for climate and skin type. To prevent the consequences, we may customizable for skin type and climate changes and also be chemical free, deep hydrating and non-greasy because of the combination of kokum and shea butter. To evaluate the efficacy of the formulation, conduct the evaluation test and it gives desirable quality. This formulation has good moisturizing properties and provides nourishment to skin. The ex vivo skin retention study demonstrated a gradual decrease in formulation retention with increasing time for all formulations. Overall, the results indicate that kokum butter–based body butter exhibits good skin retention properties, making it suitable for prolonged topical application.

This study examines that the formulation of the kokum butter-based body butter can be used as natural moisturizing agent. Evaluation test is done by using certain parameters and the F4 formulation is selected as the best formulation compared to F1, F2, F3 and F5. The study result shows that the product was found to be very well at neutral pH without making allergies or irritations to the skin.

REFERENCE

1. Pallavi Suthar, Patel Ishika Rakeshbhai, Patel Yagni s, Patel v raj k. Formulation and evaluation of skin whitening body butter. World journal of pharmacy and pharmaceutical sciences, 2022; 12(6): 1705-1713.
2. Shreya Dalela Kokum butter: Top benefits for skin and how to use, 2023.
3. Ruturaj Shrikant parole, Sana attar. Formulation and evaluation of herbal body butter. IJCRT, 2024; 2320-2882.
4. Kongara Harshitha, Golu Guri Achiritha, Sukarna Singha Roy, Calef T Suchan, Joshua T Suchen. Review based study on nutritional composition, health benefits and bioactive compounds of kokum. The pharma innovation journal, 2022; 11(1): 701-705.
5. Abdul Mumeen, Beauty D. shea butter extraction technologies current status and future perspective. AJAJBR, 2019; 13(2): 9-22.
6. Hazarika M, Beraud PK, Konwar BK. Taxonomy, phytochemistry and pharmacological properties of *camellia sinensis* (L) o. Kuntze. A review of APPI pharm Scie., 2013; 3(8): 129- 135.
7. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 55th ed. Pune: Nirali publications, 14- 51.
8. Aakansha Gupta. Coconut oil: The healthiest oil on earth. International journal of pharmaceutical science and research, 2010; 19-26.
9. Rizvis, Raza ST, Ahmed F, Ahmed A, Abbas S, Mahdi F. The role of Vit E in human health and some diseases. Sultan Qaboos university med., 2014; 14: 157-165.
10. Nikita Rathi, Shital V Irsad, Surekha S. Tayade, Abhijit S Khot, Akshay C Deshmukh. Formulation and standardization of herbal lotion. IJNRD, 2022; 7(4): 2456-5184.
11. Annisa Fitryani Yusaf, Murni Musyid, Hurria, Formulation and physical quality test and antioxidant Activity test of body butter preparation from ethanol extract of rambutan fruit peel. ICBENS, 2024; 1(1): 836-850.
12. Franz TJ. Percutaneous absorption. On the relevance of in vitro data. J Invest Dermatol., 1975; 64(3): 190–195.
13. Bronaugh RL, Stewart RF. Methods for in vitro percutaneous absorption studies. J Pharm Sci., 1985; 74(1): 64–67.
14. Benson HAE. Transdermal drug delivery: penetration enhancement techniques. Curr Drug Deliv., 2005; 2(1): 23–33.