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FORMULATION AND EVALUATION OF COCONUT OIL BODY CREAM

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Abstract

This study presents the formulation and evaluation of a coconut oil-based body cream incorporating natural ingredients such as aloe vera gel, vitamin E oil, and beeswax, with Liquid Germall Plus as a preservative. The objective was to develop a stable, skin-friendly formulation with moisturising, antioxidant, and antimicrobial properties. The cream was prepared by blending oil and aqueous phases at controlled temperatures, followed by incorporation of active ingredients. This final product was evaluated for the organoleptic properties, pH, stability, and irritancy potential. The formulation demonstrated excellent stability, favourable sensory attributes, and was well-tolerated on skin, supporting its potential as a natural skincare product.

Keywords: Coconut oil, Body cream, Formulation, Evaluation, Natural moisturizer, Skin care.

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Introduction

The coconut tree (*Cocos nucifera*), often referred to as the "Tree of Life," is one of the most important crops in tropical regions, playing a crucial role in securing food, shelter, and livelihood for millions of people. It was Cultivated in the more than 90 countries in across the world 12.5 million hectares of land, and the global annual production of coconuts reaches every year over 57 billion in the world. Among the various products derived from the coconut, coconut oil has gained significant attention in recent decades for its wide-ranging applications and exceptional value particularly in the health, cosmetic, and wellness industries.

Introduced to the global market towards the end of the 20th century, coconut oil has become one of the most versatile and high-value products in coconut-producing nations. Extracted from the fresh, mature kernel of the coconut through mechanical or natural means, it is clear oil rich in medium-chain triglycerides (MCTs), antioxidants, vitamins, and biologically active compounds. While several extraction methods exist, avoiding refined, bleached, or deodorized oils is essential to preserve the oil's natural aroma, taste, and potent health benefits [1].

Coconut oil was renowned for its was antibacterial, antifungal, antiviral, anti-inflammatory, and antioxidant properties for the body. It also supports wound healing, helps regulate blood pressure, enhances the immune system, and even plays a role in weight management due to its MCT content. These unique qualities have driven increasing interest in coconut oil not just as a food or medicinal product, but also as a key ingredient in skincare particularly in body creams and moisturizers.

In skincare, coconut oil acts as a powerful natural emollient, effectively treating conditions such as xerosis (dry skin), atopic dermatitis, and minor skin infections. Its deeply moisturizing nature helps strengthen the skin barrier, reduce inflammation, and improve overall skin health. Unlike synthetic moisturizers, coconut oil offers a gentle yet effective alternative that aligns with the growing demand for clean, plant-based, and sustainable beauty products. [2]

As the demand for natural and chemical-free skincare continues to rise, more people are turning to age-old remedies that have stood the test of time. Among these, coconut oil has emerged as a superstar ingredient praised not only for its rich, moisturizing properties but also for its antibacterial, anti-inflammatory, and antioxidant benefits. Extracted from the meat of mature coconuts, this tropical oil is packed with essential fatty acids, vitamins E and K, and lauric acid all of which contribute to healthier, softer, and more radiant skin.

Coconut oil body cream combines the nourishing power of coconut oil with other skin-loving ingredients to create a luxurious product that hydrates, heals, and protects. Whether you're dealing with dryness, rough patches, or simply looking for a daily moisturizer, coconut oil body cream offers a natural, soothing solution. Its gentle nature makes it suitable for all skin types, including sensitive skin, and its light, pleasant scent adds to the sensory experience of your skincare routine. [3]

This article will explore the many benefits of coconut oil body cream, how it works on the skin, tips for choosing or making your own cream, and why it has become a staple in both modern and traditional skincare practices. If you're seeking a simple, effective, and natural way to care for your skin, coconut oil body cream might be exactly what you need

Material and Methods

Ingredients Used

1. Coconut oil
 2. Beeswax
 3. Aloe vera gel
 4. Vitamin E oil
 5. Rose water
 6. Liquid Germall Plus
- This are the which raw materials and chemicals used in. The equipment utilized in the process includes, the blender, borosilicate glass beaker, glass rod.
 - A digital thermometer, an analytical balance, and a measuring cylinder are the instruments used to analyse the coconut oil

Equipments

1. Beaker
2. Weighing balance
3. Digital thermometer
4. Stick Blender
5. Tripod stand
6. Container

Preparation of Coconut Oil Body Cream with Liquid Gram all and Preservative

Overview

The preparation of coconut oil body cream involves carefully combining multiple ingredients through mixing and emulsification to achieve a smooth, stable cream.

Step 1: Prepare the Water Phase (Beaker A)

- Add xanthan gum to a clean beaker.
- This gradually will dissolve in the xanthan gum in glycerine by stirring continuously with a spatula or stick until fully dispersed.
- Slowly add distilled water while mixing thoroughly to form a uniform gel-like mixture.

Step 2: Prepare the Oil Phase (Beaker B)

- In a separate beaker, combine coconut oil with emulsifying wax (often referred to as "wax ribbon").
- Cover the beaker with a lid or aluminum foil to prevent contamination.

- Heat this mixture gently in a water bath or double boiler, maintaining a temperature between 70–75°C, until completely melted and combined.
- Step 3: Combine Phases and Emulsify (Beaker C)
- Slowly add the water phase (from Beaker A) into the oil phase (from Beaker B) while maintaining the temperature at 70–75°C.
- Use a mixer or homogenizer to blend the two phases thoroughly, ensuring a consistent and homogeneous cream texture.

Evaluation Test: Organoleptic (Sensory) Evaluation:

The sensory properties of the coconut oil body cream were assessed manually to examine its physical characteristics. Key parameters included:

- **Appearance** – visual inspection for uniformity and smoothness
- **Color** – checked for consistency with expected formulation
- **Odor** – evaluated for pleasantness and presence of characteristic coconut scent
- **Texture** – assessed by feel for creaminess and ease of application
- **Grittiness** – checked for the presence of any unwanted particles
- **Washability** – tested by applying and removing the cream with water to determine ease of rinsing, these observations provide initial insight into the product's acceptability and user experience.

S. no	Parameter	Observation	Ideal result
1	Nature	Oil	Oil
2	Odour	Pleasant	Pleasant
3	Colour	White	White
4	Texture	Fine	Fine

Irritancy Test Procedure

To evaluate the skin compatibility of the prepared coconut oil body cream, an irritancy test was conducted as follows:

1. A 1 cm² area was marked on the dorsal (back) surface of the left hand of the test subject.
2. A measured quantity of the formulated cream was applied evenly over the marked area, and the time of application was recorded.
3. The site was monitored at regular intervals for up to 24 hours for any signs of:
 - Irritation
 - Redness (erythema) Swelling (edema)

Table 01: Irritancy test for Coconut oil and vaseline

S. no	Coconut Oil	Vaseline
1	2	1
2	1	2
3	2	2
4	1	1

Level of Skin Irritation: Comparative Analysis

A comparative skin irritancy evaluation was performed for Virgin Coconut Oil Body Cream and Vaseline. Both products demonstrated an average irritancy score of 1.5, suggesting minimal irritation potential.

This similarity in response indicates that both formulations exhibit comparable skin tolerance, with no significant difference in their likelihood to cause irritation during typical use.

Stability Study of Coconut Oil Body Cream

A stability assessment was carried out over one month to evaluate the formulation's physical integrity under varying temperature conditions. Samples of the cream were stored in tightly sealed glass containers at:

- Room temperature (~25°C)
- Elevated temperature (35°C)
- The scheduled will intervals, the formulations were and assessed for the following parameters:
- Color
- Odor
- pH
- Texture/Consistency
- Skin feel upon application

No significant changes were observed during the study period, indicating good physical stability of the coconut oil body cream under the tested conditions [4].

Moisture Content Determination of Coconut Oil Body Cream

To determine the moisture content

1. Approximately 1.5 grams of the cream was weighed into a pre-weighed, flaporcelain dish.
2. The sample was dried in a hot air oven at 100–105°C, until the difference between two consecutive weights was less than 0.5 mg.
3. The final weight loss was recorded as moisture content.

This drying method helps assess water content in the cream, which is crucial for stability and microbial safety.

Table 02: Moisture Content Determination of Cream

S. no	Temperature	Humidity	Time	Observation & Result				
				Colour	Odour	Ph	Consistency	Feel
1	Room Temperature	45	4hr	No change	No change	6.1	Normal	Smooth
2	40	41	15hr	No change	No change	6.1	Slightly change	Smooth
3	18	43	24hr	No change	No change	6.1	Thicker	Smooth

Vaseline

Table 03: Table 02: Moisture Content Determination of Vaseline

Temperature	Colour	Odour	Ph	Consistency	Feel
Room Temperature	No change	No change	6.9	Normal	Smooth
40°C	No change	No change	6.9	Slight Change	Smooth
18°C	No change	No change	6.9	Thicker	Smooth

Comparative Stability Analysis:

Coconut Oil Lotion vs. Vaseline

A comparative study was conducted to evaluate the thermal stability of the coconut oil-based body cream formulation and Vaseline under varying storage temperatures.

Observations

Colour & Odour

At room temperature, both the coconut oil cream and Vaseline maintained stable colour and scent.

However, when stored at 35°C, the coconut oil formulation showed slight discoloration and a mild shift in odour, while Vaseline remained unaffected.

pH Stability

Vaseline exhibited stable pH values under both temperature conditions. In contrast, the coconut oil cream displayed a slight decrease in pH when stored at elevated temperatures, indicating minor sensitivity to heat.

Texture & Sensory Feel

Vaseline retained a consistent texture and skin feel across temperature changes. The coconut oil-based formulation, however, showed increased viscosity and developed a heavier, greasier feel at higher temperatures.

Application of coconut oil

Daily application

Everyday Uses of Coconut Oil

Coconut oil is widely valued for its versatile roles in health, hygiene, beauty, and household care. Below are some of its most common and practical daily applications:

1. Natural Sun Protection

Coconut oil provides mild protection against UV rays, blocking around 20% of the sun's harmful radiation. While it offers an SPF rating of approximately 7, this level is still below the minimum sun protection factor recommended for standalone use in many countries. Therefore, while it may add a light barrier, it shouldn't replace standard sunscreens for prolonged sun exposure.

2. Cooking Oil for High Heat

With over 80% of its fat content being saturated, coconut oil remains stable even at high temperatures. Unlike oils rich in polyunsaturated fats, it resists oxidation during frying or baking, making it a suitable and safer option for heat-intensive cooking [5].

3. Oral Health Benefits

When swirled in the mouth (a practice known as oil pulling), coconut oil can help reduce harmful oral bacteria, including *Streptococcus mutans*, a major cause of tooth decay and gum disease. Some studies show this method is nearly as effective as using antiseptic mouthwashes when done regularly for around 10 minutes [6].

4. Anti-inflammatory Support

Coconut oil may offer anti-inflammatory benefits when consumed. Animal studies have shown a reduction in oxidative stress and inflammatory markers, though more human research is needed to fully confirm its clinical effects. [6]

5. Skin Miniaturization and Repair

Coconut oil serves as an effective natural moisturizer, especially for dry or cracked areas like elbows, knees, and heels. However, for individuals with oily or acne-prone facial skin, it may not be suitable due to its comedogenic (pore-clogging) properties.

6. Hair Protection

A well-known benefit of coconut oil is its ability to prevent protein loss in hair. Research comparing coconut oil with mineral and sunflower oils found that only coconut oil penetrated the hair shaft effectively, offering protection to both healthy and damaged hair when used before or after washing [8, 9].

7. Natural Household Uses

Coconut oil has many non-cosmetic uses:

- Stain remover: When mixed with baking soda, it helps lift stains from fabrics or surfaces.
- Deodorant base: Its antibacterial nature makes it useful when combined with ingredients like arrowroot powder or essential oils to create DIY deodorants.
- Furniture polish: Applied to wood surfaces, it adds a natural shine, repels dust, and leaves a subtle fragrance [10].

8. DIY Personal Care Products:

Coconut oil is a common ingredient in homemade:

- Lip balms and lip scrubs
- Body scrubs
- Shaving creams
- Toothpastes
- Soaps and shampoos

Its emollient, antimicrobial, and aromatic qualities make it a staple in many natural skincare and hygiene formulations [11].

Specific Dermatological Uses of Coconut Oil

Coconut oil has been widely used in traditional medicine and modern skincare due to its natural therapeutic properties.

1. Dry Skin (Xerosis)

Coconut oil is an effective, and low cost moisturizer suitable for all skin types. It's commonly found in lotions, creams, and soaps, helping to hydrate and soothe dry skin [12].

2. Hair Care

Thanks to its lauric acid content and ability to penetrate the hair shaft, coconut oil nourishes hair, enhances shine, and repairs damage. It also helps prevent dandruff and lice when used regularly [12, 13].

3. Atopic Dermatitis (AD)

Coconut oil improves the skin hydration, strengthens the skin barrier, and reduces inflammation. Clinical trials show it's more effective than mineral oil for treating mild to moderate AD in children [13, 14].

4. HIV and Cancer Support

Early research suggests coconut oil might reduce viral load in HIV patients, offering immune support through dietary use though more studies are needed [15].

5. Anti-Aging Benefits

Its antioxidant action may help delay signs of aging like wrinkles and sagging skin by combating oxidative stress. [11]

6. Oral Health (Oil Pulling)

Used in Ayurvedic practice, swishing coconut oil improves gum health, reduces bad breath, and supports overall oral hygiene.

Adverse Effects of Coconut Oil Use

While coconut oil offers much skin and hair benefits, it can also cause some negative effects, especially when overused or applied on sensitive areas:

1. Acne and Blocked Pores

Coconut oil forms a thick layer over the skin, which can trap dirt and oils—leading to clogged pores and worsening acne in people with oily or acne-prone skin.

2. Mudichood Dermatitis

Seen mainly in young women from Kerala, India, this skin reaction appears as itchy, pigmented bumps on the neck and upper back. The results from leaving residual the hair oil (like coconut or Ayurvedic oils) in the wet hair after bathing, which contacts the skin [16].

3. DCPA (Dermatitis Cruris Pustulosa et Atrophicans)

Coconut oil may worsen DCPA by keeping the skin overly moist. This increases friction and skin vulnerability, especially in folds or high-friction areas [17].

Results and Discussion

- **Appearance:** The body cream appeared white with a smooth texture and a pleasant odor.
- **pH:** The formulation maintained a stable pH of 6.1 across all storage conditions, which is ideal since skin typically has an acidic pH around 4.5 to 6.5.
- **Stability:** No significant physical or chemical changes were observed at room temperature, although slight thickening occurred at elevated temperatures.
- **Microbial Test:** No microbial growth was detected, indicating good preservative effectiveness and hygiene.

- **Irritancy:** The lotion caused no significant skin irritation or allergic reactions in test subjects.

The coconut oil-based lotion demonstrated excellent moisturizing effects, enhancing skin elasticity and forming a protective barrier against environmental damage. Its antibacterial properties effectively inhibited bacterial growth, supporting its role in skin health.

Conclusion

The developed coconut oil body cream showed strong stability, safety, and beneficial effects on the skin, making it suitable for normal to sensitive skin types. The natural ingredients, including virgin coconut oil, contributed antioxidant, anti-inflammatory, antibacterial, and immune-modulating properties, supporting wound healing and skin protection. The formulation, with minimal preservatives, aligns with the growing demand for natural and sustainable skincare products. User feedback highlighted the lotion's pleasant scent, smooth texture, and effective hydration. Overall, this virgin coconut oil body cream holds promise as a natural moisturizer with commercial potential in skincare.

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Authors Contribution

All authors are contributed equally.

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