

FORMULATION AND EVALUATION OF VIRGIN COCONUT OIL LOTION

Prof. Shivaji Maruti Patil*¹, Mis. Shravika Tanaji Gavali*², Mrs. Shreekant Shivaji Sargar*³, Mrs. Shiraj Sudhir More*⁴, Mis. Shrutika Sanjay Jadhav*⁵

*^{1,2,3,4,5}Sojar College Of Pharmacy, Khandvi, India.

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ABSTRACT

Virgin Coconut Oil is usually extracted from well matured and fresh coconut through specialized processes without damaging its natural nutrition. Xanthan gum and bees wax components are able to block moisturize of the skin.

While Virgin Coconut Oil (VIRGIN COCONUT OIL) is to moisturize and soften the skin. This study aims to determine the best Formulation in protecting dryness of skin in application to the skin, as well as knowing the physical a chemical characteristics of skin lotion.

The treatment is the addition Optiphen plus preservatives to the VIRGIN COCONUT OIL skin lotion. Evaluation is carried out on the physical and chemical properties and the level of pane list reference. Clinical studies have revealed that VIRGIN COCONUT OIL is effective and safe to use as a moisturizer and can improve skin hydration and accelerate healing in the skin.

I. INTRODUCTION

In recent years, many international cosmetics brands and their products Launch in India, compete with Indian brands and solve outstanding problems. Consumers are demanding. To look better and younger. But there is still a growing trend Designed for consumers looking for traditional cosmetics and nutritional products it is derived from natural ingredients and has certain medicinal effects. Inevitably there are such “cosmeceuticals” have studies show VIRGIN COCONUT OIL is effective and safe Acts as a moisturizer to Improve skin hydration and accelerate skin healing. The barrier function of the skin mainly lies in this stratum corneum. This highly hydrophobic layer consists of differentiated nonnucleated cells, keratinocytes, filled with keratin and embedded in lipids. It reduces skin diseases by moisturizing and soothing the skin. Lotion can maintain the moisture of the skin and the waterproofness of the skin layer leaves skin softer and smoother. Human skin needs care. From birth, the skin, like the body.

Skin is the largest, heaviest and most versatile organ of the human body. The skin is also the outermost part of senses system as a force transmitters and sensors.

Main function of Skin:

The skin is also the outermost part of our senses system as a force transmitters and sensors. The main function is to protect the body and regulate Body temperature and sensory perception. Biological aging of the skin should begin; however, Physiological aging of the skin begins earlier and therefore accelerate many external factors such as sunlight, cold, UV radiation and air Permeable and have highly specialized structures such as the stratum corneum, this is the outermost layer of the epidermis.

Benefits of virgin coconut:

Virgin coconut oil (VIRGIN COCONUT OIL) offers numerous benefits for skin health and beauty, supported by its unique composition of medium-chain fatty acids (MCFAs), antioxidants, and vitamins. Here's a detailed explanation of its skin benefits:

Moisturization and Hydration Composition: Virgin coconut oil is rich in MCFAs like lauric acid, caprylic acid, and capric acid, which have a small molecular structure. This allows them to penetrate the skin quickly, providing deep moisturization without leaving a greasy residue.

Skin Barrier Repair: The MCFAs in Virgin coconut oil help strengthen the skin barrier by sealing in moisture and preventing transepidermal water loss (TEWL). This is beneficial for maintaining skin hydration and elasticity, especially for dry and sensitive skin types.

Anti-inflammatory Properties Polyphenols and Vitamin E: Virgin coconut oil contains polyphenols and vitamin E, both of which possess anti-inflammatory properties. These compounds help calm irritated skin, reduce redness, and alleviate symptoms of inflammatory skin conditions like eczema, dermatitis, and rosacea.

Soothing Effect: When applied topically, Virgin coconut oil can provide relief from itching, burning, and discomfort associated with inflammatory skin reactions. It promotes skin comfort and improves overall skin texture.

Antimicrobial and Antifungal Benefits:

Lauric Acid: A predominant fatty acid in Virgin coconut oil, lauric acid exhibits strong antimicrobial and antifungal properties. It helps combat bacteria, fungi, and viruses on the skin's surface, making it effective against acne-causing bacteria (such as *Propionibacterium acnes*) and fungal infections (like *Malassezia* spp).

Acne Treatment: Virgin coconut oil antimicrobial properties make it a natural alternative for treating acne. It helps reduce inflammation associated with acne breakouts and prevents further bacterial growth without drying out the skin.

Wound Healing and Scar Reduction:

Collagen Production: Virgin coconut oil promotes collagen synthesis, a protein essential for skin repair and wound healing. Increased collagen production helps accelerate the healing process, minimizing the appearance of scars and promoting smoother skin texture.

Antioxidant Action: Antioxidants in Virgin coconut oil, such as phenolic compounds and tocopherols (vitamin E), protect skin cells from oxidative stress caused by free radicals. This antioxidant action supports tissue regeneration and enhances the skin's natural healing capabilities.

Anti-aging Effects:

Free Radical Protection: The antioxidants in Virgin coconut oil neutralize free radicals that contribute to premature aging, such as fine lines, wrinkles, and age spots. Regular application of Virgin coconut oil helps maintain youthful skin by protecting against environmental damage and oxidative stress.

Skin Elasticity: Improved hydration and collagen support provided by Virgin coconut oil contribute to enhanced skin elasticity and firmness. It helps prevent sagging and promotes a more resilient complexion over time.

Gentle and Non-irritating:

Hypoallergenic Nature: Virgin coconut oil is generally well-tolerated by most skin types, including sensitive skin. It is non-comedogenic, meaning it does not clog pores or cause acne breakouts. Its gentle, soothing properties make it suitable for individuals with reactive or allergy-prone skin.

Natural Cleansing and Makeup Removal:

Oil Cleansing: Virgin coconut oil can be used as a natural oil cleanser to dissolve impurities, makeup, and sunscreen from the skin's surface. It effectively lifts dirt and excess oil without disrupting the skin's natural moisture balance, leaving it clean and nourished.

Gentle and Effective: Unlike harsh chemical cleansers, Virgin coconut oil cleanses the skin without stripping it of its natural oils. This preserves the skin's moisture barrier and prevents dryness or irritation, making it suitable for all skin types, including sensitive and acne-prone skin.

Hydration and Nourishment: While cleansing, VIRGIN COCONUT OIL simultaneously hydrates and nourishes the skin with essential fatty acids and antioxidants. It leaves the skin feeling soft, smooth, and moisturized after cleansing, promoting a healthy and radiant complexion.

UV Filters: VIRGIN COCONUT OIL contains components that act as mild UV filters, providing some protection against the harmful effects of ultraviolet (UV) radiation from the sun. These include saturated fats, such as medium-chain triglycerides (MCTs), and antioxidants like vitamin E.

SPF Estimation: While specific SPF values vary depending on factors like processing methods and purity, studies suggest that VIRGIN COCONUT OIL has a natural SPF of approximately 4-5. This means it can block about 75-80% of UVB rays, which are responsible for causing sunburn and contributing

Precautions: While VIRGIN COCONUT OIL offers some sun protection benefits, it should not replace conventional sunscreen products with higher SPF ratings. For extended sun exposure, especially during peak hours (10 AM to 4 PM), use a broad-spectrum sunscreen with SPF 30 or higher and reapply it every two hours.

Usage: Apply VIRGIN COCONUT OIL to exposed areas of the skin before sun exposure as a supplementary measure. It can be used in combination with sunscreen or as a moisturizing base under makeup to enhance hydration and provide additional protection.

Disadvantage:

1. Greasiness: Some people find virgin coconut oil lotion to be greasier compared to other types of lotions, which may not be ideal for those with oily or acne-prone skin.
2. Allergic Reactions: Although rare, some individuals may be allergic to coconut oil, resulting in skin irritation or allergic reactions.
3. Staining: Coconut oil can leave stains on clothing and fabrics, especially if not fully absorbed by the skin.
4. Shelf Life: Virgin coconut oil lotion may have a shorter shelf life compared to lotions with synthetic preservatives, so it's important to use it within a reasonable timeframe to prevent spoilage.

Application for skin:

1. Moisturizing skin and hair
2. It is found that coconut natural oil has a beneficial impact on external parts of the body such as hair and skin. People in the tropics have used.
3. As a natural moisturizer for centuries, In Ayurvedic medicine.
4. Has been used to treat numerous skin disorders.
5. Wound healing is a complex process where the skin or other body tissue repairs itself after Injury.
6. The Oil of Cocos nucifera has been reported to be an effective wound heal,
7. A chronic skin disease characterized by features of defective epidermal barrier ,function and inflamed cutaneous layer. In this condition Trans epidermal water loss (TEWL) is increased. And the ability of the stratum corneum to hold water is impaired. This leads to decreased skin capacitance and hydration.
8. A study by Evangelista et al investigated the topical effect of VIRGIN COCONUT OIL on SCORAD index
9. Trans-epidermal water loss, and skin capacitance in mild to moderate paediatric.

Coconut: (Cocos nucifera)

Nomenclature:

Common name : Coconut Palm,

Scientific name : Cocos nucifera

Family : Arecaceae Order : Arecales



II. HISTORY

The name coconut comes from the Portuguese hearties of the 16 century, who allowed that the three small holes in the coconut shell act a mortal face, so they called the fruit coconut which means smiling face Smile or mouth". The word nut was added to the English language subsequently.

The Evolution and Cultural Impact of Cocos nucifera: From Ancient Traditions to Modern Globalization Coconut, revered for its versatility and nutritional benefits, has been integral to human societies from ancient to modern

times, playing diverse roles across cultures and eras. In ancient times, coconut's origins in Southeast Asia and the Pacific Islands marked its significance as a vital food source and resource for various applications.

Early civilizations utilized nearly every part of the coconut palm, from its nutritious fruit to its sturdy wood and fiber, demonstrating its importance in sustaining livelihoods and economies.

Throughout history, coconut's journey across the world intertwined with trade routes, colonization, and cultural exchanges. In ancient India and Sri Lanka, coconut held symbolic and religious significance, often associated with fertility, prosperity, and purification rituals.

In Polynesia and Melanesia, it served as a staple food, providing essential fats and nutrients to island communities. The spread of coconuts to Africa and the Americas during the Age of Exploration further enriched diets and agricultural practices, adapting to diverse climates and becoming integral to local cuisines and economies.

During the colonial era, coconut plantations emerged in tropical regions worldwide, driven by European and later American interests in producing copra (dried coconut meat) for oil extraction and export.

This expansion significantly shaped the socio-economic landscapes of regions like Southeast Asia, the Caribbean, and Pacific Islands, leading to both economic booms and environmental challenges.

In modern times, coconut's versatility continues to thrive. Beyond culinary uses, coconut-derived products such as coconut oil, milk, water, and flour have gained popularity globally for their health benefits and culinary diversity.

Coconut oil, in particular, has sparked debates over its nutritional value and applications in skincare, hair care, and even biofuel production.

Environmental sustainability and ethical sourcing have become paramount in the coconut industry today. Practices such as organic farming, fair trade certification, and initiatives promoting biodiversity conservation are increasingly adopted to mitigate environmental impact and support local communities.

Moreover, scientific research continues to explore the potential health benefits of coconut-derived products, contributing to their growing popularity in health-conscious markets.

In conclusion, from ancient times to the present day, coconut remains a symbol of resilience, adaptability, and cultural richness. Its journey through history reflects the dynamic interplay between tradition and innovation, highlighting its enduring significance in global agriculture, trade, and everyday life. Coconut, revered for its versatility and nutritional benefits, has been integral to human societies from ancient to modern times, playing diverse roles across cultures and eras.

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Origin:

The coconut began and was domesticated in Malaysia where it was considerably distributed?

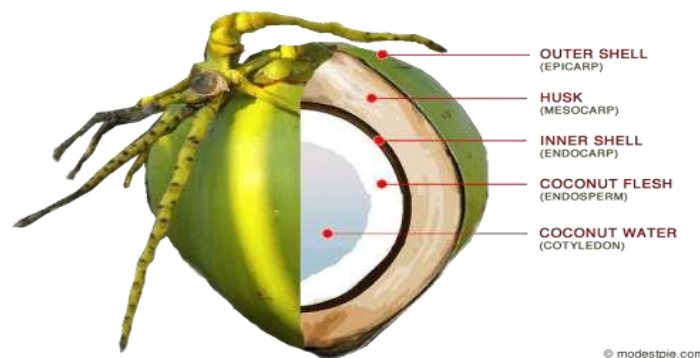
Prehistorically, it was introduced to the Asian landmass in and reached East Africa by 1492.

Alltropical areas are suitable for coconut cultivation Philippines, Indonesia, India, and Sri Lanka are major producer of coconut, in world. History

The name coconut comes from the Portuguese hearties of the 16 century, who allowed that the three small holes in the coconut shell act a mortal face, so they called the fruit coconut which means smiling face Smile or mouth". The word nut was added to the English language subsequently

The Fruit:

- The fruit of the coconut, botanically known as a fibrous drupe and popularly the 'nut', consist internally of the endosperms' kernel with the embryo embedded in it and externally protected by the fruit coat known as the pericarp which consists of three distinct and well-defined regions, viz.,
- The outermost region of the fruit coat is the exocarp for epicarp) which consists of a tough smooth and hard fibrous skin where as in the ripe fruit it assumes green, red, yellow or brown.
- Within the kernel is a cavity which in the unripe fruit is completely filled with the liquid popularly known as coconut.



Coconut oil: Basic information

- Coconut comes from the meat of matured coconuts harvested from the coconut palm. It is issued in food, medicine and in the industry.
- Coconut oil is high in saturated fat content, and because of it, it has a long self-life.
- Coconut natural oil has come one of the most sought-after oils in the world due to its high degree of achromatism and good stability types of Coconut natural oil are attained from different corridor of the cocarut Bobby oil painting oil is pulled from dried kernel by mechanical milling and virgin coconut oil painting (virgin coconut oil) is pulled from fresh kernel without high heat or chemical treatment.
- The oil painting pulled from coconut heavy with Isopropyl alcohol is called coconut test oil painting til 24 Coconut natural oil consists mainly of SFAs, of which accounts for 50 of its composition 6 In addition to triacylglycerols (Marker), is esterified with Fas.
- Coconut natural oil contains other minor factors analogous as phospholipids, sterols, tocopherols and volatiles.

Extraction of coconut oil

1. Cold Extraction
2. Hot Extraction
3. Centrifugation method
4. Fermentation
5. Chillind, Freezing and Thawing

1. Cold Extraction (C-VIRGIN COCONUT OIL):

- Cold processing is the method of VIRGIN COCONUT OIL extraction without the aid of heat.
- In this Method, the coconut milk is subjected to chilling (2-8 °C) overnight and the Sepa –s Rated oil is collected by centrifugation, filtered and stored.

Aim:

Formulate and evaluate virgin coconut oil lotion.

Objective:

1. To develop a formulation of virgin coconut oil lotion.
2. To determine the antimicrobial activity of lotion.
3. To evaluate coconut oil.

Need of research:

- **Benefits of skin:** Investigate me benefits of coconut oil lotion for skin health. This could include its moisturizing properties, its ability to soothe dry or irritated skin, and any potential anti- inflammatory or antimicrobial effects.
- **Comparison with Other Lotions:** Explore how coconut oil lotion compares to other types of lotions, such as shea butter lotion almond oil lotion, or synthetic moisturizer Look into factors like absorption rate, longevity of moisturization, and suitability different skin types.
- **Scientific Studies and Evidence:** Search for scientific studies or clinical trials that have examined the effectiveness of coco oil lotion for various skin conditions or concerns.
- **Usage Recommendations:** Research recommendations for the best ways to use coconut oil lotion, including how often to apply, ideal application techniques

III. LITERATURE REVIEW

Eyres et al. (2016): found that coconut oil consumption resulted in significantly higher levels of low-density lipoprotein (LDL) cholesterol compared to nontropical vegetable oils. Similarly, Teng et al. (2019) conducted a systematic review and meta-analysis, concluding that coconut oil consumption has adverse effects

Wallace 2018: The effects of coconut oil consumption on lipid profiles have been a subject of interest in the literature. Wallace (2018) conducted a narrative review of current evidence and highlighted that coconut oil consumption generally raised total and LDL cholesterol levels compared to cis unsaturated plant oils. This is consistent with the findings of Eyres et al. (2016) and Neelakantan et al. (2020), suggesting that coconut oil may have adverse effects on lipid profiles, particularly LDL cholesterol.

Famurewa and Ejezie (2017) isolated polyphenols from virgin coconut oil and demonstrated their potential to attenuate dyslipidemia and oxidative stress due to their antioxidant properties. These findings suggest a potential cardioprotective effect of certain components of coconut oil, providing a basis for further exploration of its health benefits

Srivastava et al., 2018 Virgin Coconut Oil has been the subject of increased attention in both the dietary and skin care sectors due to its notable health benefits. Unlike copra-derived oils, VIRGIN COCONUT OIL is extracted from the fresh mature kernel and retains a unique fatty acid profile, including a high content of lauric acid, which is thought to be responsible for its skin-moisturizing and antimicrobial properties.

IV. MATERIAL AND METHODS

In this study

1. Virgin coconut oil ,
2. Bees wax
3. Xanthan gum,
4. Glycerine,
5. Distilled water
6. Optiphen Plus

- Those are the raw materials and chemicals used. The equipment utilized in the process includes,The blender, water bath, borosilicate glass beaker, glass rod, autoclave, and aluminum Spoon.
- A digital thermometer, an analytical balance, and a measuring cylinder are the instruments used to analyse the VIRGIN COCONUT OIL.



Bees Wax



Coconut oil



Xanthan Gum



Glycerine



Optiphen plus

Equipments:

1. Beaker
2. Weighing balance
3. Water bath
4. Blender
5. Tripod stand
6. Bunsen burner
7. Container

Virgin coconut oil lotion Content:

Preparation of virgin coconut oil lotion with optiphen plus preservative

The principle of making virgin coconut oil lotion is to mix multiple ingredients and stir and beat thorough

Beaker A

- Put xanthan gum into beaker A. Use glycerine Dissolve a few parts of xanthan gum ☐ Stir evenly with a stick. Add distilled water Use a squeeze bottle to mix.

Beaker B

- Place coconut oil in another beaker Add emulsifying wax to the ribbon.
- Those beakers covered with antipodean paper. Get the best of both worlds place the beaker in a water bath and maintain the water bath temperature at 70-75°C ☐ Melt the mixture properly

Beaker C

- Mix water phase A and oil phase & until homogeneous heat to 70-75 C also use a mixer for proper mixing
- Also process the mixture into a thin white substance and create thick layer of friction.
- Let the mixture cool to below 40 C and once cool and add the lavender oil lotion the medicine contains optiphen plus preservatives.

V. EVALUATION TEST

Organoleptic evaluation:

The organoleptic parameters include it is appearance, colour, odour, texture, grittiness, Washability, which were evaluated manually for its physical properties

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

Irritancy test:

1. Mark an area of 1sq.cm on the left-hand dorsal surface.
2. A definite quantity of prepared lotion was applied to the specified area and time was noted.
3. Irritancy, erythema, edema was checked if any for regular intervals up to 24 hrs. comparative Table for Irritancy Test.

| Sr no | Virgin coconut oil | Vaseline |
|-------|--------------------|----------|
| 1 | 2 | 1 |
| 2 | 1 | 2 |
| 3 | 2 | 2 |
| 4 | 1 | 1 |

Level of Irritation: For the sample data provided, both Virgin Coconut Oil Lotion and Vaseline have an average irritancy rating of 1.5, indicating that both products perform similarly in terms of causing skin irritation.

This table and summary demonstrate that based on the sample data provided, both Virgin Coconut Oil Lotion and Vaseline have nearly identical performance in terms of causing skin irritation, suggesting that there is no significant difference between the two products in this aspect.

Stability studies:

Stability testing of prepared formulation was conducted for batch by storing at different temperature conditions for the period of one month. The packed glass vials of formulation stored at different temperature conditions Viz. room temperature, 35degree C and were evaluation for physical parameters like colour, odour, PH, consistency and feel. (14)

Determination of moisture content:

Weigh about 1.5gm of the powdered drug into a weighed flat and thin Porcelain dish. Dry in the oven at 100 degree C and 105 degree C, until two consecutive weights do not differ by more than 0.5 mg cool in desiccators and weigh. The loss in weight is usually recorded as moisture.

Virgin Coconut Oil Lotion:

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

Vaseline:

| Temperature Condition | 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 |

In comparison between Vaseline and the lotion formulation, the stability testing reveals distinct differences:

Colour and Odor: Both Vaseline and the lotion formulation-maintained colour and Odor stability at room temperature. However, at 35°C, the lotion exhibited slight changes in colour and odour, whereas Vaseline remained unchanged.

pH Stability: Vaseline showed consistent pH levels at both room temperature and 40°C, while the lotion formulation experienced a minor decrease in pH at the higher temperature.

Consistency and Feel: Vaseline maintained its consistency and feel across temperature variations, whereas the lotion formulation showed signs of thickening and a greasy feel at 40°C.

Overall Conclusion: Vaseline demonstrated superior stability compared to the lotion formulation, retaining its physical properties more effectively under varying temperature conditions. This suggests that Vaseline may be more resilient to temperature-induced changes, making it a more reliable option for formulations requiring stability over time.

PH –

PH of 1% aqueous solution of the formulation was measured by using digital PH meter at constant.

- The average pH of the 1% aqueous solution of Virgin Coconut Oil lotion is approximately 6.1
- The average pH of the 1% aqueous solution of Vaseline is approximately 6.05.
- There is a slight difference in pH between the two samples, with Vaseline having a slightly higher pH compared to Virgin Coconut Oil.

| Initial pH | Final pH | Difference (Initial - Final) | Reference Value |
|------------|----------|-------------------------------|-----------------|
| 6.5 | 5.8 | 0.7 | 6.5 |
| 7.0 | 6.2 | 0.8 | 6.5 |

Washability –

- This is the common method for checking the wash ability of the formulation.

The formulation was applied on the skin and then ease and extend of washing

- With water were checked manually by using 1 litre of water is used to remove move all content of the formulations were applied on the surface.

| Sample | Virgin coconut oil (washability score) | Vaseline (washability score) |
|--------|--|------------------------------|
| 1 | 70 | 80 |
| 2 | 72 | 82 |
| 3 | 69 | 79 |
| 4 | 71 | 81 |

- The average washability score of the Virgin Coconut Oil lotion is 70.5.
- The average washability score of Vaseline is 80.5. Vaseline shows higher washability compared to Virgin Coconut Oil lotion, with an average washability score of 80.5 versus 70.5 for the coconut oil lotion.
- These results suggest that Vaseline is more easily washed off compared to Virgin Coconut Oil lotion. This may be an important consideration for users who prefer a product that can be easily removed from the skin.

Antibacterial test evaluation:

| Original (prepared moisturising cream) | Zone of inhibition (mm) | | | |
|---|-------------------------|------|------|------|
| | 20ul | 40 | 60 | 80ul |
| E. coli | 5 | 12 | 15 | 17 |
| Marketed Preparation (NIVEA) | Zone of inhibition (mm) | | | |
| | 20ul | 40ul | 60ul | 80ul |
| E. coli | 7 | 13 | 16 | 18 |

VI. RESULTS AND DISCUSSION

The formulation s pH level was to be 6. The pH range is suitable for as skin has acidic pH 6.5. The formulation was free from heavy metals and microbes. When inoculated in agar medium, there was no any microbial growth observed. Stability studies were conducted on formulation for any physical or chemical change. Virgin coconut oil lotion is often praised for its moisturising properties age improve elasticity and provide protective barrier

against environmental. The antibacterial activity of virgin coconut oil lotion was assessed. The result was showed that the lotion was effective to inhibit growth of bacteria.

VII. CONCLUSION

The best formula in this study added extracted coconut oil and has been shown to be safe Suitable for normal to sensitive all skin types. Natural ingredients extracted into coconut oil are added during the production process body lotion. It prevents the skin from getting wet or dry. Coconut oil moisturizer is also proven to be one of the skins moisturizing various ingredient that are very useful for our skin.

Virgin coconut oil (VIRGIN COCONUT OIL) acts as an antioxidant, anti-inflammatory, skin protectant and antibacterial agent it also acts as an immune modulator. It is used to treat various skin conditions. Which is provides wound healing protective properties to human skin. It can also be concluded that one of the formulae of this lotion is rated as excellent as the others, with a Virgin coconut oil VIRGIN COCONUT OIL Value of 76% Ingredients without any preservatives are acceptable. Coconut oil body lotion mainly uses Optiphen plus preservatives because of protective effect against bacteria and other. The lotion demonstrated significant benefits for skin hydration, elasticity, and overall health. Additionally, it was well-received by users for its pleasant scent and smooth texture. The results support the potential of virgin coconut oil lotion as a valuable addition to skincare routines, promoting natural and sustainable beauty solutions.

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