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Developing and Analyzing Polyherbal Lather Shaving Cream Formulations

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ABSTRACT

Shaving cream is a semi-solid emulsion that is applied to the skin. Shaving cream is not a cosmetic hair product, but provides a foaming agent to gently remove unwanted hair. Commercially available shaving creams are full of synthetic chemicals, which are very harmful to the skin if used regularly or daily. As we know, the skin on the face is very delicate and can be scratched when shaving. This led us to prepare shaving cream with natural herbs. Commercial preparations contain sodium hydroxide, potassium permanganate, glycerin and sodium lauryl sulfate, but all synthetic substances have been replaced by natural plant products such as anti-inflammatory aloe vera gel, natural surfactants and concentrated soap extract and coconut oil. Primer, Antifungal and Antiseptic Neem Oil, Antibacterial Olive Oil, Aromatic Lemon Oil. We prepared four structures, one synthetic, the second recycled, the third natural and the fourth natural. The pH is the same as your skin's. Easy to apply and remove. It spreads easily on the skin. All four shaving cream formulations showed the same results.

KEYWORDS: *Facial Skin, Synthetic Chemicals, Natural Cream, Semi-Soild, Emulsion*

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INTRODUCTION

Shaving cream isn't just a mundane grooming product-it occupies a significant space within the cosmetic realm. Defined as substances intended for application on the body for purposes like cleaning, protection, beautification, and altering appearance, shaving cream is a carefully concocted blend of oil, soap or surfactant, and water [22,23,24]. It's primary mission to make the process of removing hair with a razor smooth and hassle-free, whether on the face or any other part of the body Venture into the historical archives, and you'll find that the journey of shaving cream is more than just a mundane tale. Dating back to approximately 3000BC, the earliest known form involved a mixture of wood alkali and animal fat applied as a shaving aid. [26,27,28,29]. The pre-20th-century era saw the dominance of hard shaving soap in bars or sticks, a tradition that would soon face disruption. In 1919, the status quo was challenged by Frank Shields, a former MIT professor, who introduced the world to the first-ever shaving cream-Babalola [30,31,32,33]. This innovative product marked a departure from the traditional use of brushes to work soap into lather, offering a more convenient and efficient alternative. Fast forward to 1949, and the Rise shaving cream stepped onto the scene, introducing the first pressurized can. Within the next decade, this format asserted its dominance, capturing two-thirds of the American market. Not only have packaging materials evolved, so have fuels, and we said goodbye to ozone-depleting chlorofluorocarbons (CFCs) in the late 1990s. A mixture of butane, propane, butane and isobutane, which falls somewhere in between. The 1970s ushered in the era of razors that offer different textures and experiences. Then, in 1993, Procter and Gamble Company patented a post-foam gel composition combining the properties of foam and skin. While these advances in innovation have greatly improved the shaving experience, many synthetic shaving creams are full of harmful chemicals. Regular use can cause a variety of skin problems, including pain, redness, and itching. So when you buy your real shaving cream, take a moment to think about its previous development and composition that can improve your care [33,34,35,36,37,38].

Shaving cream full of aloe benefits aloe vera (Aloe barbadenis). miller), neem oil (Azadirachta indica), coconut oil (Cocos nuifera), olive oil (Olea europaea) and soap. Dried fruits (Sapindusmukorossi), lemon oil (Citrus limon), stearic acid (octadecanoic acid). The above components have been found to have many biological functions.

Aloe vera *(Aloe barbadenis miller)*

Native to the Arabian Peninsula, but now found in tropical and dry climates around the world, aloe vera is more than just an ornamental plant. Known for centuries as a traditional remedy for skin conditions such as burns and wounds, aloe vera is nature's first aid [1,2,3]. However, its benefits extend beyond skin care and health benefits. the health It's amazing. It is rich in 75 compounds, including vitamins (A, C, E, B12), enzymes (amylase, catalase and peroxides), minerals (zinc, copper, calcium) and sugar (monosaccharides such as mannaose-6-phosphate) and polysaccharides such as glucomannan, anthraquinones (aloin and emodin) and fatty acids (salicylic acid, lignin and saponin) In addition to the end use, aloe vera is antioxidant, anticancer, antidiabetic and anti-hyperlipidemic [39,40,41].

Neem oil *(Azadirachta indica):*

Neem, also known as Margosa, is a plant belonging to the Meliaceae family. A well-known member of the plant world, the genus Azadirachta is one of two species. Neem is native to the Indian subcontinent and parts of Southeast Asia, and its roots have spread throughout the world, inhabiting tropical and subtropical regions. The real magic of neem lies in the fruits and seeds that serve as the source of neem oil, called margosa oil[4,5,6]. Neem oil, which is extracted by pressing in these areas, is a vegetable oil that increases health benefits. . . Composition of the material. Among its important nutrients are fatty acids (EFAs), limonoids, vitamin E, antioxidants, triglycerides, calcium and others - an ideal team for skin care. When it comes to skin care, neem oil is in the spotlight for good reason. Its anti-inflammatory properties make it perfect for protecting against skin irritation, and its ability to reduce acne and pimples is effective in solving common skin problems. In addition, the presence of antioxidants and vitamin E gives neem oil anti-aging properties, adding another layer to its skin-protecting powers. Nature is amazing, it contains trees like neem, providing a complete gift and benefit to our skin [48,49,50].

Coconut oil *(Cocos nuifera):*

Proud member of the Arecaceae palm family, the coconut tree holds the unique title of being the only living species in the genus Cocos. The term "coconut" does not refer to the fruit itself, but includes the entire palm kernel. The positive form of this word comes from the old Portuguese word "coco", which means head or skull. This designation comes from the three distinct grooves in the coconut shell that resemble the shape of the eye. Spread along the coast, coconut trees have become a cultural symbol of the continent, synonymous with sun-drenched beaches and palm fronds. In addition to the beauty of nature, the coconut is a type of wealth, and coconut oil is one of the most popular. Coconut oil has a unique composition that is rich in medium-chain fatty acids, including capric acid, capric acid, and lauric acid. such as medium chain fatty acids. The beauty of these fatty acids is that they have a moisturizing effect when applied to the skin. Therefore, coconuts are not only a great addition to your tropical landscape, but also an excellent skin care remedy [42,43,44].

Top of Form

Olive oil *(Olea europaea)*

Olive trees, belonging to the olive family (Oleaceae), are a type of shrub or small tree that thrives in the Mediterranean Sea. In the compact form of the small tree it is called Olea europaea 'Montra', dwarf olive or small olive. This species extends its roots beyond the Mediterranean and grows in countries around the world, from Australia and New Zealand to North and South America and South Africa. Basically, this species is the type species of the genus. The most important thing about the olive tree is its fruit, which is why it is called an olive tree. As the main source of olive oil, it is one of the main agricultural powerhouses of the Mediterranean region. In addition to their culinary uses, olives and olive oil display surprising properties [9,10,11]. These include sources of anti-inflammatory, antibacterial and antioxidant effects. If we take a closer look at olive products, olive oil is unique because of its polyphenolic compounds. These compounds not only contribute to the flavor of the oil, but also influence various biological activities. From cooking to skin care, olives and olive oil have proven to be good friends.

Soapnut *(SapindusMukorossi)*

The Soapnut belongs to the Sapindaceae family and is a beautiful genus of 5 to 12 species of small trees and shrubs. This unique group of plants takes root in warm and tropical regions around the world.[9] Within the soapnut genus there are both herbaceous and perennial species, which reflects the diversity of this plant group. Members of this genus, known as soap nuts or soap nuts, get their name from the amazing ability of the fruit's pulp to produce soap. The very name of the genus is a linguistic reference, derived

from the Latin words "sapo" meaning soap and "Indicus" meaning Indian, and reflecting its connection to the land of India. The fame of Soapnuts lies in the pulp of the fruit, which contains saponins (natural compounds with surfactant properties). These chemicals, or chemicals, were used by ancient Asians and Americans for cleaning purposes. This is an indication of the wise use of nature in traditional ways [10].

Lemon oil *(Citrus limon)*

The lemon is a small green species of flowering plant in the Rutaceae family. It is found mainly in Asia and is found in northeastern India and China. Lemon oil is extracted from lemon cells and contains essential oils. It has anti-inflammatory, antioxidant and antibacterial properties. Contains tannins, polyphenols, citric acid, etc [13].

Objective

Objective of the research was to prepare and evaluate a chemical free shaving cream. This will become better alternative for chemical based formulation. To reduce the side effects associated with the synthetic formulations.

Material and Methods

Material The material used in the preparation of the shaving cream were purchased from the Patanjali Ayurveda Store, Poona Ayurvedic and herbals, Pune. All the evaluation parameters of material were conducted at TMV's Lokmanya Tilak Institute of Pharmaceutical Science's Pune.

Formulations:

Formula I: Synthetic

Formula II: Semi synthetic

Formula III: Natural

Formula IV: Natural

Table no. 1: Composition of four different formulations of shaving cream

Sr. No.	Name of ingredients	Quantity Taken (gm)			
		I	II	III	IV
1	Stearic acid	7.65	7.65	7.65	4.6
2	Cetyl alcohol	3.2	2	-	-
3	Potassium hydroxide	3.3	2.34	-	-
4	Sodium hydroxide	0.12	0.12	-	-
5	Glycerin	3.5ml	2.5 ml	0.5ml	-
6	Methyl parabean	0.1	0.1	-	-
7	Neem oil	-	-	0.6ml	0.96ml
8	Aloe vera	-	4.5	8	14
9	Coconut oil	4.84ml	-	4ml	3ml
10	Olive oil	-	2.8ml	3.84ml	3.84ml
11	Soapnut extract	-	-	5ml	7ml
12	Rose water	-	-	1.7ml	
13	Lemon oil	-	-	-	0.15ml
14	Purified water	7.74ml	7.74ml	-	-
15	Perfume	0.15ml	0.15ml	0.15ml	-

Methods

Method for preparation of Synthetic formulations (Formula I & II)

First weigh all the ingredients. Take steric acid, cetyl alcohol and coconut oil in porcelain dish and heat on water bath. Maintain the temperature till 70°C Dissolve potassium hydroxide, sodium hydroxide and methyl paraben in water. Take water phase in morter slowly add the heated mixture into the morter and triturate well in one direction so as to get creamy emulsion .Lastly add glycerin and perfume.

Method for preparation of Natural formulation (Formula III& IV)

Accurately weigh all the ingredients. Take neem oil, olive oil and coconut oil in porcelain dish the mix it well to get a uniform mixture. Heat the mixture on water bath. Slowly add steric acid in small proportions to the mixture in porcelain dish. Maintain the temperature at 70°C. Once dissolve cool at room temperature. Take glycerin, soapnut extract and aloe vera gel in morter. Slowly triturate the mixture in one direction to get a uniform mixture. Slowly add the mixture from porcelain dish into the morter and triturate in one direction.

Lastly add glycerin and perfume.

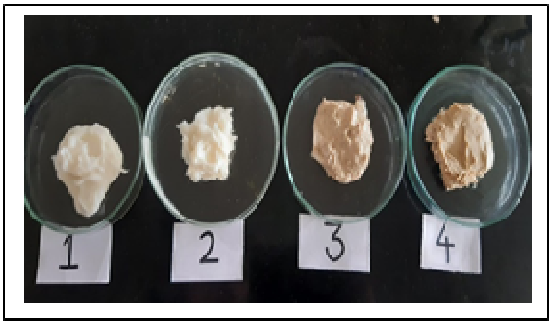


Figure no. 1: 1: Synthetic cream, 2: Semisynthetic, 3: Natural, 4: Natural

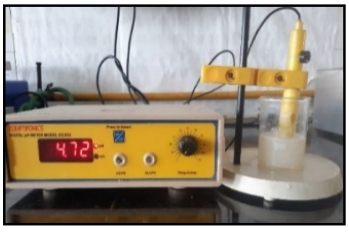
RESULT

Determination of pH: The pH of the shaving cream was determined by using digital pH meter. The readings are as mentioned in table no. 2, The pH of shaving cream is important because it can affect its compatibility with the skin. Ideally, skincare products, including shaving cream, should be close to the skin's natural pH, which is around 4.7 to 5.75. However, individual preferences and skin sensitivities can vary, so it's essential to consider personal comfort and reactions when choosing skincare products.

Table no 2: pH of Shaving cream

Sr no.	Formula	pH
1	I	9.57
2	II	9.46
3	III	6.22
4	IV	4.72

Table no. 3: Determination of pH

Formulation	
	I
	II
	III
	IV

Determination of Antimicrobial Activity

Antimicrobial property was carried out by the pour plate method. Where we used *s.aureus* bacteria and found no bacterial growth. The antimicrobial activity was assessed using the pour plate method. In this procedure, a culture of Staphylococcus aureus bacteria was introduced into a solid agar medium. Subsequently, the substance or material under investigation, which is believed to possess antimicrobial properties, was added to the agar.

Table no. 4: Detection of microbial growth

Sr no.	Formula	Microorganisms	Microbial Growth
1	I	Staphylococcus aureus	Absent
2	II	Staphylococcus aureus	Absent
3	III	Staphylococcus aureus	Absent
4	IV	Staphylococcus aureus	Absent

Washability test: Small amount of shaving cream was applied on hands and hold under running water, the shaving cream was easily removed from hands. the washability test conducted involved applying a small amount of shaving cream to hands and then holding them under running water. The observation that the shaving cream was easily removed from the hands suggests good washability.

Irritability test: An area was marked on the dorsal side of the left hand, a small amount of creamwas applied on it and the hand was observed for irritation, redness and edema. The test was repeated at the interval of 24hours

Parameters Evaluated:
Irritation: Any discomfort, itching, or unpleasant sensation.
Redness: The appearance of red patches or discoloration on the skin.
Edema: Swelling or puffiness in the applied area.

Homogeneity study: Homogeneity is to be determined by visual inspection of the shaving cream it is done to check any clog or uniformity of the cream. A homogeneity study is designed to assess the consistency and uniformity of a product, in this case, shaving cream. The study involves a visual inspection to check for any signs of clogging or irregularities in the cream.

Parameters Evaluated:

Clogging: Check for any noticeable clogs or clumps within the shaving cream. Clogging could affect the product's application and user experience.

Uniformity: Evaluate the overall consistency and evenness of the cream. A homogeneous product should have a uniform texture without any separation or uneven distribution of ingredients.

Phase separation: The prepared shaving cream was kept in the air tight container at a room temperature for a week. Any changes in the shaving cream was observed. The phase separation test you described involves placing the prepared shaving cream in an airtight container at room temperature for a week and observing any changes that occur during this period. This test is designed to assess the stability of the shaving cream formulation over time.

Foam height: The foam height test you described involves taking an equal amount of shaving cream in four different test tubes of the same height and diameter. Each tube is then agitated with 10 ml of water for 15 seconds, and the height of the resulting foam is recorded. This test is likely conducted to assess the foaming properties and stability of the shaving cream.

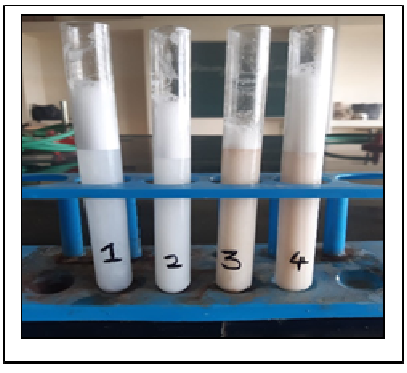


Figure no 3. Foaming of four different formulations.

Physical properties: The physical properties of the shaving cream such as odour, colour, consistency, state, appearance etc. are to be observed. These observations provide a comprehensive overview of the physical properties of the different shaving cream formulations. The variations in colour, fragrance, consistency, and other properties may influence consumer preferences and user experience.

Table No. 5: Physical Properties of Formulation I to IV

Sr	Property	Formula I	Formula II	Formula III	Formula IV
1	Colour	White	Creamish White	light Brown	Light brown
2	Fragrance	Rose like	Rose like	Rose like	Lemon like
3	Appearance	Smooth	Smooth	Smooth	Smooth
4	Consistency	Moderate	Moderate	Adequate	Proper thick
5	Texture	Smooth	Smooth	Smooth	Smooth
6	Greasy	Greasy	Greasy	Greasy	Greasy
7	Foam height	3.5cm	2.7cm	1.7cm	4.2cm
8	Elegance	Not Elegant	Not Elegant	Not Elegant	Not Elegant
9	Washability	Washable	Easily washable	Easily washable	Easily washable
10	Homogenicity	Homogeneous	Homogeneous	Homogeneous	Homogeneous

Discussion:

In conclusion, the pharmaceutical evaluation of shaving cream formulations encompassed a range of parameters, including pH, antimicrobial activity, washability, irritability, homogeneity, and physical properties. Formulation IV emerged as a promising candidate due to its skin-friendly pH, antimicrobial efficacy, excellent washability, non-irritating nature, homogeneous consistency, and superior foaming properties. These findings contribute to a comprehensive understanding of the formulations, aiding in the selection of an optimal shaving cream for consumers. Further research and consumer trials can enhance the applicability of these formulations in real-world scenarios. In the pursuit of formulating an ideal shaving cream, our study undertook a comprehensive evaluation, scrutinizing various parameters ranging from the crucial pH levels and antimicrobial activity to the sensory attributes and functional characteristics of the formulations. This meticulous assessment aimed not only to discern the efficacy of the shaving creams but also to provide insights into their potential as skincare products.

One of the pivotal aspects investigated was the pH of the shaving creams. The skin's pH, typically ranging between 4.7 to 5.75, is paramount for ensuring compatibility with skincare products. In this regard, Formulation IV stood out by exhibiting a pH of 4.72, closely mirroring the skin's natural acidity. This revelation positions Formulation IV as a potential front-runner for being inherently skin-friendly, considering the paramount importance of pH in preventing skin irritations and maintaining a healthy skin barrier. The assessment of antimicrobial activity through the pour plate method revealed a noteworthy absence of microbial growth across all formulations, denoting their efficacy in resisting the proliferation of Staphylococcus aureus bacteria. This finding underscores the formulations' potential in promoting hygiene and safeguarding against bacterial threats, thereby enhancing their suitability for personal care.

The functional properties of the shaving creams were thoroughly explored through various tests. The washability test showcased the ease with which the shaving cream was removed under running water, a characteristic indicative of user convenience and efficient cleansing. The irritability test, examining discomfort, redness, and swelling, provided crucial insights into the formulations' gentleness on the skin, with no reported adverse effects. Homogeneity studies offered a glimpse into the consistency and uniformity of the formulations, ensuring a smooth and seamless application. Foaming properties, a quintessential aspect of shaving creams, were rigorously assessed through the foam height test. Formulation IV, with a notable foam height of 4.2 cm, demonstrated superior foaming capabilities. This characteristic is pivotal for ensuring a satisfying and effective shaving experience, contributing to the overall user satisfaction and product performance.

Observations of the physical properties, encompassing color, fragrance, appearance, consistency, texture, greasiness, and elegance, further enriched our understanding of the formulations. Formulation IV, with its light brown color, lemon-like fragrance, smooth appearance, proper thickness, and homogeneous texture, emerged as a formulation harmonizing sensory appeal with functional excellence. In a holistic consideration, Formulation IV emerges as a well-rounded candidate, combining skin-friendly pH, robust antimicrobial properties, efficient washability, non-irritating nature, homogeneous consistency, and excellent foaming capabilities. The alignment of these characteristics

positions Formulation IV as a potential choice that not only adheres to essential skincare standards but also offers a superior and delightful shaving experience.

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Conflict of Interest: The authors affirm that there is no conflict of interest associated with this research.

Reference:

[1] Sánchez M, González-Burgos E, Iglesias I, Gómez-Serranillos MP. Pharmacological Update Properties of Aloe Vera and its Major Active Constituents. Molecules. 2020 Mar 13; 25(6):1324

[2] Surjushe A, Vasani R, Saple DG. Aloe vera: a short review. Indian J Dermatol. 2008; 53(4):163-6

[3] Hekmatpou D, Mehrabi F, Rahzani K, Aminiyan A. The Effect of Aloe Vera Clinical Trials on Prevention and Healing of Skin Wound: A Systematic Review. Iran J Med Sci. 2019 Jan; 44(1):1-9

[4] Alzohairy MA. Therapeutics Role of Azadirachta indica (Neem) and Their Active Constituents in Diseases Prevention and Treatment. Evid Based Complement Alternat Med. 2016 Mar; 2016:11

[5] Zakia Khanam, Hanan M. Al-Yousef, Ompal Singh, and Irshad Ul Haq Bhat, Neem Oil, Green Pesticides Handbook, October 2017.

[6] Biswas, Kausik, et al. "Biological Activities and Medicinal Properties of Neem (Azadirachta Indica)." Current Science, vol. 82, no. 11, 2002, pp. 1336–45.

[7] Coconut oil: What do we really know about it so far? April 2019 Food Quality and Safety 3(4) DOI:10.1093

[8] Wallace TC. Health Effects of Coconut Oil-A Narrative Review of Current Evidence. J Am Coll Nutr. 2019 Feb; 38(2):97-107

[9] Gaforio JJ, Visioli F, Alarcón-de-la-Lastra C, Castañer O, Delgado-Rodríguez M, Fitó M, Hernández AF, Huertas JR, Martínez-González MA, Menendez JA, Osada J, Papadaki A, Parrón T, Pereira JE, Rosillo MA, Sánchez-Quesada C, Schwingshackl L, Toledo E, Tsatsakis AM. Virgin Olive Oil and Health: Summary of the III International Conference on Virgin Olive Oil and Health Consensus Report, JAEN (Spain) 2018. Nutrients. 2019 Sep 1; 11(9):2039.

[10] Bilal RM, Liu C, Zhao H, Wang Y, Farag MR, Alagawany M, Hassan FU, Elnesr SS, Elwan HAM, Qiu H, Lin Q. Olive Oil: Nutritional Applications, Beneficial Health Aspects and its Prospective Application in Poultry Production. Front Pharmacol. 2021 Aug 25; 12:723040.

[11] Potential health benefits and components of olive oil: An overview, Khalid Mushabbab AL-Asmari1*, Atef Mohammed Al-Attar1,2 and Isam Mohamed Abu Zeid1,2 BIOSCIENCE RESEARCH, 2020 17(4): 2673-2687.

[12] Ben Hsouna A, Ben Halima N, Smaoui S, Hamdi N. Citrus lemon essential oil: chemical composition, antioxidant and antimicrobial activities with its preservative effect against Listeria monocytogenes inoculated in minced beef meat. Lipids Health Dis. 2017 Aug 3; 16(1):146

[13] SCIENCEDOMAIN international. Antioxidative Action of Citrus limonum Essential Oil on Skin,G. Bertuzzi, B. Tirillini, P. Angeliniand R. Venanzoni, European Journal of Medicinal Plants,3(1): 1-9, 2013.

[14] Surjushe A, Vasani R, Saple DG. Aloe vera: a short review. Indian J Dermatol. 2008; 53(4):163-6

[15] Alzohairy MA. Therapeutics Role of Azadirachta indica (Neem) and Their Active Constituents in Diseases Prevention and Treatment. Evid Based Complement Alternat Med. 2016; 2016.

[16] Ng YJ, Tham PE, Khoo KS, Cheng CK, Chew KW, Show PL. A comprehensive review on the techniques for coconut oil extraction and its application. Bioprocess Biosyst Eng. 2021 Sep; 44(9):1807-1818.

[17] Yekeen N, Malik AA, Idris AK, Reepei NI, Ganie K. Foaming properties, wettability alteration and interfacial tension reduction by saponin extracted from soapnut (Sapindus Mukorossi) at room and reservoir conditions. J Pet Sci Eng. 2020 Dec; 195:107591.

[18] Chen CC, Nien CJ, Chen LG, Huang KY, Chang WJ, Huang HM. Effects

of Sapindusmukorossi Seed Oil on Skin Wound Healing: In Vivo and in Vitro Testing. Int J Mol Sci. 2019 May 26.

[19] Mileva M, Ilieva Y, Jovtchev G, Gateva S, Zaharieva MM, Georgieva A, Dimitrova L, Dobreva A, Angelova T, Vilhelmova-Ilieva N, Valcheva V, Najdenski H. Rose Flowers-A Delicate Perfume or a Natural Healer? Biomolecules. 2021 Jan 19; 11(1):127.

[20] Wang H. Beneficial medicinal effects and material applications of rose. Heliyon. 2023 Dec 10; 10(1):e23530. doi: 10.1016/j.heliyon.2023.e23530.

[21] Mármol I, Sánchez-de-Diego C, Jiménez-Moreno N, Ancín-Azpilicueta C, Rodríguez-Yoldi MJ. Therapeutic Applications of Rose Hips from Different Rosa Species. Int J Mol Sci. 2017 May 25; 18.

[22] Tanner J, Melen K. Preoperative hair removal to reduce surgical site infection. Cochrane Database Syst Rev. 2021 Aug 26; 8(8):CD004122.

[23] Costello L, Goncalves K, Maltman V, Barrett N, Shah K, Stephens A, Dicolandrea T, Ambrogio I, Hodgson E, Przyborski S. Development of a novel in vitro strategy to understand the impact of shaving on skin health: combining tape strip exfoliation and human skin equivalent technology. Front Med (Lausanne). 2023 Nov 2; 10:1236790.

[24] Karegoudar JS, Prabhakar PJ, Vijayanath V, Anitha MR, Surpur RR, Patil VM. Shaving Versus Depilation Cream for Pre-operative Skin Preparation. Indian J Surg. 2012 Aug; 74(4):294-7.

[25] Zapf L, Riethmann M, Föhrenbacher SA, Finze M, Radius U. An easy-to-perform evaluation of steric properties of Lewis acids. Chem Sci. 2023 Feb 6

[26] Kang CN, Shah M, Lynde C, Fleming P. Hair Removal Practices: A Literature Review. Skin Therapy Lett. 2021 Sep; 26(5):6-11.

[27] Karegoudar JS, Prabhakar PJ, Vijayanath V, Anitha MR, Surpur RR, Patil VM. Shaving Versus Depilation Cream for Pre-operative Skin Preparation. Indian J Surg. 2012 Aug; 74(4):294-7.

[28] Tanner J, Woodings D, Moncaster K (2007) Derby Hospitals NHS Foundation Trust, Derby City General Hospital, Research & Development, Derby, Derbyshire, UK, DE 22 3NE Cochrane Database Syst Rev. J PerioperPract 17(3):118–121, 124–132

[29] Cowley K, Vanoosthuyze K. Insights into shaving and its impact on skin. Br J Dermatol. 2012 Mar; 166 Suppl 1:6-12.

[30] Evans RL, Bates S, Marriott RE, Arnold DS. The impact of different hair-removal behaviours on the biophysical and biochemical characteristics of female axillary skin. Int J Cosmet Sci. 2020 Oct; 42(5):436-443

[31] Abdelaziz AA, Ashour MS, Hefni H, el-Tayeb OM. Microbial contamination of cosmetics and personal care items in Egypt--shaving creams and shampoos. J Clin Pharm Ther. 1989 Feb; 14(1):29-34.

[32] Dao H, Lakhani P, Police A, Kallakunta V, Ajjarapu SS, Wu KW, Ponkshe P, Repka MA, Narasimha Murthy S. Microbial Stability of Pharmaceutical and Cosmetic Products. AAPS PharmSciTech. 2018 Jan; 19(1):60-78

[33] Güven N, Kaynak Onurdağ F. İlaç, kozmetikvegıdaürünlerindekullanılanbazıkoruyucularınantimikrobiyalveantibiyofilmetkisininaraştırılması [Investigation of antimicrobial and antibiofilm effects of some preservatives used in drugs, cosmetics and food products]. Mikrobiyol Bul. 2014 Jan; 48(1):94-105

[34] Durian DJ, Weitz DA, Pine DJ. Scaling behavior in shaving cream. Phys Rev A. 1991 Dec 15; 44(12):R7902-R7905

[35] Thur de Koos P, McComas B. Shaving versus skin depilatory cream for preoperative skin preparation. A prospective study of wound infection rates. Am J Surg. 1983 Mar; 145(3):377-8.

[36] Powis SJ, Waterworth TA, Arkell DG. Preoperative skin preparation: clinical evaluation of depilatory cream. Br Med J. 1976 Nov 13; 2(6045):1166-8

[37] Powis SJ, Waterworth TA, Arkell DG. Preoperative skin preparation: clinical evaluation of depilatory cream. Br Med J. 1976 Nov 13; 2(6045):1166-8. doi: 10.1136/bmj.2.6045.1166. PMID: 791444; PMCID: PMC1689580.

[38] Kumar R, Singh AK, Gupta A, Bishayee A, Pandey AK. Therapeutic potential of Aloe vera-A miracle gift of nature. Phytomedicine. 2019 Jul; 60:152996

[39] Sánchez M, González-Burgos E, Iglesias I, Gómez-Serranillos MP. Pharmacological Update Properties of *Aloe Vera* and its Major Active Constituents. Molecules. 2020 Mar 13; 25(6):1324.

[40] Liang J, Cui L, Li J, Guan S, Zhang K, Li J. *Aloe vera*: A Medicinal Plant Used in Skin Wound Healing. Tissue Eng Part B Rev. 2021 Oct; 27(5):455-474

[41] Zago LR, Prado K, Benedito VL, Pereira MM. The use of babosa (Aloe vera) in treating burns: a literature review. Braz J Biol. 2021 Sep 20; 83:e249209.

[42] Deen A, Visvanathan R, Wickramarachchi D, Marikkar N, Nammi S, Jayawardana BC, Liyanage R. Chemical composition and health benefits of coconut oil: an overview. J Sci Food Agric. 2021 Apr; 101(6):2182-2193

[43] Ng YJ, Tham PE, Khoo KS, Cheng CK, Chew KW, Show PL. A comprehensive review on the techniques for coconut oil extraction and its application. Bioprocess Biosyst Eng. 2021 Sep; 44(9):1807-1818.

[44] Deen A, Visvanathan R, Wickramarachchi D, Marikkar N, Nammi S, Jayawardana BC, Liyanage R. Chemical composition and health benefits of coconut oil: an overview. J Sci Food Agric. 2021 Apr; 101(6):2182-2193

[45] Borzì AM, Biondi A, Basile F, Luca S, Vicari ESD, Vacante M. Olive Oil Effects on Colorectal Cancer. Nutrients. 2018 Dec 23; 11(1):32.

[46] Marcelino G, Hiane PA, Freitas KC, Santana LF, Pott A, Donadon JR, Guimarães RCA. Effects of Olive Oil and Its Minor Components on Cardiovascular Diseases, Inflammation, and Gut Microbiota. Nutrients. 2019 Aug 7; 11(8):1826.

[47] Danby SG, AlEnezi T, Sultan A, Lavender T, Chittock J, Brown K, Cork MJ. Effect of olive and sunflower seed oil on the adult skin barrier: implications for neonatal skin care. Pediatr Dermatol. 2013 Jan-Feb; 30(1):42-50.

[48] Karagounis TK, Gittler JK, Rotemberg V, Morel KD. Use of "natural" oils for moisturization: Review of olive, coconut, and sunflower seed oil. Pediatr Dermatol. 2019 Jan; 36(1):9-15.

[49] Rinaldi F, Hanieh PN, Maurizi L, Longhi C, Uccelletti D, Schifano E, Del Favero E, Cantù L, Ricci C, Ammendolia MG, Paolino D, Froiio F, Marianecci C, Carafa M. Neem Oil or Almond Oil Nanoemulsions for Vitamin E Delivery: From Structural Evaluation to in vivo Assessment of Antioxidant and Anti-Inflammatory Activity. Int J Nanomedicine. 2022 Dec 20; 17:6447-6465.

[50] Rinaldi F, Hanieh PN, Longhi C, Carradori S, Secci D, Zengin G, Ammendolia MG, Mattia E, Del Favero E, Marianecci C, Carafa M. Neem oil nanoemulsions: characterisation and antioxidant activity. J Enzyme Inhib Med Chem. 2017 Dec; 32(1):1265-1273.

[51] Anjali CH, Sharma Y, Mukherjee A, Chandrasekaran N. Neem oil (Azadirachta indica) nanoemulsion--a potent larvicidal agent against Culex quinquefasciatus. Pest Manag Sci. 2012 Feb; 68(2):158-63.

[52] Dua VK, Pandey AC, Raghavendra K, Gupta A, Sharma T, Dash AP. Larvicidal activity of neem oil (Azadirachta indica) formulation against mosquitoes. Malar J. 2009 Jun 8; 8:124.