Available online on 15.07.2024 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Full Text Article

Review Article

An Online Survey on Usability, Acceptability, Attitude and Knowledge of Herbal and Synthetic Cosmetic Among Sikkimese Population

Samikshya Sharma, San Tshering Lepcha, Bidhya Sharma, Sonam Bhutia *

Government Pharmacy College Sajong, Government of Sikkim, Sikkim University, Sajong, Rumtek, East *Sikkim*, India-737135

Article Info:

Article History:

Received 14 May 2024
Reviewed 11 June 2024
Accepted 24 June 2024
Published 15 July 2024

Cite this article as:

Sharma S, Lepcha ST, Sharma B, Bhutia S, An Online Survey on Usability, Acceptability, Attitude and Knowledge of Herbal and Synthetic Cosmetic Among Sikkimese Population, Journal of Drug Delivery and Therapeutics. 2024; 14(7):129-135

DOI: http://dx.doi.org/10.22270/jddt.v14i7.6673

*Address for Correspondence:

Mr. Sonam Bhutia, Assistant Professor, Government Pharmacy College, Sajong, Government of Sikkim, Sikkim University, Rumtek - Sajong, East Sikkim, India-737135

Abstract

In recent years, the global cosmetics industry has witnessed a notable shift in consumer preferences towards natural and organic products, leading to an increased demand for herbal cosmetics derived from plant-based ingredients. This research survey presents a comparative analysis of herbal and synthetic cosmetics, exploring distinctions in formulation, efficacy, safety, and environmental impact. Herbal cosmetics incorporate natural elements like plant extracts, essential oils, herbs, and fruits, while synthetic counterparts are developed using chemical compounds in laboratories to replicate specific properties. The main objective is to find out the preferences between herbal and synthetic cosmetics among individuals in Sikkim. The methodology adopted for mini survey was pre-prepared questionnaires were developed by using Google forms and shared through the online platforms such as Mail, Whatapps and facebook. An online survey conducted in different districts of Sikkim revealed that 42% of respondents favoured herbal cosmetics, while 31% preferred synthetic products and 23% had no specific preference. Factors influencing those leaning toward synthetic cosmetics included perceived effectiveness, availability, and affordability. Despite the clear interest and preference for herbal cosmetics, the survey also highlighted limited choice and availability in comparison to synthetic alternatives. This suggests a substantial opportunity for growth in the herbal cosmetic industry, emphasizing the need for increased accessibility to meet the growing demand in Sikkim and beyond.

Keywords: Knowledge of Herbal, An Online Survey, Herbal Cosmetics, Acceptability, Usability, Sikkimese People

INTRODUCTION:

The pursuit of beauty is intrinsic to human nature, leading to the historical use of cosmetic products dating back to ancient times. In the ancient world, substances like honey, milk, lemon juice, clay, mud, and even arsenic were employed for beautification[1]. The origins of cosmetics can be traced to Egypt 5000 years ago[2], encompassing a diverse range of

products such as creams, perfumes, lotions, skin cleansing items, and decorative cosmetics. The term "cosmetics" is derived from the Greek word 'kosmtikos,' signifying the ability, arrangement, or skill in decorating[3]. As per the Drug and Cosmetic Act of 1940, sec. 3(aaa), cosmetics are officially defined as "any article intended to be rubbed, poured, sprinkled, or sprayed on or introduced into or applied to any part of the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance, and include any article intended for use as a substitute for cosmetics"[4].

The evolution of cosmetics spans thousands of years, with various civilizations and cultures employing diverse substances to enhance appearance or alter features. The development of cosmetics can be outlined as follows: Ancient Times: Cosmetics were extensively utilized in ancient civilizations such as Egypt, Greece, and Rome. Natural ingredients like plant extracts, minerals, and dyes were employed to create makeup, perfume, and skincare products. For instance, Egyptians utilized henna for hair dye. Herbal Cosmetics: Herbal cosmetics, often referred to as natural cosmetic ingredients, serve as the foundation for products where more than one herbal ingredient is combined to address various skin ailments. Plants play a significant role in formulating new drug products for both cosmetic and pharmaceutical applications. Herbal cosmetics encompass products where herbs are utilized in crude or extract form[5]. Herbal cosmetics, known as products, are crafted using various permitted cosmetic ingredients as a base, incorporating one or more herbal elements to deliver specific cosmetic benefits, thus termed "Herbal Cosmetics." Herbs, in this context, are recognized for their role in realigning the body with nature, offering a method rather than immediate relief[6]. A synthetic substance is a material resulting from a chemical reaction. Natural compounds undergo chemical transformations by humans to create substances distinct from their pre-reaction state. Synthetics originate from naturally existing plant, mineral, or animal sources but have undergone chemical alteration[7]. Certain synthetic cosmetics compounds have been identified as potentially toxic, accumulating in the body over time and linked to conditions such as cancer and skin/mucous membrane irritations. It is important to note that not all synthetic cosmetics ingredients carry the same level of risk; some pose more danger than others. While several of these components face usage restrictions in cosmetics, there is limited testing on how they interact with other compounds present in different products[8].

ADVANTAGES OF HERBAL COSMETICS OVER SYNTHETIC COSMETICS

The trend of using herbal cosmetics in the beauty and fashion industry is on the rise, driven by the preference of many women for natural products over synthetics to enhance personal care and beauty. Herbal cosmetics offer various advantages over synthetic counterparts.

NATURAL PRODUCT:

Herbal cosmetics are entirely natural, free from harmful synthetic chemicals. Instead of relying on chemicals, these products utilize different plant parts and extracts, such as aloe vera gel and coconut oil. Additionally, they contain natural nutrients like Vitamin E, promoting healthy, radiant skin. For instance, aloe vera, a readily available herbal plant belonging to the Liliaceae family, is a common ingredient[9]. Consumer demand for products with more natural ingredients is growing, driven by concerns about synthetic chemicals and mineral oils[10]. Safe to Use: Compared to chemical-based products, herbal cosmetics are considered safer. Their composition of natural ingredients significantly reduces the risk of side effects. For example, synthetic antioxidants like BHA (Butylated Hydroxyanisole) and BHT (Butylated Hydroxytoluene), used as preservatives in some cosmetics, have closely related herbal counterparts, such as natural antioxidants like vitamin C[11-12]. Fewer Side Effects: Synthetic beauty products can often irritate the skin, causing rashes or pore blockages. Herbal cosmetics, in contrast, come with fewer side effects. The use of natural ingredients ensures easy application and reduces the likelihood of skin issues.Notably, herbal cosmetics are free from parabens, commonly used preservatives in

Cosmetics, which can penetrate the skin and are suspected of disrupting hormone function[13-14].Economical to Use: Natural cosmetics are cost-effective, with some products even more affordable than synthetic alternatives. They are often available at discounted prices, especially during sales. According to WHO estimates, around 80% of the global population relies on natural products for healthcare due to concerns about side effects and the rising cost of modern medicines. WHO advocates for traditional herbal cures in healthcare programs, emphasizing their low cost and comparative safety[15-16].

CLASSIFICATION OF HERBAL COSMETICS

1. **According to usage-** Skin: powder, lipstick, creams, and lotions, Hair: shampoo, conditioner, and coloring preparation, Nail: nail polish, nail remover, Teeth: paste, powder, gels.
2. **According to functions**- Emollients: cold cream, vanishing cream, foundation cream, lotion, Cleansing: creams, shampoo, Decorative preparations: lipsticks, eyeliner, dressing preparations, Deodorant and antiperspirants: spray, sticks, and mouth washes, Protective preparation: creams and powders.
3. **According to composition**- Lotions, Powder, Emulsion, Solution, Suspension, Cream, Pastes, gels.

NOVEL HERBS EXTRACT USED IN COSMETICS

The herbal extracts are used to add to the cosmetic preparation due to various properties, such as antioxidant properties[17]. These antioxidants are generally classified into three types depending on the nature of their constituents: carotenoids, flavonoids, and polyphenols[18]. The carotenoids contain vitamin A and retinoic acid. Flavonoids contain antioxidant action, impart UV protection, and have chelating properties. The polyphenolics contain[19]. The demand for herbal medicines is increasing rapidly due to their lack of side effects. The best thing about herbal cosmetics is that they are purely made from herbs and shrubs[20]. According to the European Commission, herbal cosmetics are defined as any substance or preparation intended to be placed in contact with the various external parts of the human body (epidermis, hair system, nails, lips, and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, correcting body odour, protecting them, or keeping them in good condition[21].

A. LIQUORICE:

Plants have been one of the most important sources of medicines and cosmetics since the beginning of human cultivation[22]. Demand for plant-based medicines, health products, pharmaceuticals, food supplements, cosmetics, etc. is increasing day by day. Glycyrrhiza glabra L. (Fabaceae), generally known as mulaithi or liquorice, is a small perennial herb that is found in central and southwest Asia[23]. It contains various phytoconstituents like triterpenoidal saponins, flavonoids, tannins, alkaloids, and phenolic compounds.

Morphology: Glycyrrhiza glabra Linn is a perennial shrub with a height of up to 2.5 metres.The unpleasing liquorice is externally yellowish brown or dark brown in color and internally yellowish[24]. The flowers are lavender to violet in colour. The odor of liquorice is faint, and it is sweet in taste. The length should be 10 to 50 cm, the diameter should be 2 cm, and they should be cylindrical in shape.

Figure 1: Plant of Glycyrrhiza glabra.

Figure 2: Root of Glycyrrhiza glabra.

Phytochemical Constituents:

The roots of Glycyrrhiza glabra Linn contain glycyrrhizin, which is a saponin glycoside and is 60 times sweeter than cane sugar[25]. It also contains flavonoids, along with five new flavonoids: glucoliquiritin apioside, prenyllicoflav, shinflavanone, shinpterocarpin, and 1-methoxyphaseolin, which are isolated from dried roots[26]. The many volatile components such as pentanol, hexanol, linalool oxides A and B, tetramethyl pyrazine, terpinen-4-ol, -terpineol, and geraniol are also present[27]. The presence of propionic acid, benzoic acid, ethyl linoleate, methyl ethyl ketone, 2,3-butanediol, furfuraldehyde, furfurylformate, 1-methyl-2-formylpyrrole, trimethylpyrazie, and maltol compounds is also isolated from the essential oil[28].

Roles of Liquirice in Cosmetics: It is used for hair growth stimulation and skin lightening activities.

1. Hair Growth Stimulation:

Liquorice has a significant activity related to hair growth, and it can be used in the formulation of herbal products for the treatment of various types of alopecia[29]. Comparison between liquorice extract and the standard drug used (Minoxidil 2%) showed that 2% concentration of liquorice extract showed better hair growth stimulatory activity than 2% Minoxidil[30].

2. Skin Lightening Activity:

The extract of liquorice is an effective pigment-lightening agent. Glabridin in the hydrophobic fraction of liquorice extract inhibits tyrosinase activity in cultured B16 murine melanoma cells[31]. Some other active compounds in liquorice extract, like glabrene, Licochalcone A, and Isoliquiritin, are also responsible for inhibiting tyrosinase activity. Liquiritin present in liquorice extract disperses melanin, thereby inducing skin lightening[32].

B. ASHWAGANDHA:

Ashwagandha is one of the herbal extracts that are derived from the essence of Withania somnifera, commonly known as Indian ginseng or winter cherry[33]. Practitioners and pharmaceutical associations maintain Ashwagandha's "antiaging" properties[34].

Morphology:

It is a small shrub with a height of 30-150 cm and a grayishcolor with a strong disagreeable odor like horse urine. The stems of Withania are brownish dark in color and erect; sometimes leaves are absent or present. Flowers are generally small and greenish in color. The number of chromosomes is 2n = 48[35].

Figure 3: Aswagandha

C. TURMERIC:

Turmeric (Curcuma longa) is a rhizomatous herbaceous perennial plant of the ginger family Zingiberaceae that is native to tropical South Asia. Turmeric is currently used in the formulation of some sunscreens; turmeric paste is used by some Indian women to keep them free of superfluous hair; and turmeric paste is applied to brides and grooms before marriage in some parts of India[36]. They are used for anti-inflammatory wound healing, anti-cancer activity, and antibacterial activity. Skin conditions such as acne, alopecia, atopic dermatitis, facial photo aging, and psoriasis. An antioxidant, turmeric protects the skin cells from free radical damage and quickly recovers all kinds of wounds due to its antiseptic qualities[37].

Figure 4: Turmeric Plant

Figure 5: Turmeric powder

D. SANDALWOOD

Sanadlum album L. is a species of woody flowering plant, the most well-known and commercially valid of which is the Indian sandalwood tree, which is a member of S. album trees or shrubs. Most are root parasites that synthesize their own food but tap the roots of other species for water and inorganic nutrients[38]. Several species, especially S. albumin, produce highly aromatic wood, which is used for fragrance, perfume, and herbal medicine. It is also used as a flavouring agent in Ayurvedic medicine to manage the inflammatory reaction that initiates various kinds of disorders[39]. In addition, it has been used as an astringent. It is used as a face pack, mask, etc.

Figure 6: sandalwood

METHODS:

The purpose of the research was to understand what kinds of cosmetic products the Sikkimese population prefers during the purchase.

- To know whether the purchase of cosmetics by the consumer is actually affected by which factor
- To know the choice of different cosmetics by the majority of people?

The study was followed by a survey in Sikkimese to know the choices of different cosmetic products. This research was carried out in different districts of Sikkim. The information about the cosmetic products that they have been using, side effects of the products was surveyed among the people. This method was found to be effective. We conducted a cross-sectional questionnaire study of people in Sikkim. Participation in the survey was entirely voluntary, and by filling out the questionnaires, volunteers agreed to participate in the study. Before preparing the questionnaires, the following issues were considered: What kind of products do people use? What do people look for when they buy cosmetics? What is the specific reason to use the cosmetic products? Reasons for shifting towards other products. Questionnaires are given in table no.1.

ONLINE STUDY AREAS ON MAP:

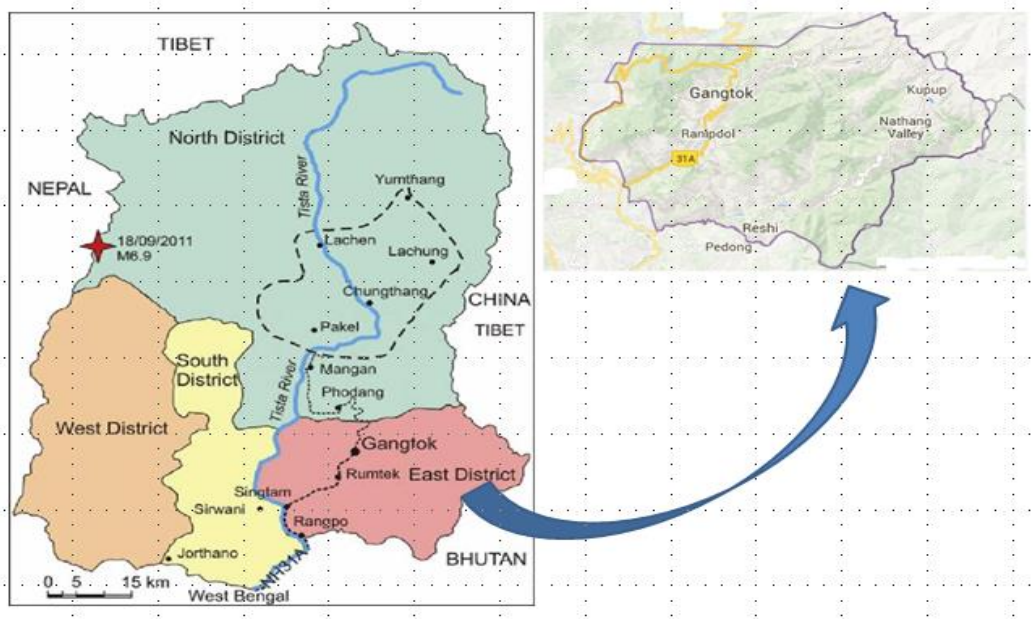


Figure 7: Districts in Sikkim

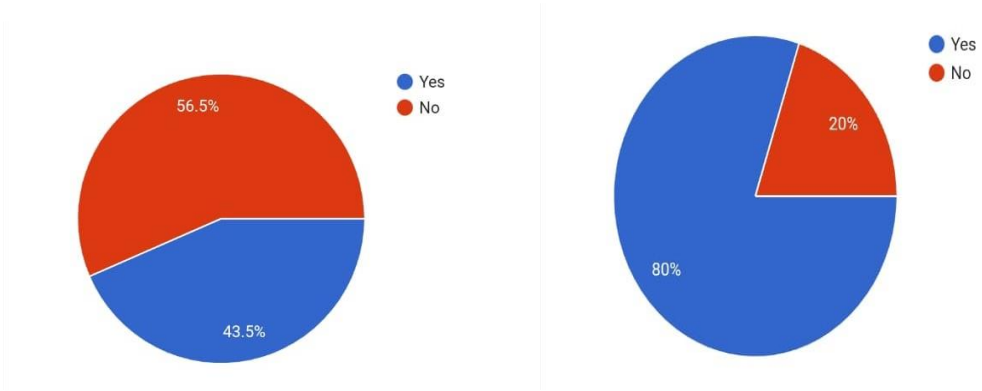
The online survey was conducted in different districts of Sikkim. The survey was done among 150 individuals in Sikkim from different districts through a simple explanation of the study followed by the questionnaire. It was done in different districts in Sikkim, covering important cities such as Gangtok, Namchi, Geyzing, Singtam, and Pakyong.

STATISTICS:

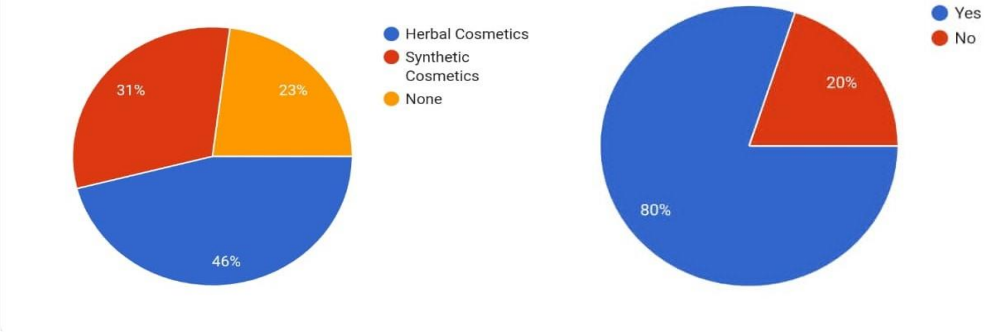
The scientific online data were collected from the various online platforms and analysis the data by using the Ex-cell software 2013 to draw the different graphs.

DISCUSSION:

Consumer Preferences: Among the respondents, 42% expressed a preference for herbal cosmetics, while 31% favored synthetic products; 23% did not specify a preference. When questioned about the factors guiding their choices, those inclined towards herbal cosmetics cited reasons such as perceived naturalness, the potential for fewer side effects, and environmental friendliness. Conversely, individuals who preferred synthetic cosmetics (31%) highlighted factors such as perceived effectiveness ease of availability, and affordability as their primary considerations- 42% of respondents indicated a preference for herbal cosmetics, while 31% preferred synthetic products. 23% had no specific preference. When asked about the factors influencing their choice, the top reasons for selecting herbal cosmetics were perceived naturalness, the potential for fewer side effects, and environmental friendliness. For those who preferred synthetic cosmetics, the main factors were perceived effectiveness, ease of availability, and affordability (31%). For those who preferred synthetic cosmetics, the main factors were perceived effectiveness, ease of availability, and affordability. **Perceived** Benefits: Respondents identified several benefits of herbal cosmetics, including fewer side effects (7%), being gentler on the skin (12%), and long-term skin health improvement (2%), among other reasons (21%.Synthetic cosmetics were primarily associated with benefits such as immediate results (12%), a wider range of options (6%), and other reasons (13%). Perceived Drawbacks: Concerns about limited effectiveness, shorter shelf life, and Potential skin irritations were cited as drawbacks of herbal cosmetics.Synthetic cosmetics were associated with concerns related to potential harmful ingredients, environmental impact, and long-term skin damage.



Graph 1: People used synthetics cosmetics before people who like to use herbal cosmetics



Graph2: People's preference cosmetics **People used herbal cosmetics**

Consumer Preferences: The survey results suggest a significant preference for herbal cosmetics among the respondents. The appeal of natural ingredients, along with the perception of fewer side effects and environmental friendliness, likely contribute to this preference. However, it is important to note that a considerable portion of respondents had no specific preference, indicating a diverse market with varied consumer needs. Perceived Benefits: The perceived benefits of herbal cosmetics align with the growing demand for natural and organic products. Consumers believe that these products are less likely to cause side effects and offer long-term benefits for their skin. On the other hand, synthetic cosmetics are preferred for their immediate results and wider product range, appealing to consumers seeking instant gratification and specific formulations. Perceived Drawbacks: Concerns about limited effectiveness and shorter shelf life associated with herbal cosmetics reflect the perception that natural ingredients may not always deliver the desired outcomes. Synthetic cosmetics face criticisms related to potentially harmful ingredients, raising concerns about long-term health effects and environmental impact.

CONCLUSION

Based on the survey conducted on herbal and synthetic cosmetics, it can be concluded that there is a significant interest in and preference for herbal cosmetics among the respondents. The majority of participants expressed a preference for natural ingredients and highlighted their perceived benefits, such as being gentle on the skin and having fewer potential side effects. The survey also revealed that concerns about synthetic cosmetics were prevalent among the respondents. Many participants expressed apprehension regarding the potential harmful effects of synthetic chemicals on their skin and overall health. The desire for products that are free from artificial additives and harsh chemicals was a recurring theme. Furthermore, the survey highlighted the perceived effectiveness of herbal cosmetics in addressing specific skin concerns. Respondents reported positive experiences with herbal products, citing improvements in skin texture, hydration, and overall appearance. The appeal of herbal cosmetics was also linked to the growing trend towards eco-friendly and sustainable lifestyles, as natural ingredients are often associated with more environmentally conscious practices. It is important to note that while the survey results indicate a clear preference for herbal cosmetics, synthetic cosmetics still have a significant market presence and offer certain advantages such as longer shelf life, stability, and specific targeted benefits. Moreover, individual preferences and needs may vary, and some participants acknowledged the potential benefits of synthetic cosmetics in certain situations. Overall, the survey findings suggest a growing consumer demand for herbal cosmetics due to their perceived naturalness, efficacy, and potential health benefits. As the beauty industry continues to evolve, it is crucial for companies to cater to these preferences by offering a diverse range of products that priorities natural ingredients while ensuring safety, quality, and efficacy.

Table 1: QUESTONARRIES

1. Which cosmetic product do you use?	Herbal cosmetics Synthetic cosmetic None
2. Name of the product that you use?	N/A
3. Why do you prefer herbal cosmetics?	Reason
4. Have you ever used synthetic cosmetic products before?	Yes No
5. What is the name of the synthetic cosmetic that you have used?	Brand name
6. Reason for shifting to herbal cosmetics?	Reason
7. Have you ever used an herbal cosmetic product before?	YES NO
8. What is the name of the herbal cosmetic that you have used?	Name of the product
9. Reason for shifting to synthetic cosmetics?	Reason
10. Opinion on synthetic and herbal cosmetics? Choice.	a) Synthetic cosmetics b) Herbal Cosmetics

Declarations

- **Ethics approval and consent to participate**

  Not applicable

- **Consent for publication**

  Not applicable

- **Availability of data and materials:**

  Data and materials are available upon request.

- **Competing interests**

  The authors have no conflict of interest to disclose.

- **Funding Source**

  Authors declare that no external funding was received for the present work.

- **Authors' Contributions**

  BS, SS & STL, responsible for Selection of the research work and major data collection by trial and error methods. B.S, responsible for the guidance of the research work till the end. BS & S.B, contributed for drafting, designing, formatting and referencing of this online survey article and communicating with scientific esteemed journal having good reputation in the scientific fields. All authors have read and approved the manuscript.

Acknowledgements:

The authors are grateful to the Health and Family Welfare Department, Government of Sikkim (GoS) and host institutes-Government Pharmacy College, Sajong, Government of Sikkim-Rumtek, Sajong, east Sikkim to give advanced facilities such as internet, sound & friendly environment facilities, etc. to collect the significant scientific online data for this survey work.

REFERENCES:

1) Aziz AA, Taher ZM, Muda R, Aziz R. Cosmeceuticals and natural cosmetics. Recent trends in research into Malaysian medicinal plants research. Penerbit UTM Press, Malaysia. 2017:126-75.

2. Chaudhri SK, Jain NK. History of cosmetics. Asian Journal of Pharmaceutics (AJP). 2009;3(3). https://doi.org/10.4103/0973-8398.56292

3.Tiwari M, Dubey V, Lahiri A. Comparative study of various herbal cosmetics: A survey. Asian J Pharm Clin Res. 2020;13(10):31-4.22 https://doi.org/10.22159/ajpcr.2020.v13i10.38904

4. Sumit K, Vivek S, Sujata S, Ashish B. Herbal cosmetics: used for skin and hair. Inven. J. 2012 Oct 10;2012:1-7.

5. Jain NK. A textbook of Forensic pharmacy (7thedn.) MK Jain Vallabh Prakashan. Delhi, India. 2007.

6.Joshi LS, Pawar HA. Herbal cosmetics and cosmeceuticals: An overview. Nat Prod Chem Res. 2015 Feb 16;3(2):170., https://doi.org/10.4172/2329-6836.1000170

7. Shivanand P, Nilam M, Viral D. Herbs play an important role in the field of cosmetics. International Journal of PharmTech Research. 2010;2(1):632-9

8. Ramasubramania R, Sreenivasulu ,, et.al. Synthetic cosmetic -An Overview. RA Journal of Applied Research, 2016. https://doi.org/10.18535/rajar/v2i9.01

9.Aurbey Hampton . 'Synthetic cosmetic and skin care ingredients to avoid'.

10.Akinyele BO, Odiyi AC. Comparative study of vegetative morphology and the existing taxonomic status of Aloe vera L. Journal of plant Sciences. 2007;2(5):558-63. https://doi.org/10.3923/jps.2007.558.563

11. Kaur A, Singh TG, Dhiman S, Arora S, Babbar R. Novel herbs used in cosmetics for skin and hair care: A review. Plant Arch. 2020;20(1):3784-93

12. Suzuki D. The "Dirty Dozen" ingredients investigated in the David Suzuki Foundation Survey of chemicals in cosmetics. Backgrounder. 2010:1-5.

13. Kadam Vaishali S, Chintale Ashwini GD, Deshmukh Kshitija P, Nalwad Digambar N. Cosmeceuticals an emerging concept: A comprehensive Review. Int J Res Pharm Chem. 2013;3(2):308-16

14.U.S.Food and Drug Administration, "parabens".

15. Suzuki D. The "Dirty Dozen" ingredients investigated in the David Suzuki Foundation Survey of chemicals in cosmetics. Backgrounder. 2010:1-5.

16.Sharma A, Shanker C, Tyagi LK , Singh M , Roa ChV, Herbal medicines for market potential in India : And overview , Academic journal of plants sciences, 2008;1:26-36.

17. Gediya SK, Mistry RB, Patel UK, Blessy M, Jain HN. Herbal plants: used as a cosmetics. J Nat Prod Plant Resour. 2011;1(1):24-32.

18. Ndhlovu PT, Mooki O, Mbeng WO, Aremu AO. Plant species used for cosmetic and cosmeceutical purposes by the Vhavenda women in Vhembe District Municipality, Limpopo, South Africa. South African journal of botany. 2019 May 1;122:422-31. https://doi.org/10.1016/j.sajb.2019.03.036

19. Ornella TT, Flore TN, Tiencheu B, Tenyang N, Ashu AO, Marie ME, Ufuan AA. Chemical and antibacterial properties of lipids extracted from some plant seeds and fruits commonly used in cosmetics. Am. J. Food Technol. 2022;10:10-9.

20. AS bouidin, et al . social science medicine., 1999, 49, 279-289 https://doi.org/10.1016/S0277-9536(99)00118-5 PMid:10414835

21. Gediya SK, Mistry RB, Patel UK, Blessy M, Jain HN. Herbal plants: used as a cosmetics. J Nat Prod Plant Resour. 2011;1(1):24-32.

22. Chopra RN, Chopra IC, Handa KL, Kapur LD. Terminalia arjuna W&A (Combretaceae). Indigenous drugs of India. Chopra IC, Handa KL, Kapur LD (eds). 2nd ed. Calcutta, Academic Publishers. 1958:421-24

23. Hill AF. Economic botany. A textbook of useful plants and plant products. Economic botany. A textbook of useful plants and plant products.. 1952(2nd edn).

24. http://www.divineremedies.com/glycyrrhiza_glabra.html (15/09/2009).

25. Rastogi RP and Mehrotra BN. Compendium of Indian Medicinal Plants published by Central Drug Research Institute, Lucknow and National Institute of Sciences Communication and Information Resources, New Delhi, 1990-1994; 6: 395-398.

26. Damle M. Glycyrrhiza glabra (Liquorice)-a potent medicinal herb. International journal of herbal medicine. 2014;2(2):132-6.

27. Li W, Asada Y, and Yoshikawa T. Flavonoid constituents from Glycyrrhiza glabra Linn hairy root cultures, Phytochemistry, 2000; 55(5): 447-56 https://doi.org/10.1016/S0031-9422(00)00337-X PMid:11140606

28. SATIVUM A, MAXIMA C, PERUVIANA T. Hair growth stimulating effect and phytochemical evaluation of hydro-alcoholic extract of Glycyrrhiza glabra. Education. 2013 Aug;2019.

29. Cronin H, Draelos ZD. Top 10 botanical ingredients in 2010 anti-aging creams. J Cosm Derm,s 2010; 9(3): 218-225. https://doi.org/10.1111/j.1473-2165.2010.00516.x PMid:20883295

30. Sharma V, Agrawal RC, Pandey S. Phytochemical screening and determination of anti-bacterial and antioxidant potential of Glycyrrhiza glabra root extracts. J Environ Res Develop, 2013; 7(4A): 1552-1558.

31. Fenwick, G. R., Lutomski, J., & Nieman, C. (1990). Liquorice, Glycyrrhiza glabra L.1Composition, uses and analysis. Food chemistry, 38(2), 119-143 https://doi.org/10.1016/0308-8146(90)90159-2

32. Mishra, L. C., Singh, B. B., & Dagenais, S. (2000). Scientific basis for the therapeutic use of Withania somnifera (ashwagandha): a review. Alternative medicine review, 5(4), 334-346.

33.Singh N, Bhalla M, de Jager P, Gilca M. An overview on ashwagandha: a Rasayana (rejuvenator) of Ayurveda. African journal of traditional, complementary and alternative medicines. 2011;8(5S) https://doi.org/10.4314/ajtcam.v8i5S.9 PMid:22754076 PMCid:PMC3252722

34. Gaurav N, Kumar A, Tyagi M, Kumar D, Chauhan UK, Singh AP. Morphology of Withania somnifera (distribution, morphology, phytosociology of Withania somnifera L. Dunal). Int J Current Sci Res. 2015;1(7):164-73.

35. Bakht J, Ali H, Khan MA, Khan A, Seed M, Shafi M, Islam A, Tayyab M. Antimicrobial activities of different solvents extracted samples of Linunusitatissimum by Disc Diffusion method. African journal of biotechnology. 2011; 10(85):19825-35. https://doi.org/10.5897/AJB11.229

36. Bakht J, Ali H, Khan MA, Khan A, Seed M, Shafi M, Islam A, Tayyab M. Antimicrobial activities of different solvents extracted samples of Linunusitatissimum by Disc Diffusion method. African journal of biotechnology. 2011; 10(85):19825-35. https://doi.org/10.5897/AJB11.229

37. Christenson PA, Secord N, Willis BJ. Identification of trans-β-santalol and epi-cis-β-santalol in East Indian sandalwood oil. Phytochemistry. 1981 Jan 1;20(5):1139-41. https://doi.org/10.1016/0031-9422(81)83047-6

38. Deng S, May BH, Zhang AL, Lu C, Xue CC. Topical herbal medicine combined with pharmacotherapy for psoriasis: a systematic review and meta-analysis. Archives of dermatological research. 2013 Apr;305:179-89 https://doi.org/10.1007/s00403-013-1316-y PMid:23354931

39. Alok S, Jain SK, Verma A, Kumar M, Mahor A, Sabharwal M. Herbal antioxidant in clinical practice: A review. Asian Pacific journal of tropical biomedicine. 2014 Jan 1;4(1):78-84. https://doi.org/10.1016/S2221-1691(14)60213-6 PMid:24144136