

# Herbal Remedies in Cosmeceuticals Formulation: A Review on Nepalese Perspectives

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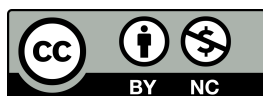
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## ABSTRACT

**Introduction:** The beauty product preparation from natural ingredients reaches is historical. People of rural area where the practice of modern cosmetic products are not accessible, they mostly use and depend upon the locally available ingredients in their own formulations. The inclusion of extracts in topical formulations can minimize the skin damage of oxidative stress, which has been associated with delaying the aging process. Therapeutic benefits by addition of plant-based active ingredients such as alpha-hydroxy acid, retinoic acid, ferulic acid, ascorbic acid, and coenzyme Q10 are common. Natural preservatives are also in priority but it is equally important to carry research for their efficacy and assurance.

**Methods:** An independent approach was used to conduct the literature review. Major well-known bibliometric information sources studied are the Web of Science, Scopus, Mendeley and Google Scholar. Several keywords like name of plants, skin whitening, anti-acne, herbal cosmetics, Ayurvedic herbs, skin cancer, moisturizer etc were chosen to obtain a large range of papers to be analyzed. Local news papers, research reports and official websites were also studied.

**Results:** The results obtained from this review showed that, there are numerous herbs which are effective and safe for cosmetic purpose. Herbal based cosmetic factories are started in Nepal but their research part not much strong and found frequently lead by non-pharmacist or non-chemist human resources. Herbs are rich in vitamins, phenolics and carotenoids which have mainly anti-aging, revitalizing and rejuvenating properties. Herbs have vitamins, saponins and flavanoids which supply various nutrients to hair and help to darkening of hair. Different literatures available prove that the heavy metals are also mixed in large quantity in cosmetics found in Nepalese market. There is an immediate need to execute strong guidelines regarding the quality of cosmetic products in Nepal.

**Conclusions:** The current review on herbal cosmetics focuses on the natural sources of cosmetics, their medicinal benefits, mechanism of action, key chemical constituents and their advantages along with safety.

**Key words:** Formulations; Heavy metal; Herbal cosmetics; Phytotherapy; Skin and hair health.

## INTRODUCTION

Herbs with skin benefits are used to develop cosmetic products. Herbal cosmetics are prepared from extracts obtained from various methods. Herbal active phytochemicals are incorporated into the products to obtain the definite cosmetic benefits. Several formulations from herbs help to beautifying and improve the appearance of skin when rubbed, applied, sprayed and used in various

parts of the body. Cosmetics from natural sources are considered to be better and safer.<sup>1,2</sup> Formulations containing phytochemical from a variety of botanical sources show the good activity on skin care without side effect.<sup>3</sup> Current demand for natural products has created new avenues in the cosmeceutical market. Herbs and essential oils used in cosmetics should not be intended to penetrate beyond

the superficial layers of the skin or have any therapeutic effect.<sup>4</sup> Scientists are doing the work on different aspects to increase the effectiveness but legal requirements and regulatory procedures for herbal cosmetics are the same as for other chemical ingredients used in cosmetics.<sup>5,6</sup> Cosmetic products are intended to be applied to the human body or any part for cleansing, beautifying, promoting attractiveness, or altering the appearance.<sup>7</sup> The art of beauty product preparation from natural ingredients reaches back at least to the Egyptian period, when women rubbed herbal perfumes made by flower in oils. The inclusion of extracts in topical formulations can minimize oxidative stress in the skin, which has been associated with delaying the aging process. The terminology cosmeceutical was introduced around 1990 to describe the beauty products for skin care management. This terminology claims the medicinal benefit for skin and several active ingredients such as Vitamin C, Vitamin E, alpha-hydroxy acid, ferulic acid, Co-enzyme Q10, ascorbic acid, tocopherol, retinoic acid etc.<sup>8</sup> Many of the natural products such as arbutin (melanin inhibiting), azulene (antioxidant and anti-inflammatory), carnolic acid (antioxidant), Glycyrrhizin (skin whitening), rutin (antioxidant), squalene (emollient), rosmarinic acid (antioxidant) are used in various cosmetic preparations. These active ingredients are formulated to increase skin elasticity, delay in skin aging by reducing the wrinkles, protection against UV radiation by antioxidant property and to check degradation of collagen respectively.

Over 200 herbs and minerals are described in Ayurveda for the management and enhancement of skin beauty.<sup>9</sup> They are less allergic and dermatologists have studied and proved that they are safe to use. However some cosmetics are made up of natural ingredients, so people don't have to worry about having skin rashes for all skin types with wide variety of choices. Several cosmetic formulations are enhanced by adding the herbal extracts or oils for the objective to increase the quality for various ailments of skin, hair and other purposes. From cost of point, some of these products prepared from locally available botanicals are more affordable than synthetic ones.<sup>10</sup> Nepalese researchers are also focusing their work on herbal based cosmetic products having antiaging property.<sup>11,12</sup> However local users frequently consider to the quality as an important indicator rather than its ingredients.<sup>13</sup> On the other hand, almost every month, news is coming about duplicate cosmetic products in Nepal, duplicate cosmetic manufacturing factories, and locally refilled international branded products. Therefore, this review was conducted to understand the current practice of herbal materials for the cosmetic product development and recent information on quality of cosmetic products available in Nepalese market.

## METHODS

Selection of the plants used in cosmetic products was based on the few parameters. The popular herbal cosmetic products, Ayurvedic cosmetic products, herbs for skin and hair care, international trend on herbal cosmetic formulation, locally available herbs for beauty purpose, extracts and oils in Nepalese cosmetic companies, bioactive constituents from plants for cosmetic purpose were the key basis of selection of herbs for this review. Literature study to collect various information about the role of herbs in skin care management was conducted rigorously. The review was designed and collected the information from papers, bulletins, websites. Once the analysis of all collected documents were completed, the review paper was prepared using our own practical experience and influenced by various standards and guidelines suggested in the publications. Major well-known bibliometric information sources studied are the Web of Science, Scopus, Mendeley and Google Scholar. Appropriate keywords such as, botanical and English name of plant, skin whitening, antioxidant, anti-acne, herbal cosmetics, Ayurvedic herbs, skin cancer, moisturizer etc. were chosen. Local news papers, research reports and official websites were also studied. An independent approach was used to conduct the literature review.

## RESULTS AND DISCUSSION

Several literatures were collected from different sources as mentioned in methodology section. These herbal cosmetics published locally and internationally were categorized under the following group;

- a) Cleansing agent: help to remove dead cells, chokes
- b) Toners: help to tighten the skin
- c) Moisturizers: help to maintain the moisture of skin
- d) Antioxidants: help to delay aging process
- e) Heavy metals: hazardous for skin

This extensive review of the herbal cosmetics and Ayurvedic cosmetics was focused to identify the herbs frequently used in classical and modern formulations. The information was also collected on the cosmetic products available in Nepalese market with their quality perspectives. Herbal based or herbal ingredient mixed cosmeceutical products have gained high acceptability among consumers due to lack of side effect which are occasionally seen in synthetic cosmetic products. Many consumers are attracted with botanical cosmetic products which are free from harmful synthetic chemicals. Mostly female are consumers of cosmetic products while urban population uses maximum items instead of rural. In several rural areas of Nepal, people develop herbal preparations

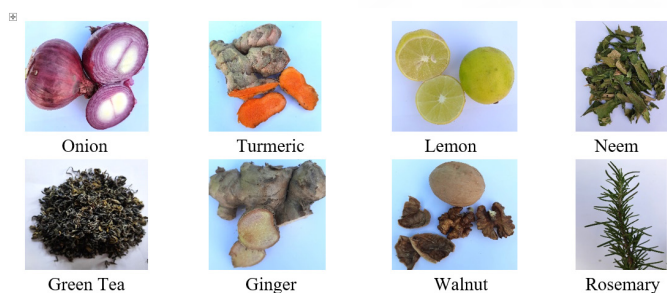
by using locally available botanicals for their own formulations of beauty products. However, the key ingredients present in most of the modern cosmetic formulations include water, emulsifiers, preservatives, thickeners, moisturisers, colours and fragrances. Naturally occurring ingredients make an additional therapeutic claim that are regulated by a different organization to set limits on the level at which a chemical can be used in a product.<sup>6</sup> The bioactive compounds of the extracts added in herbal cosmetics formulation are very sensitive during excessive processing and application in skin, therefore availability and stability is another challenge in herbal cosmetics. Hydroxy acids or phenolic acids are frequently used in cosmeceutical to improve the skin texture, control hydration and delay aging process. Herbal rinses and shampoo stimulate the glands and tissues of the scalp, and encourage hair growth. Herbal cleansing facial creams, facial mask draws impurities to the surface, stimulate the skin and tighten pores. An herbal facial steam with concentrated oil vapors purges impurities from the skin. To enhance these properties of herbal cosmetics, several approaches on research such as phytosomes, transferosomes, nanoemulsions, nanoparticles, microemulsions, and nanocrystals are going on. These new form of products could optimize both the aesthetic appeal and performance of a cosmetic product. To ensure that phytochemicals or extract used in consumer products do not cause significant harm to users and the environment, every ingredient contained within the product must be scientifically assessed and approved before being manufactured and before they can be used in consumer products. Products with no water don't need a preservative; however, during the use of such products, they will come in contact with water, then a preservative is necessary. However, many of the natural preservatives cannot be considered for cosmetic products without the extensive research work and high quality formulation studies.<sup>14</sup>

Most of herbs used in Nepal for cosmetic purpose are locally available Ayurvedic herbs. Manufacturers are using such herbs in different forms such as decoction, infusion, distilled oil etc. Herbal soap and shampoo preparation are much popular in Nepal but it is found that there are very limited R&D on such products. The quality of herbs, extracts, oils are not rigorously tested by local companies since they do not have well equipped research laboratory and herbal experts. Herbal based cosmetic factories are started now days but their research part is not much strong and found frequently non-pharmacist or non-chemist human resources in lead position. If the person having poor knowledge on herbs interferes in the cosmetic production, definitely it will result into the inferior quality product and ultimately damage the industry. Sometime these

companies claim that they formulated with herbs which are not available here in Nepal, India and nearby countries. But they have not enough documents to prove that they imported that extract. Due to lack of proper knowledge in production, it may happen the misguided level design either intentionally or unknowingly. Over last few years, herbal cosmetic production and market have increased dramatically. Though the cosmetic ingredients are herbal extract, if the plants originated from heavy metal contaminated geographical source, they eventually mixed in the products during production process. Nepal bureau of standards, has recently screened the cosmetic products available in local market of Nepal. During the survey most of the cream and lipsticks were found with high concentration of toxic heavy metals such as Lead, Mercury, Chromium etc. of cosmetic formulations cause health risk to consumers. That study was aimed to search and detect heavy metals - lead, cadmium, chromium and nickel in lipsticks, lip-balm and anti-ageing creams and mercury in fairness creams available in the market. Some cosmetics products are directly applied to the skin enter into the body and cause the hazardous effect to the internal body organs. The personal care products with such chemicals seem to be dangerous in high concentrations, high dose and industrial quantities. Some product causes an allergic reaction to the smaller quantities, and some endocrine disrupting chemicals can harm at very low doses. Some of the natural cosmetics are not always safe while their phytochemicals may cause skin reactions and allergies. Essential oils used in deodorant spray sometime cause the onset of asthmatic attacks or some reactions in skin. Sodium laureth sulphate is so toxic, propylene glycol penetrates causes skin and causes liver and kidney abnormalities and it's found in shampoo, spray deodorant. Methylisothiazolinone and methylchlorisothiazolinone are highly allergenic, and dermatologists. Titanium dioxide or zinc oxide of sunscreens, butylated hydroxyanisole of lip stick are dangerous for skin and eye. The European Scientific Committee on Consumer Safety reviewed parabens declared that five parabens were banned in cosmetic products- isopropylparaben, isobutylparaben, phenylparaben, benzylparaben and pentylparaben.<sup>15,16</sup>

Ministry of health of Nepal could be a main stakeholder to establish the cosmetic guideline as most of the ingredients are directly related to health issues. Previous approval of the manufacturing company or importing company by National regulatory authority of that country must be compulsory to follow the procedure or any process or part of a process for making, altering, ornamenting, finishing, packing, labeling cosmetic products. The licensing authority of the Government should be immediately specified in the order to immediate management of such products. Active ingredients formulated in

products are written in chemical names, which is very difficult to understand the value of each ingredients by local consumers. Every cosmetic manufacturing company of Nepal must have well qualified chemist. Mechanism of product registration can strictly control if any harmful ingredients are mixed in product with higher concentration than standard guidelines. Regular market survey of technical team also can reduce the chance of manufacturing and trading of duplicate cosmetic products including soaps, creams and shampoo of popular brands. Herbal-based cosmetic products improve the functioning/texture of the skin by boosting collagen growth by eradicating harmful effects of free radicals, maintain keratin structure in good condition and making the skin healthier.<sup>17,18</sup>



**Figure 1.: Medicinal plants used in cosmetic preparations**

**Almond oil:** Almond oil is rich in unsaturated fatty acids and vitamin E. Several cosmetic products such as day cream, night cream, shampoo, sunscreen cream and body butter are developed by using the almond oil. Because it is good for skin and reduce inflammation, reduce the dark circle below eye, cures lips, provides very nourishing, and strengthens the hair. It penetrates and moisturizes the skin very well.<sup>18</sup>

**Aloe:** Aloe extract is rich in anthraquinone glycosides and moisturizing and hydrating polysaccharides. It has shown excellent performance on skin diseases, wrinkles, marks and pigmentations. The aloe vera gel contains two hormones, macro and micro nutritarians and anthraquinones, which helps for wound healing and anti-inflammatory properties in the body and heal acne.<sup>19</sup>

**Argan oil:** For the skin serum, beauty lotion and face care products, Argan oil is frequently used. Because it is rich in unsaturated fatty acids and antioxidants (including vitamin E, polyphenols, linoleic acid, and sterols). It is used to treat a broad range of skin conditions, anti-aging purpose, and scalp-health issues.<sup>20</sup>

**Apricot:** Apricot having combination of Vitamin C, A, and phytonutrients ensures good skin and also slows down the aging process. Dried apricots juice can be used

to treat itching due to sunburn, eczema and scabies. Fruit powder is used as skin exfoliating agent.<sup>20</sup>

**Beet root:** Beet root contains colouring agents betacyanins and betaxanthins as major color-ing agents. Beet root powder is used as facial soap and lip gloss recipe. It is also used in hair dyeing and natural colorant.

**Cannabis:** Cannabis is nowadays popular in cosmetic product, particularly beauty cream preparations. Due to rich in several vitamins, terpenoids, minerals, it is used in skin care management of eczema, scabies, psoriasis, and acne. The seed oil is also used in shampoos and soap. Oil is also used in cosmetics and body care products.

**Calendula oil:** Calendula oil is rich in mainly sesquiterpene alcohols:  $\alpha$ -cadinol. It has anti-inflammatory activity, remarkable antioxidant activity, and wound healing activity. Oil is active stabilising agent for dry and sensitive skin, baby oils, sun care emulsions, and hand creams.<sup>21</sup>

**Carrot:** Carrot seed oil is indicated for anti-aging, revitalizing and rejuvenating. As it promotes the formation of new cells and helps in reducing wrinkles. It acts as natural toner and rejuvenator for the skin. Carrot is a very good source of vitamin A which is useful for the skin care management.

**Chamomile oil:** Essential oil present in the flower heads contains  $\beta$ -farnesene, chamazulene, chamomile and is used in skin lotions, tooth pastes, ointments, shampoos, soaps, de-tergents, and perfumes. It aids in skin cell regeneration and acts as an antioxidant, and remain young.<sup>20</sup>

**Centella:** Centella significantly improves hair length and make dense hair. It is used in facial care as anti-wrinkle, hydration, cleansing and exfoliation purposes. Asiatic acid, one of the component is component responsible for stimulating collagen synthesis of human fibroblasts. Similarly its constituent helps to stimulate collagen synthesis in skin fibroblast.

**Coconut oil:** Several cosmetic products are prepared by using the coconut oil. This oil contains high-level of antioxidants, thus regenerates the skin, smoothens its surface without making it oily, and destroys the free radicals that are responsible for early ageing. It is a natural fungicide and bactericidal, and besides curing infections helps to build a protective layer on the skin.<sup>20</sup>

**Ginseng:** Particularly in republic of Korea, several cosmetic products are prepared by using ginseng. Ginseng root

can help to boost the circulation of skin's smallest blood vessels, in turn ramping up the synthesis of collagen, it helps to inhibit melanin production, balance oil production, potential in lightening and brightening the look of skin.

**Ginger:** It has anti-ageing, soothe burns, clear acne, toning skin properties. Blended in shampoo, it has anti-dandruff property. Fresh juice of ginger has been shown to treat skin burns. Ginger comes with 40 antioxidant compounds that protect against ageing.

**Ginkgo:** It contain flavonoids and ginkgolides (ginkgolides A, B, C, and J). It is used for anti-aging, anti-cellulite, anti-wrinkle products, treating vitiligo, and anti-irritating skincare products. It is also used as hair color protection products.<sup>22</sup>

**Grape seed:** Grape seed contains high levels of hydrophilic constituents, such as phenolic compounds, and lipophilic constituents, such as vitamin E, unsaturated fatty acids and phytosterols. Topical application of grape seed extract in humans helps in collagen protection. Oligomeric proanthocyanidins from the grape seeds are useful in preventing the degradation of collagen, elastin and hyaluronic acid, also free radical scavenging effects and lipid peroxidation inhibitory effects, and potentially aid in enhancing hair growth.<sup>20</sup>

**Green tea:** Green tea helps against ravaging effects of the sun or photoprotection because of the presence of polyphenolic compounds. Green tea extract is more antioxidant than Vitamin C which controls the acne by skin sebum production, hormonal balance. It has skin whitening effect by tyrosinase inhibition.<sup>23</sup>

**Henna:** Henna leaf is used as a natural hair colorant because of the presence of 2-hydroxy-1,4-naphthaquinone compound. It has apiin, along with lawsone, apigenin, luteolin, and cosmoiin compounds which help for hair growth.

**Indian gooseberry:** Amala is rich in vitamin C, tannins and minerals such as phosphorus, iron and calcium which provide nutrition to hair and darkening of hair. Amala is well known for antioxidant and related with antiaging property.

**Jjoba oil:** Jjoba oil is frequently found formulated in face serum, body butter, moisturizing cream and anti-aging creams. A mild massage of jjoba oil can reduce epidermal water loss and keep the skin plump and healthy.<sup>20</sup>

**Lavender oil:** The constituents of lavender oil are

1,8-cineole, limonene and linalool. It has been reported to inhibit the histamine release from the inflamed cells, anti-septic, deodorant, relieving, soothing, cytophylactic, and cicatrisant.<sup>20</sup>

**Lemongrass oil:** Lemongrass oil having terpenoids mainly citral is a best known skin toner, possesses skin healing properties, soothe irritations on the skin, strengthen your hair follicles, helps to kill hair lice, and provides shining to hair.<sup>20</sup>

**Lemon:** The juice from the lemon which is rich in vitamin C and limonine for brightening skin and hair care. Lemon peel, rich in essential oil is also used in Skin conditioning agent.

**Liquorice:** Licorice is mainly used skin whitening, anti-inflammatory, and agent in several creams. Tyrosinase is the compound that causes the formation of melanin that can cause hyperpigmentation and dark spots.

**Moringa:** Leaves which are rich in phenolics and seeds which are rich in unsaturated fatty acids are suggested to maintain the natural skin pigmentation because it possesses a mild sun protective activity. Seed oil is used in soap formulation in order to improve the stability of the lather and the cleaning efficiency. In South Asian countries, this plant is used to prepare anti-aging cream, soap, shampoo and different cosmetic products.

**Neem:** Leaf extract mainly yields quercetin and  $\beta$ -sitosterol as well as number of limonoids and many antimicrobial constituents. Neem oil with its natural anti-bacterial properties helps to deep cleanse the skin and for the treatment of dandruff.

**Olive oil:** Olive oil is composed mainly of triacylglycerols of unsaturated fatty acids. It nourishes the dry skin and chapped lips, to strengthen weak and brittle nails, to restore and beautify hair and scalp and to skin elasticity and to regenerative purpose.<sup>20</sup>

**Oat:** Oat oil is rich in antioxidants, essential fatty acids and natural emollients. Oat oil is used in many lotions, creams, facial oils, salves and balms since it has soothing properties. Oatmeal is incredibly soothing to the skin, but it must be finely ground up to be used as a scrub.

**Onion:** Onion is popular nowadays for the growth of hair. It is believed that onion extract can improve the scars, redness, acne and skin texture. It is rich in bioactive compounds such as fructo-oligosaccharides, flavonoids and sulfur compounds which are useful for antiaging and improvement of hair follicles.

**Orange Peel:** Hesperidin, Coniferin and phlorin are key ingredients of orange peel while limonene is major volatile compound from peel oil. Hesperidin, is good for skin, hesperidin strongly inhibited melanin synthesis and tyrosinase. It is strong antioxidant and thus inhibits the melanogenesis.

**Papaya:** Papaya with antioxidants and vitamin A helps for slough off dead cells from the skin surface, skin whitening, reducing unwanted hair, exfoliating dead skin, repairing ageing skin etc. Fruit is rich in enzyme papain, vitamins mainly vitamin A, minerals, flavanoids and fibers.

**Rose oil:** Chemical components of rose oil are well known as moisturizer, leaves the skin soft, improve the appearance of aging skin, smooth and hydrated. It can be added to formulas with use level 1-100% in skin care products.<sup>20</sup>

**Rosemary oil:** Main chemical components of rosemary oil are 1,8-cineol, linalool and pinene. Carnosic acid, a phenolic compound helps to ease congestion, puffiness and swelling and can also be used for acne, dermatitis and eczema. Rosemary is effective in preventing cutaneous photo damage of skin by UV radiations.<sup>20</sup>

**Saffron :** Saffron flower is effective in treatment of psoriasis and useful for glowing skin. Saffron is rich in Vitamin A, Vitamin B2, Vitamin B3 and Vitamin C. All constituents of delivering positive health benefits and used to lighten skin tone, reduce dark circles below the eyes, and tackle light pigments, in addition to combatting acne and moisturizing effect. It is antifungal and can be used to treat acne.

**Sandalwood:** Sandalwood is rich in oil and consist of ximenynic acid which has anti-inflammatory and vasodilatation properties. Therefore, seed oil was a potential product to be used in cosmetic and personal care products like beauty soap, cream, hair oil and face pack.

**Sesame oil:** Sesame oil having the higher amount of unsaturated fatty acids such as oleic, linoleic, linolenic acids which are easily absorbed by the skin, has healing properties to the capillaries, moisturizing, nourishing, softening , anti-inflammatory, natural protector against sun damage and UV exposure, helpful to remove lice from scalp and hair. It is a base oil in most of Ayurvedic oils.<sup>20</sup>

**Shikakai:** Sikakai contains vitamin C and D, along with other properties that make it ideal for hair care, removes dandruff, make hair softer, thick and shiny, prevents dry scalp. Shikakai powder is also very suitable as a pre-treatment to hair before coloring hair with natural dyes.

**Strawberry:** The malic acid in strawberries removes stains from teeth and makes them look whiter. The Vitamin C fights free radicals that cause damage to cells and collagen resulting in fine lines. Antioxidants and exfoliants in strawberries remove dirt and impurities while soothing and moisturizing.

**Sunflower oil :** Consisting primarily of triglycerides of linoleic, oleic acids, Vitamin E and lecithin, this oil is used in wide variety of emulsions formulated for face and body products, lotion, salt scrub, bath oil and massage oil formulations due to its smoothing properties to skin.<sup>20</sup>

**Tea tree oil:** It is effective in promoting healthy skin by soothing and healing a wide range of skin issues. One of the most common tea tree oil uses is as a home remedy for acne. It is also used topically as a local antiseptic for cuts and abrasions, for burns and helps to counter cracked and ragged cuticles.<sup>20</sup>

**Turmeric:** The paste of turmeric powder is rubbed in skin for treatment of inflammation and skin injury and used as an antiseptic mainly due to high curcumin content. It is also used in treatment of dandruff, hair growth stimulators, and hair colorant. Major constituents are curcumenoids and curcumin is a key chemical component.<sup>24</sup>

**Walnut:** Polyunsaturated fatty acids of walnut oil helps to keep the skin moisturized. They nourish the skin from within, enhancing the growth of healthier and radiant cells. The regular application of warm walnut oil is known to lighten the dark circles. Walnut beats are used as scrubbing agent in face scrub.

## CONCLUSION

Herbal extracts are primarily added to the cosmetic formulations due to several associated properties such as antioxidant, anti-inflammatory, antiseptic and antimicrobial properties. Above mentioned herbs have been found benefited from the recent studies on the human beauty. Consuming herbal cosmetics having plant based active ingredient can help to prevent and manage to a regular beauty, wellness to boost longevity and bio-compatible. Rising number of consumers demanding the natural product based cosmetics with traceable and more natural ingredients, free from harmful chemicals and with an emphasis on the properties of botanicals. Herbal based cosmetic factories are started in Nepal but their research part is not much strong. It is also observed that unexperienced, non-pharmacist or non-chemist human resources are in the lead position which impact on quality.

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