



**UNVEILING THE COSMETIC POTENTIAL OF TURMERIC: A REVIEW**

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**ABSTRACT**

Since ancient times, turmeric, a spice made from the *Curcuma longa* plant, has been used in traditional medicine and beauty routines. Its bioactive component, curcumin, has been the subject of much research due to its demonstrated antibacterial, anti-inflammatory, and antioxidant capabilities. With a focus on turmeric's uses in skin and hair care, this article attempts to provide an overview of the research that has been done on the cosmetic benefits of the spice. We talk about turmeric's potential advantages in lowering inflammation, hyperpigmentation, and acne, as well as how it helps with wound healing, skin repair, and hair growth. We also point out regions that require more study to fully realize turmeric's beauty potential.

**KEYWORDS:** Turmeric, curcumin, cosmetics, skin care, hair care.

**INTRODUCTION**

Since the beginning of time, medicinal plants and other natural items have been used to treat a wide range of illnesses, including COVID-19. These products are the primary source of the most potent modern medications.<sup>[1]</sup>  
<sup>[2]</sup> Since ancient times, turmeric - scientifically known as *Curcuma Longa L.* - has been used extensively as a condiment, nutritional supplement, cosmetic ingredient, and coloring agent, to name a few uses. Since 2014, India has been the world leader in the production, consumption, and export of turmeric. Nigeria, however, is developing quickly in that area.<sup>[3]</sup> Owing to its natural, unsynthesized, and inexpensive nature, it is still utilized in Hindu religious rites and as a dye for sacred garments. Actually, one of the least expensive spices is turmeric. While it is utilized similarly to saffron as a color, the two spices have different culinary applications and should never be used in place of saffron in recipes. It was employed as a spice in food and had some religious significance throughout the almost 4,000-year-old Vedic culture in India. The word "meritorious earth" (*terra merita*) comes from the Latin and describes the color of pulverized turmeric, which is similar to a mineral pigment. For 4,000 years, people have employed turmeric, or *Curcuma longa*, to treat a wide range of illnesses. Numerous studies have revealed that turmeric may actually aid in the treatment of a variety of diseases. On the other hand, when you read news articles regarding the health benefits of turmeric, keep a few things in mind. Initially, a lot of research has been done

on animals and test tubes; hence, the herb's effectiveness in people may be limited. Second, injectable curcumin—the active ingredient in turmeric—has been employed in certain studies. Lastly, contradictory data is shown in several investigations. However, turmeric may be useful in treating digestive issues, lowering inflammation, and preventing infections and certain types of cancer. Indian curries get their unique taste and yellow color from turmeric, which is also frequently used as a food dye.<sup>[4]</sup> It's also used to color cheese and butter, and in mustard. Both Ayurvedic and Chinese medicine have traditionally utilized turmeric as an anti-inflammatory and to heal wounds, skin conditions, liver and digestive issues, and other ailments. As early as 1815, Vogel and Pelletier's history states that Curcumin, sometimes known as "yellow coloring matter," was initially separated from *Curcuma Longa*. The Milobedeska and Lampe Curcumin's structure was discovered in 1910 to be a Diferuloylmethane with keto-enol tautomers. While the enol form is more alkaline in circumstances, the keto form is primarily neutral and acidic.

**Genetic resources**

In the past, research on the collection, characterization, assessment, classification, and recording of turmeric led to the gathering of 410 accessions of the plant as well as 30 additional wild species from various regions of India. After analyzing and characterizing 568 collections of turmeric, six distinct main kinds were found in India. Many species of the genus are deeply linked to the

social, ethnic, rural, and folkloric lives of different populations in Asia; some are used medicinally, others as plants that give dye and arrowroot, and still others are connected to religious and social ceremonies and rituals, cultural events, and folklore arts.<sup>[5,6]</sup> Certain *Curcuma* species are becoming more significant these days as a result of fresh findings identifying very valuable novel biochemical components found in their rhizomes. Turmeric's medicinal applications (symptoms and treatments) when combined with other plants.

### Origin of plants

According to ethnobotanical evidence, turmeric was first used in India in ancient times in connection with Sakthi worship, or the worship of the divine mother or goddess, by pre-Aryans. It was then traded and used as a condiment and coloring agent. The topic has been extensively studied.<sup>[7]</sup> The Indo-Malayan region played a major role in the genus's origin and spread, supporting the Indo-Malayan origin and center of diversity theory. It is thought that turmeric originated in Southeast Asia<sup>[8]</sup> and then traveled to adjacent regions in China, Japan, Indochina, and other South Pacific Islands. From there, it is thought to have traveled to tropical West Africa and East Africa. It was only recently brought to the Caribbean Islands and Central America. As a spice and condiment, turmeric is highly favored among the rice-eating populations of Indo-China and Southeast Asia.<sup>[9]</sup> It enhances the taste, color, and flavor of many foods. In the past, it was frequently used as a dye in the weaving business, but newer synthetic dyes have since taken its place. Based on reports, the Western Ghats region is home to around eight tuber-bearing species, one stolon-bearing species, and sixteen non-tuberous species. As a result, it is regarded as the genus's primary hot spot, ranking on par with the North Eastern region of India. Thus, the South Western Peninsula of India may have been one of the genus's original Asian habitats, in addition to being a center of variety for the genus. Similar circumstances can be seen in the Eastern Ghats region, which includes large areas of Madhya Pradesh, Andhra Pradesh, and Orissa. In Orissa's tribal-dominated districts of Kandhamal, Gajapati, Ganjam, Mayurbhanj, and Koraput, turmeric is the primary cash crop. Orissa has been growing turmeric since the beginning of time.<sup>[10]</sup>

### Plant and its chemistry

*Curcuma longa* L. Is a rhizomatous perennial herb that reaches a height of one meter. Within the family Zingiberaceae and genus *Curcuma*, it is the most widely used species. The genus has over 100 species, about 40 of which are native to India.<sup>[11,12]</sup> The Arabic term "Kourkoum," which implies saffron, is the source of the Latin name "*Curcuma*." It needs a lot of water and grows best in hot, humid climates. Its huge, oblong leaflets are paired with a short pseudostem. There is a main, or mother, rhizome within the subterranean rhizome and several branching minor rhizomes. They are pale yellow, reddish yellow, or orange brown in color and are

pyriform, ovate, or oblong in shape. It doesn't produce any fruit and has pale yellow flowers. It is grown throughout the tropical regions of Africa, China, India, Indonesia, and Thailand.<sup>[13,14]</sup> Based on the region of production, the two primary commercial varieties of turmeric in India are the "Madras" and "Alleppey" varieties. The British and Middle Eastern markets favor Madras turmeric, which has less volatile oils and curcumin, while the US imports Alleppey turmeric as a spice and food coloring. Turmeric from Madras has a brighter, lighter yellow color that works well for curry powder and mustard paste. The "Bengal" variety is mostly utilized as a coloring agent.<sup>[15]</sup>

### Composition

The rhizome's makeup consists of oils and curcuminoids, which give the plant its characteristic yellow color and flavor. Perfumes and aromatherapy both employ oils. The anti-inflammatory, anti-nociceptive, and antioxidant qualities of the essential oils may exist.<sup>[16]</sup> Although *Curcuma longa* has a lot of curcumin, other plant species including *Curcuma aromatica* and *Curcuma phaeocaulis* can also provide you with curcumin. Curry powders have comparatively lower quantities of curcumin than pure turmeric, which has the highest content (average 3.14% by weight).<sup>[17]</sup>

### Curcumin

Vogel and Pelletier extracted curcumin, often known as "yellow coloring matter," from *Curcuma longa* for the first time in 1815. Thirteen Its structure - a diferuloylmethane - was clarified in 1910 by Lampe and Milobedeska. It is present as a tautomer of ketoenol. In neutral and acidic environments, the keto form predominates, but in alkaline settings, the enol form does. It is soluble in methanol, ethanol, dimethyl sulfoxide, and acetone but insoluble in water, acidic solutions, and neutral pH solutions.<sup>[18]</sup> In alkaline media, variable deterioration has been documented. There have also been reports of photodegradation. It moves swiftly through the cell membrane and is lipophilic. The intestinal metabolism of rats and humans produces tetrahydrocurcumin, hexahydrocurcumin, curcumin glucuronide, and curcumin sulfate by both conjugation and reduction. Dihydroferulic acid, ferulic acid, and curcumin's in-vitro breakdown products were observed in rats in vivo and may have biological effects. It is not well absorbed; the liver breaks it down quickly, and the gall bladder gets rid of it. Urine excretes little of anything.<sup>[19]</sup>

Because of its high first-pass metabolism and low bioavailability, oral curcumin may not be as clinically effective as it has been in in vitro trials. While curcumin's plasma concentration upon oral ingestion is in the nanomolar range, its therapeutic activity in vitro has been documented at doses in the micromolar range.<sup>[20]</sup> To boost curcumin's oral bioavailability, more recent technologies, such as adjuvants, nanoparticles, liposomes, micelles, and phospholipid complexes, are

being investigated. Studies frequently do not specify the precise amount of curcumin utilized, and commercial formulations vary in this regard. Furthermore, it comes in many forms with varying biological potencies.<sup>[21]</sup>

### Biological effects

A highly pleiotropic chemical, curcumin affects several different signaling pathways. Its properties include wound healing, chemoprevention, hypoglycemia, anti-inflammatory, anti-oxidant, antibacterial, chemosensitizing, and radio sensitizing effects. More research is required to determine the functional implications of these relationships.<sup>[22]</sup>

### Traditional uses

From birth to burial, turmeric has been used in traditional ceremonies and rituals. It is revered, auspicious, and a sign of wealth. In many Indian communities, a piece of turmeric tied to a turmeric-dyed thread serves as the nuptial string. It is applied to the bride and groom's entire body the day before the wedding; clothing dyed or branded with it is considered auspicious. In some communities, it is applied every evening. Women have been described as beautiful in classic Indian literature if their faces and bodies radiate yellow. It is used as an amulet to fend off evil spirits and in Hindu temple rites and ceremonies like "Homa" and "Pooja".<sup>[23, 24]</sup> Turmeric powder was originally made into "kumkum" by alkalizing it. Married women apply it to the middle of their foreheads or where their hairline parts are. Commercial forms are currently accessible; however, it's unclear what's in them. It contains canaga oil, groundnut oil, turmeric, tragacanth gum, fragrance, starch, chalk powder, azo or other colors, and parabens.<sup>[25, 26]</sup>

### Condiments

Because of its color and scent, turmeric is utilized in cuisine. Communities in Southeast Asia take up to 1.5 g daily. Its flavor, color, and preservation qualities have made it more popular throughout the world. It is a part of the curry powder (10–30% turmeric) that gives meat and fish their flavor. Turmeric is less common in vegetarian curry mixtures because of its bitter flavor. Due to their strong, bitter flavor and vibrant color, turmeric oleoresins - which are derived from the solvent extraction of powdered rhizomes - are utilized in the food sector.<sup>[27]</sup>

### Colouring agent

Curcumin's yellow colour has been used in the food, textile, and cosmetics industries. It is added to food as an ingredient. It is a natural substitute for synthetic tartrazine because of its comparable color. Mustard, dairy goods, cakes, soups, sauces, gravies, seafood, and cereals have all been colored with it. It is meant for temporary storage and is only suitable for specific foods. Its susceptibility to light and deterioration in the presence of heat, chemical oxidants, and alkaline environments are the causes of this. According to the Joint FAO/WHO

Expert Committee on Food Additives, a daily dose of 0–3 mg/kg of curcumin is considered acceptable.

### Cosmetology

Since women have always applied turmeric topically, it's possible that this was the first cosmetic ever discovered. It is thought to improve the complexion, lessen acne, and slow the growth of facial hair.<sup>[28]</sup> According to the authors' observation, a lot of Tamil Nadu ladies still apply turmeric to their faces every day before taking a bath. Products for skin care have made use of the color yellow. An off-white hydrogenated version of curcumin called tetrahydrocurcumin is used topically as an antioxidant for the skin. If mixed with moisturizers, it could stop lipids from going rancid.<sup>[29]</sup>

### Local uses

There are several ways that the locals treat scabies with turmeric. If taken twice a day for seven days, a mixture of turmeric powder and cow's pee can help cure many skin conditions like scabies, acne, and itches. Fresh turmeric juice mixed with cow pee, applied twice daily for 15 days, treats many skin disorders, worms, and itches. For scabies, a paste made of turmeric and prickly poppy seeds (*Argemone mexicana*) is also utilized. The affected areas of scabies and other skin problems are pasted with turmeric and tamarind leaves (before going to bed for seven to eight days). Scabies can also be treated using a paste consisting of fresh turmeric and *Pongamia glabra* seeds or leaves.

In the Bharavanthy taluk in the Shimoga district of Karnataka, scabies is treated by applying a paste consisting of cumin and turmeric seeds.<sup>[30]</sup> Jharkhandi tribal people cure piles with a mixture consisting of sugar and fresh turmeric rhizome. The usual specific use of turmeric in Kerala state to treat a few common illnesses.<sup>[31]</sup>

### Dermatology

Human basal cell carcinoma cells undergo apoptosis and p53 overexpression when exposed to curcumin. Moreover, it causes apoptosis in human and mouse melanoma cells and suppresses NF- $\kappa$ B.<sup>[32, 33, 34]</sup> Human melanoma cells were exposed to modest doses of curcumin combined with red-blue light irradiation, which resulted in oxidative stress-mediated cell death, decreased proliferation, and increased apoptosis.<sup>[35]</sup> Additionally, it inhibits NF- $\kappa$ B, which prevents squamous cell cancer from growing and proliferating.<sup>[36]</sup> Topical treatment may prevent the skin's chemical carcinogenesis from occurring. It suppresses the STAT-3 and NF- $\kappa$ B pathways, causing selective apoptosis in cutaneous T cell lymphoma cell lines, which has an inhibitory effect on the disease.<sup>[37]</sup>

### Adverse effect

Because of variables like inconsistent product and dose usage in trials, potential drug interactions, low bioavailability, exposure to contaminants, insufficient

research, and conflicting indications of carcinogenicity in animal studies, the long-term safety of compounded medicines remains unclear. Curcumin has an antioxidant impact at lower cellular levels, while higher amounts may increase reactive oxygen species (ROS).<sup>[38]</sup> It has been connected to oxidative stress in cases of acute vitiligo.<sup>[39]</sup> It has been documented to suppress the apoptotic response to cytotoxic chemotherapy drugs in cases of breast cancer.<sup>[40]</sup> Because of its possible antiplatelet effects, it might be best to stop using it before cutaneous surgery.<sup>[41]</sup> Topical curcumin has been reported to be effective in treating both immunologic and non-immunologic contact urticaria.<sup>[42]</sup> In a variety of contexts, reports of allergic contact dermatitis to curcumin or turmeric with positive patch tests have been made. Tetrahydrocurcumin, which was utilized as an antioxidant in sunscreen, has also been linked to it.<sup>[43]</sup>

### Turmeric patent

Turmeric has countless medicinal benefits. India has long used it as an antibacterial and to treat various types of wounds. This is extensively documented and has been noted. Nevertheless, despite turmeric's widespread usage in folk medicine, two non-resident Indians from the University of Mississippi Medical Center in Mississippi, Drs. Suman K. Das and Hari Har P. Cohly, filed a patent application for the "use of turmeric in wound healing" in December 1993 with the US Patent Office. March 1995 saw the granting of the patent. It stated that a new discovery had been made on the use of an adequate quantity of turmeric, both orally and locally, to speed up the healing of wounds. It was carried out, and following lengthy techno-legal proceedings, the decision was made in March 1997 to categorically reject all six claims, holding that the medical qualities of turmeric could not be patented. As a result, the patent for turmeric was revoked due to its failure to meet the novelty requirement. The breakthrough, according to the then-Director General of the Central Institute of Scientific Research (CSIR), Dr. R. A. Mashelkar, has far-reaching implications for the preservation of traditional Indian knowledge in the public domain. India has implemented the Geographical Indications Bill, the Plant Varieties Bill, and the Traditional Knowledge Digital Library as part of a multifaceted strategy to address IPR conflicts. In addition to its medical, cosmetic, and ethno-botanical use in humans, turmeric (*Curcuma longa* L.) has a wide range of applications and is closely associated with social, cultural, religious, folk, and classical art forms. These attributes make turmeric a very valuable plant. More ancient than many other cultivated crops, it is a significant plant. Given its insecticidal, fungicidal, and therapeutic qualities, further research on the value addition of turmeric is therefore desperately needed.<sup>[44]</sup>

### CONCLUSION

In conclusion, turmeric has become a valuable ingredient in the beauty business thanks to its long history of traditional use. Its bioactive element, curcumin, has been demonstrated to have strong antibacterial, anti-

inflammatory, and antioxidant qualities, making it a useful component in a range of cosmetic products. It has been discovered that turmeric enhances skin health by decreasing inflammation, hyperpigmentation, and acne, as well as by encouraging skin suppleness and wound healing. Its natural pigment has also been used to improve color and texture in hair care products. To fully investigate turmeric's potential in cosmetics and standardize its use, more research is necessary. However, the data now available indicates that turmeric is a natural and adaptable component that can be used to create cutting-edge cosmetics that support healthy, glowing skin and hair.

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