

Review article

# A Review on Turmeric: An Extraordinary Herb Used in Cosmetics for Aesthetic Applications

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**ABSTRACT:**

The aromatic herb *Curcuma longa* belongs to the ginger family (Zingiberaceae), and its rhizomes are rich in curcuminoid pigments, especially curcumin, which has anti-inflammatory properties. Astringent, anti-irritant, antibacterial, and anti-inflammatory capabilities are among the characteristics of curcuminoids derived from *Curcuma longa*. They also exhibit photoprotective, anti-aging, anti-wrinkle, hydrating, antioxidant, and moisturising effects. One of the oldest medicinal plants, turmeric (*Curcuma longa*), has been utilised since ancient times. The bioactive ingredient in turmeric is curcumin, which comes from the Zingiberaceae family. Numerous studies have shown that curcumin is primarily responsible for the majority of the effects of turmeric. The objective of this review was to give a succinct overview of the therapeutic and dietary benefits of curcumin. In addition to being an excellent source of macro- and micronutrients including protein, energy, vitamins, and minerals, turmeric is also used for its anti-inflammatory and skin cancer-fighting abilities. Due to its antifungal and antibacterial properties in skin and hair, turmeric has been used from ancient times to the present. Additionally, ayurvedic and cosmetic uses of turmeric include blood cleansing and a variety of skin care treatments. The component of the plant that is most frequently used is typically the rhizome. It can be made in a variety of ways and is thought to help with coughs and asthma. Strong antioxidative, anti-inflammatory, and antibacterial characteristics are found in the natural yellow pigment curcumin, which is derived from the spice turmeric. Because of these qualities, curcumin has been used as a treatment for psoriasis, atopic dermatitis, wound healing, and other conditions that cause or contribute to the ageing of the skin.

**Keywords:** Curcumin, *curcuma longa*, zingiberaceae, anti-oxidant, anti-inflammatory, anti-aging, anti-bacterial, anti-cancer agent.

## 1. INTRODUCTION

Ancient civilizations have employed medicinal plants as a source for significant modern medications [1]. The colourant and condiment turmeric (*Curcuma longa* L.) is frequently used in cooking and cosmetics. With an output of 8.46 lakh tonnes in 2014–2015, India is the world's top producer, exporter, and consumer of turmeric [2]. The Latin term "terra merita," which means "meritorious earth," is the source of the name. It is sometimes referred to as the "yellow root," "golden spice," or "Indian saffron" and has been utilised in traditional medicine and religious rituals for at least 6000 years.

Turmeric's use stretches back approximately 4000 years to the Indian Vedic culture, when it was both a culinary spice and a symbol of some religious significance. It probably spread to China by 700 A.D., East Africa by 800 A.D., West Africa by 1200 A.D., Jamaica in the eighteenth century, and Jamaica by 1200 A.D. In accordance with Sanskrit medical treatises, Ayurvedic, and Unani systems, turmeric powder

has a long history of therapeutic use in South Asia. Marco Polo first described this spice in 1280, marvelling at a vegetable that displayed characteristics so similar to those of saffron [3].

Both the medical and scientific communities as well as the culinary community have shown a great deal of interest in the spice turmeric. The ginger family includes the rhizomatous herbaceous perennial plant known as turmeric (*Curcuma longa*) [4]. Curcumin, a component of turmeric, has been used medicinally for thousands of years, but it has only recently been possible to pinpoint the precise mechanism(s) of action and identify the bioactive components [5]. The primary natural polyphenol present in the rhizome of *Curcuma longa* (turmeric) and other *Curcuma* spp. is curcumin (1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione), also known as diferuloylmethane [6]. Due to its antioxidant, anti-inflammatory [7], antimutagenic, antibacterial [8,9], and

anticancer qualities [10, 11], *curcuma longa* has a long history of usage as a medicine in Asian nations.

In addition to being a strong source of macro- and micronutrients including protein, energy, vitamins, and minerals, turmeric is also well-known for its many therapeutic uses, including its anti-inflammatory, anti-ulcer, and anti-cancer characteristics. Additionally, it has hepatoprotective, antibacterial, antifungal, and renal effects. Since ancient times until the present, turmeric has been utilised; its main usage is for its antifungal and antibacterial effects on the skin and hair.

Curcumin is well-known for its therapeutic properties on a variety of human ailments, and it has demonstrated an anti-proliferative action in a number of cancers [12]. Numerous illnesses, including amenorrhea, anaemia, asthma, dislocation of joints, diabetes, diarrhoea, cough, dyspepsia, liver disorder, loss of appetite, cough, bronchitis, hepatitis, ring worm infection, menstrual disorder, toothache, urinary infection, skin conditions, scorpion sting, ring worm infection, and weakening of eye sight, are treated with it therapeutically[13]. Typically, countries like Cambodia, India, South China, Indonesia, Madagascar, Malaysia, the Philippines, and Viet Nam cultivate *Curcuma longa*. Because curcuminoid pigments are present, the rhizome, or main stem, of the *C. longa* plant has a number of offshoots or ramifications that are a characteristic orange colour (curcumin, demethoxycurcumin, bisdemethoxycurcumin, and cyclocurcumin). Rhizomes from *C. longa* have been used as tonics, to treat ulcers, cough, and the common cold, and even as an ointment to speed up wound healing. They also contain digestive, carminative, antispasmodic, antioxidant, antidiarrheal, diuretic, and stimulant properties. As a penetration-enhancing drug, urea has been used in conjunction with other treatments. Papain-like proteolytic enzymes are found in ginger rhizomes (*Zingiber officinale*), and their extract may be employed in topical preparations to help other substances penetrate the skin more easily.

			antimicrobial agent.
8	Wrinkles	Turmeric cream	Antiwrinkle, anti-irritant, antiaging agent.
9	Sun burns	Sunscreen, moisturizer of turmeric.	Anti tanning, antioxidant, and moisturizing agent
10	Gastrointestinal diseases	Turmeric supplements	Carminative, antibacterial, anti-inflammatory, and antiulcer agent
11	Eczema	Turmeric face pack and face cream	Antibacterial, anti-inflammatory, and anti pain agent.
12	Diabetes mellitus	Turmeric powder with amla and honey is used.	Anti-diabetic agent.
13	Hepatoprotective diseases	Turmeric extract is used.	Anti inflammatory and antioxidant agent
14	Breast cancer	Three turmeric preparations with different amounts of other naturally occurring substances (polar compounds and/or essential oils) were equally effective at preventing human breast cancer.	Anti-cancer agents.[14]

## 2. TURMERIC USED AS FOLK MEDICINE

Species such as *C. longa*, *C. aromatica*, *C. caesia*, *C. zedoaria*, *C. kwangsiensis*, *C. phaeocalis* and *C. comosa* have been used in used in Ayurveda, Siddha, Unani, Chinese, veterinary, and folk medicine throughout South-East Asia. It is a common household remedy for many ailments such as cough, respiratory ailments, anorexia, rheumatism, dysentery, abdominal pain and dental disorders. Gastrointestinal disorders such as liver disease, acidity, dyspepsia, ulcers, indigestion, and flatulence are also treated. A hot poultice made from turmeric and slaked lime is used to relieve muscle pain and inflammation caused by injury. Fresh turmeric is applied to perineal laceration after delivery to aid wound healing. It is applied to the severed umbilical cord of newborns in rural India as an antiseptic. Women are given warm milk with turmeric, ginger and honey to drink after childbirth. Turmeric paste is applied for various skin diseases, burns, bites and eye infections. Turmeric and neem have been used for the treatment of small pox and chicken pox.

Turmeric is frequently used medicinally to treat conditions like gas relief, improved digestion, parasitic worm infections, improved menstruation, arthritis relief, gallstone dissolution, and increased physical energy. Ayurvedic treatments for skin conditions and blood purification also employ turmeric and its paste. To get rid of extra hair, turmeric paste is helpful for hair. Turmeric is applied to the skin of the bride and groom before marriage in some regions of India, Pakistan, and Bangladesh to make skin glow and

**Table 1: Turmeric used for pharmaceutical purpose**

S.no	Diseases	Treatment	Uses
1	Respiratory diseases.	Using hot milk with turmeric.	Viral infection
2	Dental disorders	Brushing of turmeric on teeth	Antibacterial Agent
3	Muscle strain	A hot poultice made from turmeric and slaked lime is used.	Anti-inflammatory agent.
4	Wound healing	Fresh turmeric is applied on the wound	Antiseptic agent
5	Viral diseases (chicken pox , small pox)	Turmeric along with neem is used	Antiviral agent
6	Psoriasis	Turmeric paste is applied on the skin	Anti-oxidant and anti-inflammatory agent.
7	Acne scar	Turmeric face pack is used.	Anti-inflammatory, antioxidant and

shine and to help keep harmful bacteria away from the body. Turmeric is mostly used by multinational corporations in the manufacturing of various sunscreens and face creams. To aid in digestion, reduce gas and bloating, and treat intestinal ailments as well as colds and sore throats, many food manufacturers integrate turmeric into a variety of food products such as rice and bean meals. Turmeric is regarded as a carminative and bitter digestive in both traditional Chinese and Ayurvedic medicine. As recommended by Ayurveda since ancient times, it also aids with sprains and oedema [15].

Additionally, as a digestive enhancer that increases the activities of chymotrypsin, amylase, and pancreatic lipase, turmeric functions as a dietary supplement. By combining with other species like coriander, cumin, black pepper, and red chilli in rabbits, turmeric also promotes bile flow, bile acid secretion, and the mucin content of gastric juice [16, 17]. You can use turmeric paste to treat wounds and prevent infection. Additionally, kidney, heart, and neurological diseases can be treated with turmeric. An ischemia and reperfusion model of myocardial injury was used to assess the impact of turmeric on myocardial apoptosis and cardiac function.

#### **Chemical constituents of Turmeric:**

The curative qualities of turmeric and its supply of curcumin have long been recognised; however, the capacity to determine the precise mechanism(s) of action and to determine the bioactive components has only recently been studied as follows: [18]. The main herbal polyphenol found inside the rhizome of *Curcuma longa* (turmeric) and other *Curcuma* spp. is curcumin, also known as diferuloylmethane [19]. Due to its antioxidant, antimutagenic, antibacterial,[20,21] and anticancer qualities,[22,23] curcuma longa has long been utilised as a medicinal herb in Asian nations. The curcuminoids, which include curcumin (diferuloylmethane), monodexmethoxycurcumin, and bisdesmethoxycurcumin, are the active components of turmeric. Curcumin accounts for around 90% of turmeric's curcuminoid composition. Proteins, resins, and carbohydrates are other components. Curcumin, which makes up 35.4% of raw turmeric, is the energetic component that has received the most research [24].

Curcumin was initially extracted from turmeric in 1815, and its structure, diferuloylmethane, was identified in 1910. Turmeric: Also referred to as "Haridra" or "Haldi," turmeric comprises moisture (23.1%), protein (6.3%), fat (5.1%), minerals (3.5%), and carbohydrates (69.4%).When rhizomes are steam distillation to produce an essential oil, the following compounds are found: -phellanderene (1%), sabiene (0.6%), cineol (1%), borneol (0.5%), zingiberene (25%) and sesquiterpines (53%)[25]. The primary curcuminoid found in turmeric is curcumin. Turmeric has a yellow colour because of curcumin, which is now known to be the main component behind most of the medicinal benefits. There may be up to 5% curcumin in

turmeric.[26].Its maximum absorption occurs at 425 nm. Turmeric/color curcumin's changes from yellow to deep red when exposed to acidic environments, and the condition in which it is employed in different religious occasions[27].

#### **Benefits of turmeric for skin:**

Turmeric is used in both natural and conventional alternative skincare products.

#### **Turmeric for skin whitening:**

In Ayurveda, turmeric is regarded as one of the most important components for skin whitening. It is believed to lighten dark spots and level out skin tone. Because of this, Hindu weddings continue the custom of covering the bride in Haldi.

These effects are the consequence of turmeric's potent anti-inflammatory and antioxidant ingredients acting together to enhance the skin's natural health. According to a recent study, utilising turmeric-based lotion can lighten skin tone in just three weeks [28].

#### **Turmeric for glowing skin:**

Stress and environmental pollution can make your skin look dark and gloomy. Your skin will be refreshed by the anti-inflammatory and antioxidants in it, bringing out its natural radiance [29].

#### **Turmeric to treat acne:**

Acne is one of the most prevalent problems that everyone deals with at a certain time during their lives. Turmeric can help treat acne. Your skin may become irritated or inflamed as a result of over-the-counter medications, skincare products, or skin treatments.

One of the magical spices that combats acne is turmeric. Turmeric's antibacterial and anti-inflammatory characteristics aid in preventing the bacteria's growth. It lessens the blemish's redness and puffiness[30].

#### **Turmeric to get rid of dark circles:**

Hereditary, lack of sleep, pigmentation, excessive sun exposure, or even rubbing or scratching the eyes are the main causes of dark circles. We are aware that waking up with bothersome, tired-looking under-eye bags may be very distressing.

Due to its anti-inflammatory and lightning properties, turmeric aids in minimising the appearance of dark circles. Additionally, it increases blood flow, which aids in minimising puffiness [31].

#### **Turmeric moisturizes dry skin:**

Your skin will appear dry, dull, and dehydrated. Wintertime conditions might make this dryness more worse. It's crucial to take extra care of your skin in addition to applying thick body lotion all throughout the day.

The skin is deeply hydrated, is nourished, and the removal of dead skin cells is accelerated by this magical element. To soften and moisturise your skin, treat yourself with a mask containing turmeric [32].

#### **Turmeric for preventing early signs of aging:**

Turmeric shields the skin from harmful UV rays, which are the main cause of early ageing. When the skin's natural oils

are gone, it loses its elasticity and begins to develop wrinkles and fine lines. The neck, forehead, and region surrounding the eyes are the first places where premature ageing starts. The significant anti-oxidant effects of curcumin stop the creation of free radicals, which in turn aid in slowing down the ageing process. These antioxidants also guard skin cells against damage[32].

**Turmeric for reducing the appearance of stretch marks:**

Turmeric can help lighten stretch marks on your stomach, arms, or legs, which can be particularly challenging to heal. The antioxidants in turmeric permeate skin and enhance membrane cell performance. Stretch marks become lighter due to this treatment [33].

**Applying natural turmeric face masks:**

The following are the different ways to include the wonderful spice into your skincare regimen to get the desired radiant and blemish-free skin [34-38].

**Table: 2: Home Remedies of Natural Turmeric:**

S.NO.	INGREDIENTS	STEPS
1	<p><b>FOR HEALTHY AND YOUTHFUL SKIN:</b>  <b>Turmeric Milk for skin</b>                      Turmeric and Milk work as a great combination to fight the free radicals that are responsible for damaging your skin. The Alpha Hydroxy Acids (AHAs) present in milk exfoliates the dead cells in the skin and makes the skin moisturized and healthy-looking.</p>	<ul style="list-style-type: none"> <li>• One teaspoon of Turmeric powder and</li> <li>• Two teaspoons of milk</li> </ul> <p><b>Step 1:</b> Mix turmeric powder and milk to make a fine paste.  <b>Step 2:</b> Apply the paste all over the face and neck. Leave it on until it dries.  <b>Step 3:</b> Wash off with cool water for glowing and younger-looking skin.</p>
2	<p><b>FOR PIGMENTATION:</b>  <b>Turmeric and Mustard Oil</b>                      Vitiligo is a skin condition in which the pigment is lost from areas of the skin, causing whitish patches, often with no clear cause. This might cause your skin to appear pigmented and patchy. Turmeric is an effective home remedy for vitiligo. Turmeric along with mustard oil and stimulate the pigmentation of the skin</p>	<ul style="list-style-type: none"> <li>• ½ teaspoon of turmeric powder</li> <li>• Few drops of mustard oil</li> </ul> <p>Apply a mixture of turmeric powder and mustard oil for 20 minutes to the affected area. Do this twice a day for positive results.</p>
3	<p><b>FOR SKIN LIGHTENING:</b>  <b>Turmeric And Lemon</b>                      Turmeric imparts glow, and lemon juice has bleaching properties. When used together, these ingredients help in lightening pigmentation and skin discoloration. The citric acid in lemon also deep cleanses the pores with excess sebum (secretion of the sebaceous gland, which makes the skin look oily), bacteria, and dirt. With regular use of this mask, you will observe your skin becoming more even, clean</p>	<ul style="list-style-type: none"> <li>• One tablespoon of turmeric powder.</li> <li>• A few drops of lemon juice.</li> </ul> <p><b>Step 1:</b> Mix together the ingredients in a bowl to make a smooth paste.  <b>Step 2:</b> Now apply this paste all over the face and neck with a cosmetic brush.  <b>Step 3:</b> Let the paste sit for about 5 to 10 minutes.  <b>Step 4:</b> Rinse off with warm water and pat dry your skin with a clean towel.</p>

	and glowy.		
4	<p><b>FOR GLOWING SKIN:</b>  <b>Curd And Turmeric</b>                      Curd is known to have good bacteria that help in making your skin glow. Curd nourishes your skin from within and is suitable for both dry and oily skin types. Fuller’s earth possesses cleansing, antiseptic and oil-absorbing properties. It will help in enhancing skin elasticity.</p>	<ul style="list-style-type: none"> <li>• One teaspoon Turmeric powder</li> <li>• One tablespoon of Curd</li> <li>• One teaspoon of Fuller’s earth</li> <li>• One teaspoon of Sandalwood</li> <li>• One tablespoon of Rose Water</li> </ul>	<p><b>Step 1:</b> Mix all the ingredients in a bowl and make a smooth paste.  <b>Step 2:</b> Now, apply the paste all over the face and neck. Leave it on for 15 minutes.  <b>Step 3:</b> Later, wash off with cold water. You can apply this mask once a week.</p>
5	<p><b>FOR WELL-NOURISHED SKIN:</b>  <b>Turmeric and Honey</b>                      This Turmeric and Honey mask will help you in getting glowing skin while moisturizing it from the inside. As Honey is considered a natural moisturizer, it soothes and hydrates the skin. It also helps in removing acne marks and inhibiting free radicals from causing wrinkles and fine lines. Turmeric, as we know, brightens up the skin.</p>	<ul style="list-style-type: none"> <li>• ½ tablespoon of turmeric powder</li> <li>• ½ tablespoon of milk and</li> <li>• ½ tablespoon of honey</li> </ul>	<p><b>Step 1:</b> mix all the ingredients to make a fine paste.  <b>Step 2:</b> Apply the prepared pack all over the face and neck. Let it sit for about 10 to 15 minutes.  <b>Step 3:</b> Wash off with lukewarm water and pat dry the face with a clean towel.</p>
6	<p><b>FOR HYDRATED SKIN:</b>  <b>Turmeric and coconut oil:</b>                      Coconut oil is known for skin calming, antimicrobial and anti-fungal properties. It is also an excellent natural skin hydrator that helps in preventing excess sebum production.</p>	<ul style="list-style-type: none"> <li>• 1 tablespoon of turmeric powder</li> <li>• Few drops of coconut oil.</li> </ul>	<p><b>Step 1:</b> Take a bowl and mix the mentioned ingredients into a smooth paste.  <b>Step 2:</b> Apply all over the face and neck after cleansing.  <b>Step 3:</b> Now massage it well in circular motions for a minute.  <b>Step 4:</b> Wipe off after letting it sit for 5 extra minutes.  <b>Step 5:</b> Later, rinse off using a mild cleanser.</p>
7	<p><b>FOR SKIN FIRMING:</b>  <b>Turmeric and Egg white:</b>                      This magical face mask helps in treating certain skin infections. It relaxes and soothes the irritated skin. The astringent in egg whites helps in firming the skin and stops itching. Lemon juice with excellent antibacterial properties keeps the acne-causing bacteria at bay. Being a great source of antioxidants and squalene, almond oil keeps the skin hydrated.</p>	<ul style="list-style-type: none"> <li>• One teaspoon of turmeric</li> <li>• One egg white</li> <li>• ½ teaspoon of lemon juice</li> <li>• Few drops of almond oil</li> <li>• Rosewater for maintaining consistency.</li> </ul>	<p><b>Step 1:</b> Blend almond oil and egg white.  <b>Step 2:</b> Now, add lemon juice and turmeric. Add enough rose water to make a semi-flow mixture.  <b>Step 3:</b> Apply the mixture all over the face and neck.  <b>Step 4:</b> Wait till the mask dries completely and wash off with lukewarm water and a mild cleanser.</p>
8	<p><b>FOR CLEAR SKIN:</b>  <b>Turmeric And Banana Face</b></p>	<ul style="list-style-type: none"> <li>• One teaspoon of turmeric</li> </ul>	<p><b>Step 1:</b> Smash the banana and then add</p>

<p><b>Mask:</b> Banana is an excellent source of many phytochemicals, antioxidants, and moisture that are very important for the skin. While Lectin in bananas kills the acne-causing bacteria, Amino acids nourish the skin and enhance its elasticity. The antioxidants in honey help in shielding the skin from environmental and oxidative damages. It also helps in blackhead removal. You can apply this mask three times a week to keep blackheads and pimples at bay.</p>	<ul style="list-style-type: none"> <li>• powder</li> <li>• ripped banana</li> <li>• ½ teaspoon of honey</li> </ul>	<p>turmeric and honey to it. Mix well into a smooth paste. <b>Step 2:</b> Apply the paste all over the face and neck and let it sit for about 20 minutes. <b>Step 3:</b> Later, wipe it out using cotton and wash it off with lukewarm water.</p>
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**3. TREATMENT OF SKIN DISORDERS:**

**Curcumin for the treatment of psoriasis**

A chronic inflammatory, multisystemic, and multifactorial condition called psoriasis (PsO) affects approximately 3% of the world's population. The clinically present thick, silvery plaques are a result of uncontrolled keratinocyte growth [39].

Curcumin is able to suppress the excessive production of TNF- by activated macrophages [40-44]. Curcumin has been shown to directly bind to the receptor-binding sites of TNF- by covalent and non-covalent interactions, blocking the subsequent TNF-dependent activation of NF- B[45, 46]. It has been also observed that curcumin can inhibit a TNF-promoter by its methylation and is able to impair lipopolysaccharide (LPS) signaling, responsible of the induction of TNF- production, by acting on toll-like receptors (TLRs) 2 and 4 [47-49]. Moreover, curcumin is a non-competitive inhibitor of phosphorylase kinase (PhK), a serine/threonine-specific protein kinase. Levels of PhK in human skin samples taken from patients affected by untreated active psoriasis, resolving psoriasis undergoing topical treatment, and non-psoriatic subjects showed to directly correlate to the activity of psoriasis.

**2. Curcumin for the treatment of atopic dermatitis:**

Atopic dermatitis (AD) is a persistent, itchy, inflammatory skin condition with no known cause that is brought on by a complex interaction of immunological, environmental, and genetic factors [50]. Although it typically begins in early infancy, it also significantly impacts a large number of adults.

The pathogenesis of AD is heavily influenced by an imbalance in the T cell subsets. A switch from the initial Th2 response to a Th1 type-immune response is seen in later phases, with excessive release of IL-1, IL-6, TNF-, IL-12, and IL-18 by recruited monocytes [51]. The early stages are characterised by an abnormal production of cytokines by Th2, such as IL-4, IL-5, IL-13, and IL-31. Curcumin has long

been utilised to treat atopic dermatitis symptoms in Asian nations [52]. A daily application of the herbal extract combination cream Herbavate®, which contains *C. longa*, has been shown in clinical studies to reduce erythema, scaling, thickening, and itching in eczema patients [53]. Following topical use of creams containing curcumin, reports of contact dermatitis and contact urticaria have been made [54-56]. Again, in highly reactive patients like those with atopic dermatitis, observation is advised.

**Curcumin for wound care:**

Treatment of wounds is a therapeutic problem that has a big financial impact on healthcare systems all over the world [57]. The process of healing a wound is intricate and dynamic, involving a series of cellular and molecular actions.

It can be broken down into three steps to make it easier to understand:

- (1) Inflammation and haemostasis,
- (2) Proliferating while granulation tissue is being formed, and
- (3) Remodelling, including scarring and the development of new epithelium [58].

A significant number of neutrophils are attracted to the site of the injury during the inflammatory phase, producing proteases, reactive oxygen species (ROS), and inflammatory mediators such TNF- and IL-1 [59,60]. Through the decrease of TNF-expression, inhibition of nuclear factor-B (NF-B), and disruption of LPS signalling, curcumin can lessen inflammation. Additionally, peroxisome proliferator-activated receptor-gamma (PPAR-) and myeloid differentiation protein 2-TLR4 co-receptor (TLR4-MD2) are two additional signalling pathways through which curcumin exerts its anti-inflammatory actions [61-64]. An important aspect of the aetiology of a chronic non-healing wound is prolonged inflammation, which is greatly influenced by excessive oxidative stress [65, 66]. Although the body naturally produces low levels of ROS during the process of healing a wound, the cellular antioxidant system is unable to control their excessive production, which results in oxidative stress, lipid peroxidation (LPx), DNA damage, and the inactivation of enzymes, including those that scavenge free radicals, which eventually leads to chronic disease [67]. Curcumin can maintain the generation and activity of antioxidant enzymes and their constituents, such as glutathione (GSH), while restoring the redox balance and suppressing transcription factors related to oxidation thanks to the reducing potential of its electron-donating groups [68,69-73]. Additionally, curcumin has been shown to have a protective effect against hydrogen peroxide in vitro in human keratinocytes and fibroblasts [74].

During the proliferative phase, curcumin may have a large impact [75]. In example, studies have shown that curcumin can decrease the activity of membrane matrix metallo-proteinases (MMPs), boost the production of collagen and hydroxyproline, and quicken the maturation of collagen

fibres [76]. Curcumin also shortens the time it takes for wounds to become epithelized and encourages the differentiation of fibroblasts into myofibroblasts, which signals the start of wound contraction [77-81].

Due to the drug's greater accessibility at the wound site, topical use of curcumin appears to have more significant effects on wound healing than oral dosing [82-84].

#### **Curcumin for the treatment of skin aging:**

The Problem of "Inflammaging" Human ageing is a very complicated process that depends on intricate interactions between genetic, environmental, and stochastic factors. It takes place in a complex biological and physiological environment. It has been suggested that the term "exposome" be used to refer to all of the exposures that a person experiences from conception to death, encompassing both internal and external stimuli as well as how the body reacts to these events. Environmental factors have been specifically identified as not clinically obvious infections, UVA and UVB radiation from the sun, air pollution, and tobacco smoke [85]. Many changes happen with aging. Among the most important are changes in the immune response related to stages of cell differentiation and inflammation, understood as low-grade subclinical inflammation, expressed by high levels of elevated levels of inflammatory factors, both of which are promoted by chronic antigenic stimulation [86].

Inflammation is considered to be the basis of most age-related diseases (ARDs). Increased levels of cytokines such as IL-1,2,6,12,15,18,22,23, TNF- and INF have been detected in patients affected by multiple ARDs, such as obesity, metabolic syndrome, diabetes, cardiovascular disorders. And Alzheimer's disease, as well as decreased anti-inflammatory factors such as IL1-Ra, IL-4, IL-10 and TGF- $\beta$  [87]. The release of these cytokines is primarily induced by chronic antigenic stimulation and is maintained by increased ROS production, which is also induced by an inflammatory response to antigenic stimuli. On the other hand, the antioxidant system can be depleted in the context of chronic inflammation, leading to redox state imbalance and prolonged oxidative stress [88]. In this vicious cycle, pathophysiological changes, tissue damage, and healing occur simultaneously. Irreversible cellular and molecular damage without clinical evidence accumulates gradually over decades, eventually leading to skin aging and ARD [89]. Long-lived people, especially centenarians, seem to deal with chronic subclinical inflammation through an anti-inflammatory response, hence the term "anti-inflammatory" [90]. Based on these observations, recent efforts have been made to identify molecules capable of improving our response to subclinical inflammation and preventing cellular damage. Because of its known anti-inflammatory and antioxidant effects, the potential for topical and systemic use of curcumin in the treatment and prevention of skin aging has been investigated, particularly in relation to sun exposure [91]. A clinical study of 28 women in their 30s who investigated the use of an herbal gel containing

turmeric, rosemary, and gotu kola (Tricutan®) to improve signs of photo-aging, reported Significant improvement in skin firmness and overall improvement in skin self-control. Subject. Evaluated after 4 weeks of daily use.

#### **4. CONCLUSION:**

Turmeric, or *Curcuma longa*, is a member of the Zingiberaceae family and has been used as a natural medicine since ancient times. The nutrient value of turmeric is substantial, especially in terms of protein and dietary fibre. Additionally, turmeric is a good source of macro and micronutrients that support the body's regulatory processes and promote good health. It offers a variety of beneficial antioxidant benefits and is also beneficial for illnesses like cancer, ulcers, and inflammation. As a result, it has the ability to combat a number of illnesses like cancer, diabetes, allergies, arthritis, Alzheimer's disease, and other long-lasting and difficult to treat conditions. *C. longa* needs to be the subject of additional research to determine the hidden areas and their useful clinical applications that can be put to use for the benefit of humanity.

Larger clinical studies that could give clinicians reliable information about curcumin safety and the potential clinical benefits of curcumin-containing products to skin health could be conducted if limitations related to curcumin in vivo use, such as low oral bioavailability and metabolism, are bypassed. The creation of innovative delivery systems and the potential use of curcumin in combination with conventional medications offer a very interesting area for future practical study.

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