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THE DYNAMIC DUO OF UNRAVELING & HEALING PROPERTIES OFTURMERIC AND POWER TEA: A REVIEW

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ABSTRACT:
This review delves into the comprehensive healing properties of turmeric and green tea, two natural substances renowned for their extensive use in traditional medicine and culinary practices. Turmeric, scientifically known as Curcuma longa L., has a rich history spanning centuries, revered for its multifaceted benefits in treating ailments ranging from inflammation-related conditions to microbial infections and diabetes. Its bioactive compounds, notably curcuminoids and essential oils, display potent anti-inflammatory, antioxidant, antimicrobial, and wound-healing properties. Additionally, turmeric exhibits substantial potential as a remedy for diabetes owing to its ability to lower blood sugar levels and enhance insulin action.
On the other hand, green tea, derived from Camellia sinensis leaves, offers a wealth ofhealing attributes, primarily attributed to its polyphenolic composition, including catechins like (-)-epigallocatechin-3-gallate (EGCG). EGCG stands out for its pronounced anti- inflammatory, anti-carcinogenic, and antioxidant effects, making it a prominent element inthe therapeutic arsenal of green tea. The intricate mechanisms involving growth factors, gene families such as transglutaminases (TGMs), and the application of compounds like chitosan green tea polyphenols (CGP) complex contribute to the understanding of wound healing processes and the potential therapeutic benefits of green tea derivatives.
Exploring the synergistic effects and complementary attributes of turmeric and green tea compounds unveils a promising landscape in holistic health. Their diverse biological effects, unraveled through scientific investigations, underscore the immense potential of naturalremedies in addressing various health concerns. This synthesis of knowledge highlights the intricate pathways and mechanisms that underpin the healing properties of these natural substances, emphasizing their role in fostering well-being and advocating for further exploration in modern medicine and health interventions.

KEYWORDS:
- Curcuminoids
- Demethoxycurcumin
- Bisdemethoxycurcumin
- Polyphenols
- Terpenes
- Flavonoids
- Wound healing

- Polyphenolic compounds
- Catechins
- Epigallocatechin-3-gallate (EGCG)
- Transglutaminases (TGMs)

INTRODUCTION:

Popularly known as "turmeric," Curcuma longa L., a member of the Zingiberaceae family,has been used in Asia for centuries as a condiment, preservative, flavouring, and colouring aswell as a home cure for a variety of illnesses [1, 2]. Turmeric comes in more than 70 different types that are known, produced, and sold and may have different chemical qualities [3].

Other names for the herb include Curcuma (Sp. It. Fr.), acafrao da India (port.), geelwortel (Dutch), kurkum (Arab), Manjano (East Africa [KiSwahili]), manjal (Tamil), kunyit (Indonesia), temukunyit (Malaysian), and iyu-chin (China)[14-16].

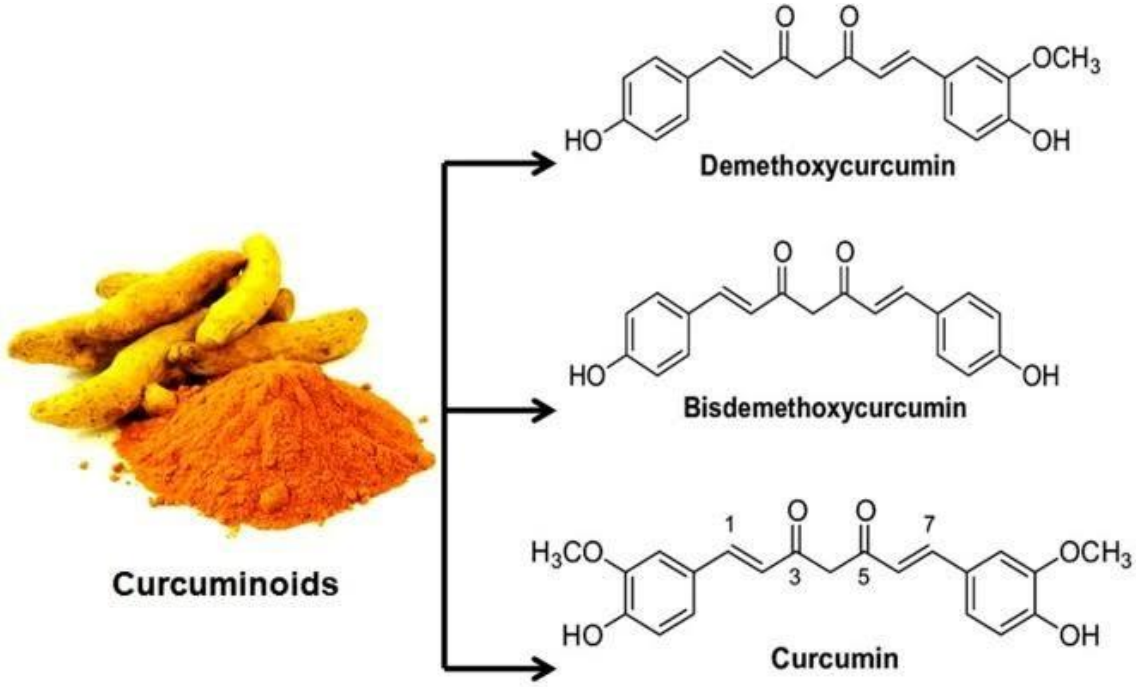
GEOGRAPHICAL SOURCE:

Turmeric is grown around the world in hot climates, but it is mostly grown in India, which is the world's top producer, user, and exporter [4,5]. About 180,000 acres are used to grow turmeric in India, where 25 million tons are produced annually [5]. The plant is exported as dried rhizomes, turmeric powder, oleoresin, essential oil, curry powder, or curcumin to the United States, the United Kingdom, Japan, Iran, the United Arab Emirates, Saudi Arabia, the Netherlands, South Africa, and Singapore [6, 7]. China, Taiwan, Sri Lanka, Bangladesh, Burma(Myanmar), Nigeria, Australia, the West Indies, Peru, Jamaica, and a few other Caribbean andLatin American nations are where it is mostly grown[8]. Turmeric has been used in Asian cuisines for both flavour and colour, as well as in Chinese and Ayurvedic medicine, particularly as an anti-inflammatory and for the treatment of jaundice, menstruation problems, hematuria, bleeding, and colic[9].

CHEMICAL CONSTITUENTS:

1. TURMERIC:

A variety of rich sources of polyphenolic curcuminoids, such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin, were found during phytochemical analysesof the C. longa plant[10]. Approximately 80% of curcuminoids are demethoxycurcumin and bisdemethoxycurcumin; the other components of curcuminoids are protein (6.3%), fat (5.1%), minerals (3.5%), carbs (69.4%), and moisture (13.1%) [11,12].A-phellandrene (1%),
sabinene (0.6%), cineol (1%), borneol (0.5%), zingiberene (25%) and sesquiterpenes (53%) are all present in the essential oil (5.8%) produced by steam distillation of rhizomes[13].



Many studies have demonstrated for years that turmeric is incredibly rich in beneficialphytochemicals with pharmacological properties, such as polyphenols (such as curcuminoids), terpenes (such as - and -turmerone, -zingiber, and -sesquiphellandrene), flavonoids, coumarins, saponins, tannins, and steroids [17-19].

The main curcuminoids are demethoxycurcumin and bisdemethoxycurcumin, which are derivatives of curcumin [17,21,22]. The main bioactive phytochemical in turmeric, curcumin, makes up about 5% of the rhizome. The bioactive substances aromatic-tumerones, -santalene, and aromatic curcumene are also present in essential turmeric oils [23,24]. Curcumin haslimited biomedical applications due to its brief half-life, poor stability, and low bioavailability [25]. However, other approaches are being researched to get over these restrictions, such as employing natural enhancers and creating curcumin delivery methodsthat are capsule-shaped [26,27]. Numerous studies have shown that primary and secondary metabolites in turmeric extracts may increase curcumin's in vivo bioavailability[25,28]. Other phytochemicals, such as quercetin, genistein, terpineol, epigallocatechin-3-gallate, and resveratrol, have demonstrated synergistic benefits when combined with curcumin to increaseits bioavailability [29,30].

HEALING PROPERTIES OF TURMERIC:

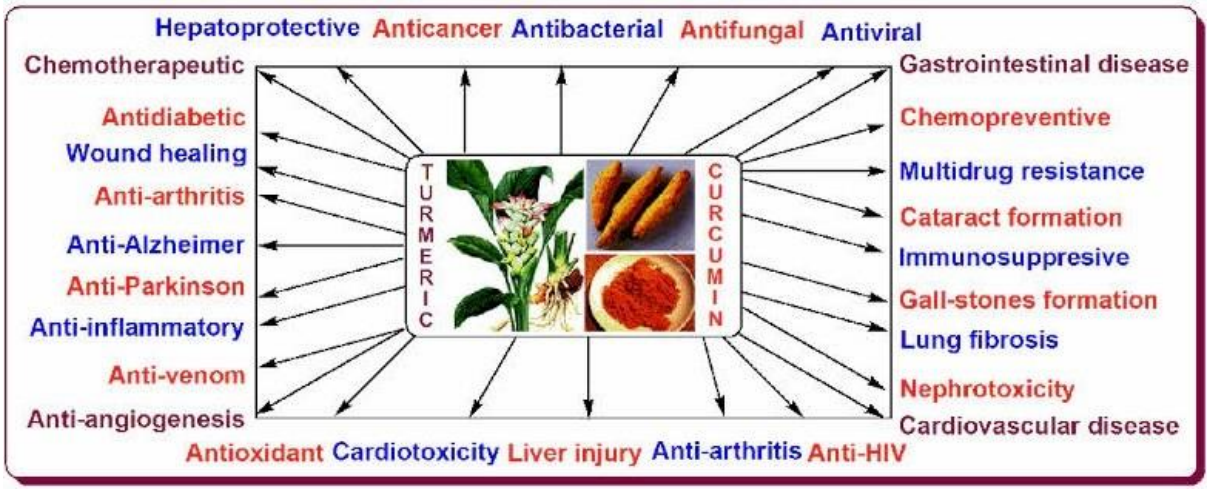
In addition to adding flavor to food, turmeric—also known as the "Kitchen Queen"—hasbeen used as a common domestic cure in traditional medicine to treat a variety of illnesses, such as sinusitis, rheumatism, cough, diabetic sores, biliary disorders, and anorexia. Numerous biological effects of turmeric have been demonstrated. Its anti-inflammatory, antioxidant, anti-mutagenic, anti carcinogenic, anticoagulant, anti-fertility, anti-diabetic, antibacterial, antifungal, anti-protozoal, antiviral, anti-fibrotic, antivenin, antiulcer, hypotensive, and hypocholesteremic properties are a few of these[31,32,33].

Turmeric as First Aid: Due to its anti-inflammatory and anti-microbial properties, studies have demonstrated the hemostatic (capable of stopping bleeding from wounds) and vulnerary properties that make turmeric an excellent wound healer [33,34].In rats and rabbits, turmeric powder has the ability to heal both septic and aseptic wounds [35].

Pain and Inflammation: Inflammation is widely acknowledged as a source of numerous health problems. Turmeric is an excellent anti-inflammatory herb that relieves illnesses such as bursitis, arthritis, and back pain, among others, and it also has a vital function in inflammation [36]. Turmeric's anti-inflammatory activity includes reducing histamine levels and enhancing adrenal gland synthesis of natural cortisol. It suppresses the production of the pro-inflammatory cytokine TNF- and the gene that produces the inflammatory COX-2 enzymes.

Antimicrobial Activity: Turmeric extract and Curcuma longa essential oil suppress the growth of a wide range of bacteria, parasites, and harmful fungi. Antibacterial properties of turmeric rhizome aqueous extract [37]. Curcumin and the oil fraction both inhibit the growthof germs such as Streptococcus, Staphylococcus, Lactobacillus, and others[38]. The extracts ether and chloroform, as well as the oil of C. longa, have antifungal properties[39]. Crude ethanol extract has antifungal action as well [39].

In Diabetes: Turmeric is a significant ingredient in most Ayurvedic diabetes treatments because it lowers blood sugar, enhances glucose metabolism, and more than triples insulin action. Part of the action could be attributed to its chromium content. At relatively low dosages, curcumin inhibits galactose-induced cataract development [40]. Turmeric andcurcumin both lower blood sugar levels in rats with alloxan-induced diabetes [41]. Curcumin also reduces diabetes-related problems caused by advanced glycation end products [42]. [43]



2. POWER TEA :

INTRODUCTION:

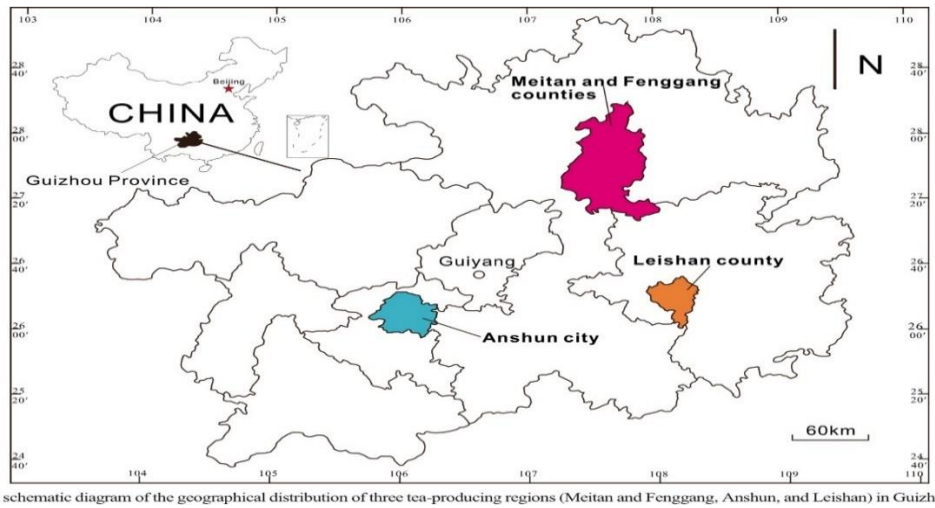
The fragrant beverage known as tea is made by adding hot or boiling water to the fresh or cured leaves of the East Asian evergreen shrub Camellia sinensis, which is said to have originated in the borderlands of northern Myanmar and southwest China[44].Tea is essentially an infusion that is prepared by steeping tea bush leaves, buds, or twigs in hot water for a few minutes. True tea comes in four fundamental varieties: black, oolong, green, and white. Herbal tea is typically referred to as an infusion.

10-to 30% (dry leaf weight) of polyphenols, such as catechins, flavonols, flavanones, phenolic acids, glycosides,and the aglycones of plant pigments, are found in green tea leaves (GTL) (Camellia sinensis L.)[45,46].Although tea ismostly drunk as a beverage, green tea extracts are also used as strong antioxidants to extend the shelf life, enhance flavour, and make food look healthier to consumers[47].

GEOGRAPHICAL SOURCE:

China gave rise to the tea plant, which is today grown throughout the world in many differentnations, including India, Indonesia, Sri Lanka, Kenya, Turkey, Vietnam, Japan, Iran, Argentina, and so on. China is a significant tea producer and exporter.China was the world's largest producer of tea in 2018, with 2.616 million tons produced, and 365,000 tons exported, ranking second globally[48].

Due to their differences between green and black teas, the chemical compounds found in tea leaves are a significant factor in discriminating. When determining the tea's geographical origin, it can be challenging to use these factors as discriminant variables because, forexample, green tea comes from both Japan and China, and black tea is produced in bothChina and India[49].



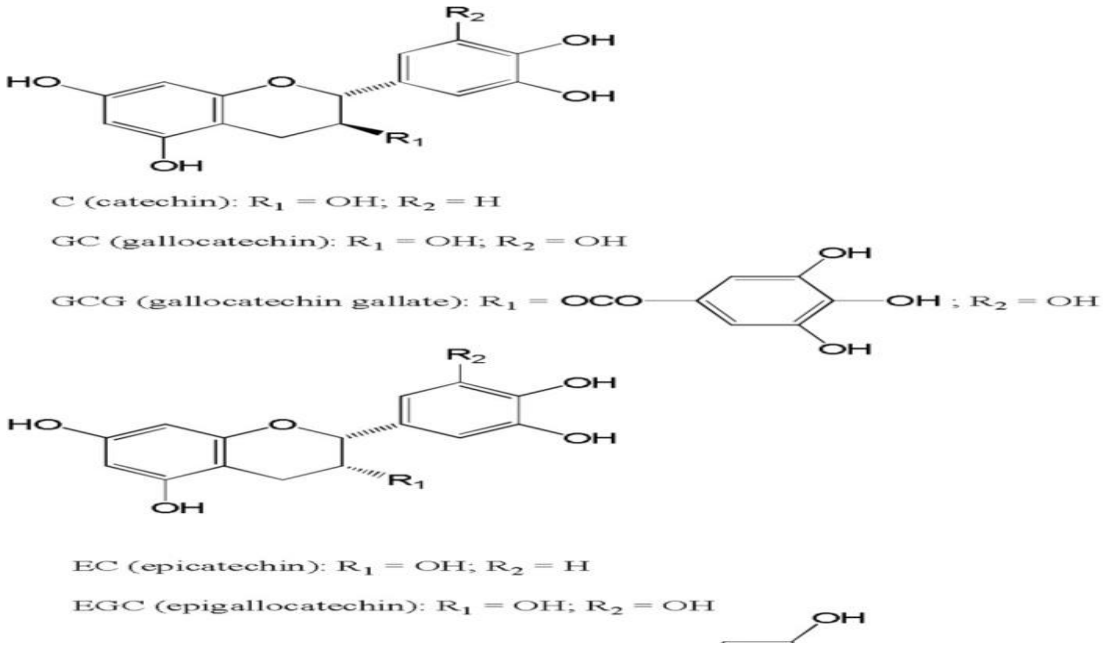
A schematic diagram of the geographical distribution of three tea-producing regions (Meitan and Fenggang, Anshun, and Leishan) in Guizhou, China

Tea is mostly grown in several countries in Central, South, and Southeast Asia, as well as Africa. It

is one of the three most popular nonalcoholic beverages worldwide, along with coffee and coca.One of the most significant agricultural goods in the import and export markets of many nations across the world today is tea.According to statistical data from FAOSTAT (2018), the world's fresh leaf production and planting area are estimated to be approximately 419.3 × 104 ha and 6.3 × 106 t, respectively.In China, the fresh leaf yield and tea planting area are around 2.47 x 106 t and 222.4 x 104 ha, respectively, making up 40.5% and 54.6% of the world's total fresh leaf production and tea planting area.With 4.8 × 104acres of tea cultivation at the end of 2018, Guizhou Province held the top spot in China for four years running [50] .The above schematic diagram shows the location in map[51].

CHEMICAL CONSTTUENT:-

Many studies have been conducted on the chemical makeup of tea leaves. The majority of the compounds found in tea leaves, which make about 25–35% of the dry weight, are polyphenols[52,53]. Flavanols, hydroxyl-4-flavanols, anthocyanins, flavones, flavonols, and phenolic acids are the six primary families of chemicals that make up tea's polyphenol content.



The above are the chemical structure of Chemical constituents[54]. Catechins (flavan-3-ols) are the major and prominent flavanols found in tea polyphenols. They include (-)-epicatechin (EC), (-)-epicatechin gallate (ECG), (-)-epicatechin (EGC), (-)- epigallocatechin gallate (EGCG), (+)-catechin (C), and (+)-gallocatechin (GC)[55-57].

There is 2–4% methylxanthines along with trace amounts of caffeine, theophylline, and theobromine.While there are numerous amino acids in tea, theanine, which is unique to thetea plant, is the most prevalent and makes up half of the total amino acid content. The biosynthesis of the tea fragrance involves the breakdown of amino acids.Although they are not the main ingredients in a tea blend, volatile chemicals, lipids, carotenoids, and chlorophyll all contribute significantly to the aroma's formation[58-60].

HEALING PROPERTIES OF POWER TEA:

Many growth factors have been shown to have positive effects on the healing process in numerous research. Exogenous growth factors have also been used in tests to aid with wound repair[61-64].Epigallocatechin-3-gallate (EGCG) is the most prevalent and has a positive effect on healing among the significant polyphenols found in green tea[65,66].Numerous gene families have new and

distinct roles in wound healing that have been discovered recently through the study of genes that aid in the activation of growth factors. Stabilizing protein assemblies, transglutaminase (TGM) is a gene family comprising structurally and functionally similar enzymes. The papain-like catalytic trio that powers TGMs' Ca2 +-dependent trans-mediating activity catalyzes a variety of events that result in post- translational modifications of proteins[67,68].

An in vitro wound-healing model was used to examine the link between the CGP complex- induced expressions of TGMs and the activation of a differentiation pathway in normal epidermal keratinocytes by chitosan green tea polyphenols (CGP) complex. This work aimsto verify that the CGP complex therapy activates TGMs, in contrast to antioxidant characteristics which may be important in wound healing by starting the proliferative phaseof repair. given that studies on cutaneous damage have shown growth factor up- or down- regulation[69].

Green tea contains epicatechin derivatives, often known as polyphenols, which have anti-inflammatory, anti-carcinogenic, and antioxidant qualities. (-)-epigallocatechin-3-gallate (EGCG) is the main and most potent chemopreventive component of green tea that is in charge of the pharmacological or biochemical actions[70].

CONCLUSION:-

Turmeric, celebrated as the "Kitchen Queen," transcends its culinary charm, boasting a rich history in traditional medicine. Its multifaceted nature reveals an impressive array of biological effects, showcasing a tapestry of healing capabilities. From combating inflammation to exhibiting antimicrobial prowess and aiding in diabetes treatment, turmeric emerges as a powerhouse in holistic health.

The compelling evidence of turmeric's anti-inflammatory, antioxidant, antimicrobial, and anti-diabetic properties underscores its significance across various health domains. Its role as a first aid tool, showcasing its ability to staunch bleeding and accelerate wound healing, further solidifies its reputation as a potent natural remedy.

Moreover, studies unravel additional elements in the healing process, highlighting the influence of growth factors, polyphenols like EGCG found in green tea, and the activation of gene families like transglutaminases (TGMs). The intricate pathways and mechanisms explored in wound healing research shed light on the potential therapeutic benefits of compounds like chitosan green tea polyphenols (CGP) complex and epicatechin derivatives present in green tea, particularly (-)-epigallocatechin-3-gallate (EGCG), renowned for its anti-inflammatory, anti-carcinogenic, and antioxidant properties.

In essence, the exploration of turmeric's diverse healing attributes, alongside the insights gleaned from complementary compounds and genetic studies, underscores the vast potential of natural remedies in fostering health and well-being.

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