



PHARMACOLOGICAL POTENTIAL OF *TARGETES ERECTA*: A REVIEW

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ABSTRACT

Herbal medicines and plants that have medicinal properties are nowadays highly used and very important in the healthcare system. *Tagetes erecta* is one of the important plants that have medicinal properties. *Tagetes erecta* is commonly known as African marigold and in Marathi as jhenduful. Various regions of India have different names for this plant. This paper discusses the medicinal properties and uses of *Tagetes erecta*. Various chemical constituents are present in various parts of the plant. The presence of these chemical constituents is responsible for so much work done on this plant. Various pharmacological activities are reported of this plant such as, anti-inflammatory, antidiabetic, hepatoprotective, antidepressant, and antiepileptic-like major activities. In this paper all information related to the *Tagetes erecta* plant will be

helpful for the researcher to do their study based upon this plant.

KEYWORDS: *Tagetes erecta*, Marigold, Chemical constituent, Pharmacological activities.

INTRODUCTION

Around the world, herbal medicines are becoming more and more popular as people use bioactive compounds derived from plants to treat a variety of illnesses, including cancer and bacterial infections.^[1] The medicinal properties of plants continue to play a significant role within the healthcare system for a significant portion of the world's population. This is particularly true in developing nations where herbal medicine has a long history of use. Both developed and developing countries are seeing an increase in the development and

acknowledgment of these plants' therapeutic and financial benefits.^[2] Throughout human history, natural plant products have been utilized for a number of purposes. Numerous of these naturally occurring compounds have biological activity that may be helpful in the creation of new drugs. The Indian medical school known as "Ayurveda" primarily uses plant-based drugs or formulations to treat a variety of illnesses, including cancer.^[3]

There are roughly 50 species of annual or perennial herbaceous plants in the genus *Tagetes* (family Compositae/Asteraceae).^[4] African marigold, or *Tagetes erecta* L., is among of the most significant flower crops used for commercial purposes and is a member of the Asteraceae family. Out of the 33 species in the genus *Tagetes*, the species *Tagetes erecta* L is most commonly grown for its beautiful blooms. The marigold plant is native from Central as well as South America, particularly Mexico.^[5] This well-known garden plant yields *Tagetes* oil, an intensely fragrant essential oil that is primarily used in the creation of upscale fragrances.^[3] *Tagetes erecta* is an important medicinal plant whose edible flowers are known to have many health benefits due to their bioactive polyphenolic compounds.^[6]

Taxonomical classification

- Kingdom : Plantae
- Division : Magnoliophyta
- Order : Asterales
- Family : Asteraceae
- Genus : *Tagetes*
- Species : *Tagetes erecta*

Common name

- English : Marigold, African Marigold
- Hindi : GendaSanskrit : Sandu
- Marathi : Jenduphule
- Kannad : Chenduhuvu
- Telugu : Banti
- Tamil : Turkamalli

Description

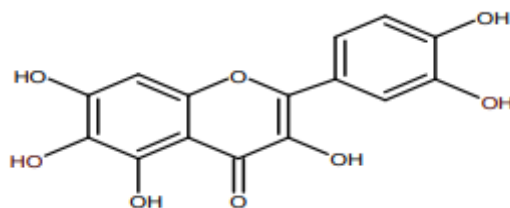
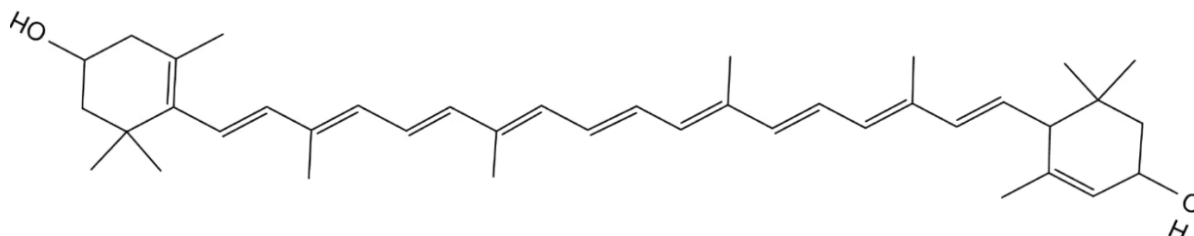
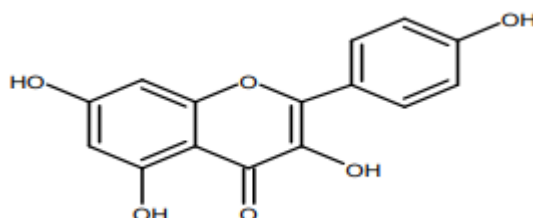
These are fast-growing annual flowering plants that range in height from dwarfs of 6 to 8 inches to medium, taller, and erect plants of 10 to 3 feet. They have a shorter flowering season from midsummer to frost and produce large, pompon-like double flowers up to 5 inches across.^[7] The plant's glossy green foliage is a result of its oppositely arranged, pinnately divided leaves with lanceolate, serrated leaflets. Its large, brightly colored flower heads, which are made up of multiple ray and disc florets and range in color from bright yellow to an intense orange, are its most notable morphological feature.^[8] Tiny hairs cover the leaves and stems, and the leaf margins may be wavy. This plant requires temperatures between 20°C and 30°C, and it produces a lot of flowers each year during the winter and rainy seasons.^[9] Significant genetic diversity is present in marigold, which is essential for breeding initiatives meant to produce better varieties. Because they exhibit high heritability and wide genetic diversity, traits like leaf width, flower weight, and flower diameter are perfect for choice in breeding initiatives.^[10]

Ethnomedicinal uses

Folk medicine uses this plant's various parts, including its flower, to treat a range of illnesses. Leaves are applied to boils and carbuncles, used as an antiseptic, and used to treat kidney problems, muscle aches, and piles. The flower is used in Ayurvedic medicine to treat fevers, epileptic seizures, astringent, carminative, stomachic, liver, scabies, and eye disorders. They are said to purify blood, as well flower juice is used to treat bronchitis, rheumatism, and bleeding piles.^[11]

Chemical constituents

Tagetes erecta L contain various type of chemical constituents. More than fifty compounds belonging to various classes of plant metabolites, including polyphenolic acids, flavonoids, amino acids, and tannins, were found in *T. erecta* flowers. It has been demonstrated that the plant *Tagetes erecta* contains quercetagetin, a glucoside of quercetagetin, phenolics, syringic acid, methyl-3, 5-dihydroxy-4-methoxy benzoate, quercetin, thienyl, and ethyl gallat.^[12] Bithienyls and α -terthienyls are found in *Tagetes erecta* fresh ground root. Using GC/MS, 27 terpenoids are found in *Tagetes erecta* leaf oil.^[13] The plant contains lutein (64–80%) and trace amounts of antheraxanthin, zeaxanthin, crytoxanthin, β -carotene, and roughly fourteen other carotenoids.^[14]

**Quercetagetin****Lutein****Kaempferol**

Pharmacological Activities

Antidiabetic Activity

Antidiabetic activity reported by the author using ethanolic extract of *Tagetes erecta* flowers by maceration extraction process. During the study they used 25 male wistar rat. For the evaluation of the antidiabetic activity they used Alloxane used model and study carried out for 28 days. Alloxane was administered intraperitoneally. As a test drug *Tagetes erecta* ethanolic extract used with the dose of 25 mg/kg, 50 mg/kg and 75 mg/kg of their body weight. Then the blood glucose level is observed in experimental groups with 7th, 14th, 21st and 28th day. According to study Ethanolic extract of *Tagetes erecta* shows dose dependent decrease in blood glucose level.^[15]

Hepatoprotective Activity

The authors used a carbon tetra chloride-induced hepatopathy model to report the hepatoprotective activity in *Tagetes erecta* flowers. Serum ALT, AST, ALP, and bilirubin levels were elevated in the ethanolic extract. When compared to the CCl₄-intoxicated group,

the ethyl acetate fraction of *Tagetes erecta* (EATE) at a dose of 400 mg/kg orally greatly lowered the elevated serum marker enzymes and level of bilirubin to almost normal. With the exception of cytoplasmic vascular degenerations surrounding portal tracts, mild inflammation, and lobular inflammation foci, the histological alterations in the liver of rats given 400 mg/kg of EATE extract and CCl₄ demonstrated an impressive recovery. The observed hepatoprotective action is caused by phytoconstituents like steroids, terpenoids, and flavonoids.^[16]

The authors state that they used an ethanolic extract of *Tagetes erecta* L flowers in wister albino rats to demonstrate hepatoprotective activity. CCl₄ was administered intraperitoneally (i.p.) along with olive oil in a carbon tetrachloride-induced model. Biochemical estimation was done 48 hours after the injection of CCl₄. Hepatoprotective activity is shown by the preparation of flower ethanolic extract.^[17]

Antidepressant and anti-stress Activity

The authors carried out an evaluation of antidepressant and anti-stress activity by using leaves of *Tagetes erecta*. Methanolic extract prepared by Soxhlet apparatus. Adult male mice were used for the study by using the forced swim test, tail suspension test, and anoxic tolerance test. Diazepam was used as a standard drug. The methanolic extract of *Tagetes erecta* leaves with the highest dose shows great potential antidepressant activity as well as antistress activity.^[18]

Anti-Ulcer activity

The authors of this study evaluated the anti-ulcer activity by using the Wistar rats. The ethanolic extract of *Tagetes erecta* flowers was prepared by soaking powder. The ethanol-induced model is used for the evaluation of anti-ulcer activity in which lansoprazole is administered at 10 mg/kg orally. Test drug used in dose manner of 200mg/kg and 400mg/kg according their body weight. Estimation of free acidity and total acidity and serum biochemical analysis was carried out.^[19]

Ulcerative colitis Activity

Ulcerative colitis activity was evaluated by the authors using hydroalcoholic extracts of flowers of *Tagetes erecta*. Male Swiss mice were used for activity in which dextran sulfate sodium induced mice. Oxidative parameters and inflammatory parameters were observed. These are the parameters that show the inflammatory-related relation.^[20]

Antitumor Activity

Antitumor activity, which is evaluated by the authors. The hydroalcoholic extract of *Tagetes erecta* leaves and flowers was used. Antitumor activity was evaluated by the in vitro method. Lung cancer cells were used for the antitumor activity. In which the 550,500 mg/mL dose was used.^[21]

Antiwrinkel Activity

For the evaluation of anti-wrinkle activity, the authors used methanolic extract prepared by cold maceration. From the methanolic extract, a compound was isolated by column chromatography. Isolated compounds were isolated by HPLC analysis. There were three assays used for the determination of anti-wrinkle activity. Hyaluronidase inhibitory assay, elastase inhibitory assay, and assay for MMP-1 inhibitory activity.^[22]

Spasmolytic Activity

This pharmacological activity was done by the authors, in which the *Tagetes erecta* flowers were used for the study. Ethanolic extract is prepared by the maceration extraction process as well as aqueous extract. For the study, adult male guinea pigs were used. Isolation tissue preparation was prepared for the study in which the distal ileum part was used.^[23]

Anti-nociceptive and Anti-inflammatory Activity

The authors have done research on *Tagetes erecta* L. leaves and evaluated anti-nociceptive and anti-inflammatory pharmacological action. For evaluation of this activity, the authors used leaves of *Tagetes erecta* and extraction prepared by the Soxhlet extraction process with hydroalcoholic solvent. For the antinociceptive activity, mice were used, and the activity was performed by using acetic acid-induced writhing and the hot plate model. And anti-inflammatory activity was carried out using rats with carrageenan-induced paw edema. Hydroalcoholic extract of *Tagetes erecta* leaves administered orally in doses of 250 mg/kg and 500 mg/kg according to their body weight. In both activities, the extract shows significant activity.^[24]

Antioxidant Activity

The authors evaluated the antioxidant activity of flowers of *Tagetes erecta*. Flower powder Ethanolic and methanolic extracts were prepared, and by the in vitro method, they were evaluated for antioxidant activity by DPPH radical scavenging activity and ABTS radical

scavenging activity. Total phenolic content, total flavonoid content, non-enzymatic and enzymatic oxidants, and H₂O₂ level were determined.^[25]

Antibacterial Activity

The antibacterial activity of *Tagetes erecta* was evaluated by the authors by using leaf extract in which supernatant was extracted for the activity. For the evaluation of the antibacterial activity, leaf extract was used by the agar well diffusion assay. Antibiotic sensitivity testing is also done. 10 gram-positive and 3 gram-negative microorganisms were used for the activity.^[26]

Antiepileptic Activity

To evaluate the antiepileptic activity, the authors used ethanolic extract of flower. Ethanolic extract used in in vivo models. Various models were used. MES and PTZ induced convulsions like the model used. The study authors reported that an ethanolic extract of flowers showed antiepileptic activity.^[27]

CONCLUSION

Tagetes erecta is a herbaceous plant which have importance in our tradition and also have medicinal important. As per the literature survey and various sources the *Tagetes erecta* L is a plant which have various pharmacological properties due to presence of various phytochemicals. Researchers studying the various phytochemicals, characteristics, and applications of the T. erecta plant will undoubtedly benefit from this review.

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