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A CONCISE REVIEW ON *TARGETES ERECTA*

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ABSTRACT

Medicinal plants have been of great importance to the health care needs of individuals and their communities. The use of herbal preparations made from medicinal plants is widespread in developing countries. The healing powers of traditional herbal medicines have been realized since antiquities. About 65% of the world populations have access to local medicinal plant knowledge system. India is sitting on a gold mine of well-recorded and traditionally well practiced knowledge of herbal medicine. This article discusses about the medicinal values of *Tagetes erecta*. In this communication, we reviewed the pharmacological and phytochemistry of *Tagetes erecta* and its application in the treatment of various ailments like the flower parts of plants are used as a hepatoprotective, insecticide, anti-oxidants and analgesic. This review discusses the investigation made by various workers related to chemical constituents, pharmacological action and toxicological studies of this plant since years till date.

Key words: *Tagetes erecta*, Pharmacological Actions, Toxicological Studies.

INTRODUCTION

Medicinal plants and derived medicine are widely used in traditional cultures all over the world and they are becoming increasingly popular in modern society as natural alternatives to synthetic chemicals [1]. In the last few decades there has been an exponential growth in the field of herbal medicine. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects [2]. At the present juncture, the modern conventional healthcare is burdened with great problems of unsafe medicines, chronic diseases, resistant infections, auto immune disorders and degenerative disorders of ageing, despite great scientific advances. More than 70% of India's 1.1 billion populations still use these non-allopathic systems of medicine [3]. India possesses almost 8% of the estimated biodiversity of the world with around 0.126% million species [4]. The World Health Organization (WHO) estimated that approximately 80% of world population relies mainly on traditional medicines, mostly plant drugs in their health care. Today, Ayurveda coexists with modern system of medicine, and is still

widely used and practiced. About 30% of the currently used therapeutics is of natural origin [5].

Botanical Study

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

Traditional Uses

The leaves are reported to be effective against piles, kidney troubles, muscular pain, ulcers, and wounds. The pounded leaves are used as an external application to boils and carbuncles.

Chemical Constituents

Lutein is an oxycarotenoid, or xanthophyll, containing 2 cyclic end groups (one beta and one alpha-ionone ring) and the basic C-40 isoprenoid structure common to all carotenoids. It is one of the major constituents and the main pigment of *Tagetes erecta*.

Pharmacological Actions

Anti-bacterial Activity

Rhama and Madhavan reported the anti-bacterial activity of different solvents of *Tagetes erecta* flowers against *Alcaligenes faecalis*, *Bacillus cereus*, *Campylobacter coli*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Streptococcus mutans* and *Streptococcus pyogenes*. The flavonoid possesses anti-bacterial activity against all the tested strains and shows maximum zone of inhibition for *Klebsiella pneumoniae* (29.50 mm). The flavonoid-Patulintrin is one of the potential elements for its anti-bacterial activity [6].

Antimicrobial Activity

Ruddock et al reported the anti microbial activity in 19 plants used in Colombian traditional medicine for cutaneous infections, were screened against *Neisseria gonorrhoeae* (NG) by disc susceptibility assay. In all, 71% of the crude extracts exhibited antibacterial activity against the antibiotic susceptible NG strain, whereas 10% of the extracts inhibited penicillinase-producing NG strain GC1–182. The *Tagetes erecta* flower parts showed maximum inhibitory action against NG strain [7].

Anti-oxidant activity

Chivde et al reported the antioxidant studies on the ethanolic extract of *Tagetes erecta* flowers by three different assays like DPPH, reducing power and super oxide radical scavenging activity at different concentrations were used. In all the three assay, *Tagetes erecta* showed better reducing power than the standard (i.e. ascorbic acid), and super oxide anion scavenging activity and DPPH antioxidant activity showed less than standard. However, ethanolic extract of *Tagetes erecta* demonstrated antioxidant property in all the *in Vitro* models [8].

Hepatoprotective activity

Bose et al reported the hepatoprotective activity in flowers of *Tagetes erecta* by carbon tetra chloride induced hepatopathy model. The ethanolic extract showed the increase in serum ALT, AST, ALP and bilirubin levels. Ethyl acetate fraction of *T. erecta* (EATE) at the dose of 400 mg/kg orally significantly decreased the elevated serum marker enzymes and level of bilirubin almost to the normal level compared to CCl₄-intoxicated group. Histological changes in the liver of rats treated with 400 mg/kg of EATE extract and CCl₄ showed a significant recovery except cytoplasmic vascular degenerations around portal tracts, mild inflammation and foci of lobular inflammation. Phytoconstituents such as flavonoids, terpenoids and steroids are responsible for the observed hepatoprotective activity [9].

Insecticidal activity

Nikkon et al reported the insecticidal activity in *Tagetes erecta* flowers against a stored product insect pest, *Tribolium castaneum* (Herbst). The chloroform fraction showed highest toxicity against both the larvae and adults

of *Tribolium castaneum* followed by petroleum ether fraction and ethanol extract. The LC values of chloroform fraction against first, second, third, fourth, fifth and sixth instar larvae were 11.64, 14.23, 19.26, 29.02, 36.66, 59.51 µg/cm² (72 h.), respectively and for adults the value was 65.93 µg/cm² (72 h.). No mortality was observed in control. Finally they concluded that the flower of *Tagetes erecta* might be a pesticide against *Tribolium castaneum* [10].

Mosquitocidal activity

Nikkon et al reported the mosquitocidal activity in ethanolic, chloroform and petroleum ether extracts of *Tagetes erecta* flowers against different instars of *Cx. quinquefasciatus*. Among the tested samples the chloroform soluble fractions showed the highest toxicity and consequently the LC₅₀ values (14.14 µg/mL, 17.06 µg/mL, 36.88 µg/mL and 75.48 µg/mL) for all instar larvae of *Cx. quinquefasciatus*. The larvae showed comparative tolerance in the course of increasing age and time. From this they concluded the flowers of *Tagetes erecta* having good mosquitocidal activity [11].

Nematicidal activity

Husain et al reported the nematicidal efficacy of four medicinal plants viz. *Azadirachta indica*, *Calotropis procera*, *Datura stramonium* and *Tagetes erecta* was ascertained for the control of *M. incognita*. All leaf amendments at different dosages significantly improved the plant growth characteristics of okra and reduced root-knot infections compared with the untreated control [12].

Wound healing activity

Ibrahim et al reported the wound healing activity of carbopol gels prepared from hydro alcoholic extracts of *Gymnema sylvestre* (GE) and *Tagetes erecta* Linn. (TE) in excision wound model and burn wound models in albino mice. In excision and burn wound models, the GE and TE treated animals showed significant reduction in period of epithelization and wound contraction and combined gel showed accelerated wound healing activity may be because of synergism. The enhanced wound healing activity of hydro alcoholic extracts may be due to free radical scavenging action and the phytoconstituents (flavonoids) present in it which either due to their individual or additive effect fastens the process of wound healing [13].

Anti oxidant and Analgesic activity

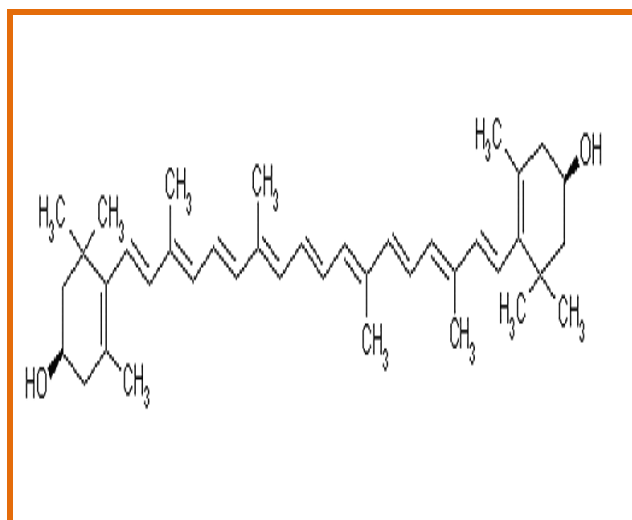
Bashir and Gilani reported the *in vitro* anti oxidant and *in vivo* analgesic activities (acetic-acid-induced abdominal writhing) on flower extracts of *Tagetes erecta*. The results revealed the presence of pronounced antioxidant potential on dose-dependent (100 and 300 mg/kg) and analgesic effect also. The antioxidant and analgesic activities obtained seem to be in good accordance with the medicinal uses of Aztec marigold as an anti-inflammatory and analgesic [14].

Larvicidal activity

Marques et al reported the larvicidal activity of essential oil from *Tagetes erecta* against 3rd instars of *Aedes aegypti* and to determine the amounts of larvicidal thiophenes in all plant tissues. The oil obtained by steam distillation and analyzed by gas chromatography/mass spectrometry showed 14 compounds. The main compounds were piperitone (45.72%), d-limonene (9.67%), and piperitenone (5.89%). The essential oil was active against larvae of *Aedes aegypti*, with LC₅₀ of 79.78 µg/ml and LC₉₀ of 100.84 µg/ml. The larvicidal thiophene contents were higher in the roots and flowers as demonstrated by high-performance liquid chromatography analysis. Thus, *Tagetes erecta* constitutes a good source of varied compounds showing larvicidal activity against *Aedes aegypti* [15].

Figure 1: Flowers of *Tagetes erecta***Sub acute toxicity studies**

Nikkon et al reported the sub acute toxicity studies in chloroform fraction from ethanol extract of *Tagetes erecta* flower by solvent-solvent partitioning method. The sub acute toxicity of chloroform fraction was evaluated on Long Evan's rats at 200 and 400 mg/kg doses and the results obtained from chloroform fraction treated rats were compared with untreated controls. Treatment of chloroform fraction at 200 and 400 mg/kg doses did not make any significant alterations on the hematological and biochemical parameters of rats when data were compared with that of untreated controls. Histopathological examination also showed no detectable changes in liver, kidney, heart and lung of chloroform fraction treated rats. This study revealed that the chloroform fraction of *Tagetes erecta* had no toxic effects [16].

Figure 2: Chemical structure of Lutein**CONCLUSION**

The extensive literature survey revealed that *Tagetes erecta* is important medicinal plant with diverse pharmacological spectrum. The plant shows the presence of many chemical constituents which are responsible for varied pharmacological and medicinal property. The evaluation needs to be carried out on *Tagetes erecta* in

order to uses and formulation of the plant in their practical clinical applications, which can be used for the welfare of the mankind.

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