

Preparation and Evaluation of Antimicrobial Cream Containing Herbs from Local Habital Plants

Nilesh B. Chaudhari¹, Manjusha Jadhav²

Abstract: Skin infections are seen most commonly in India. Dermatophytosis is one of the most frequent skin diseases of mankind. The disease is widely distributed all over the world and more common in men than in women. There are three genera of mould that cause dermatophytosis. These are *Epidermophyton*, *Trichophyton* and *Microsporum* [1, 2]. Traditional medicine have been employed in the management of fungal infections rather than conventional preparations like terbinafine, some of the natural plants includes garlic, lemon grass, datura, acacia, a triplex, ginger, black seed, neem, basil, eucalyptus, alfalfa and basil [3 - 4].

Keywords: *Tridax Procumbens*, *Tagets Erecta* and *Curcuma Longa*. *Epidermophyton*, *Trichophyton* and *Microsporum* [1, 2].

1. Introduction

Herbal plants such as *Tridax Procumbens*, *Tagets Erecta* and *Curcuma Longa*. were selected. Selected plant parts are dried and extracted using alcohol. Quality evaluation of the product was assessed by using different evaluation methods. From the present study it can be is possible to develop creams containing herbal extracts having Antimicrobial property and can be used as the provision of a barrier to protect skin.

Plant Profile

1) *Tridax Procumbens*^{5, 6, 7, 8, 9}



Botanical Description

Taxonomy

Kingdom: Plantae–Plants

Sub kingdom: Tracheobionta–Vascular plants

Division: Spermatophyta

Subdivision: Magnoliophyta–Flowering plants

Class: Magnoliopsida–Dicotyledons

Subclass: Asteridae

Order A: sterales

Family: *Asteraceae*–Aster family

Genus: *Tridax* L. –*Tridax*

Species: *Tridax procumbens* L

Morphological characters

Appearance -

Tridax procumbens is a perennial herb that has a creeping stem which can reach from to 8 - 30 inches (20 - 75 cm) long.

Foliage -

The leaves of *Tridax procumbens* are opposite, pinnate, oblong to ovate, and 1 - 2 inches (2.5 - 5 cm) long with cuneate bases, coarsely serrate margins, and acute apexes.

Flowers -

Tridax procumbens flowers have white rays and yellow disk flowers. They are about 0.4 - 0.6 inches (1 - 1.5 cm) wide, and held on a 4 - 12 inches (10 - 30 cm) long stalk. Flowering occurs in spring. The plant flowers are looking like daisy. The flower is tubular, yellow centered white or yellow flowers with three - toothed ray florets. Inflorescence is capitulum. It has two types of flowers: ray florets and disc florets with basal palcentation. Sometimes the flowers are 3 lobed with long, penduncled heads. Achene's black narrowly obconical, 2.0 - 2.5 mm long with feathery pappus. Flowering - Fruiting throughout the year.

Fruits -

Fruits are achenes that are dark brown to black in color, oblong, and 0.08 inches (2 mm) long, each with a head of pappus bristles that vary from 0.12 - 0.24 inches (3 - 6 mm) long. Fruit is a hard achene covered with stiff hairs and having a feathery. At one end It has plume like white pappus. The plant is invasive in part because it produces so many achenes and each achene can catch the wind in its pappus and be carried some distance.

Seeds -

Tridax procumbens seed germinate at higher temperature (35/25 and 30/20) in the presence of 58 to 78 % light. This is very sensitive to salt concentration and water stress the chromosome number are 36 (diploid) and 18 (haploid) in gametes. The production is through spreading steam and seed production.

2) *Tagets erecta*¹⁰

Tagetes erecta is stout, branching herb, native to Mexico and other warmer parts of America and neutralized elsewhere in the tropics and subtropics including India and Bangladesh.

Kingdom: Plantae

Order: Asterales

Family: Asteraceae

Subfamily: Asteroideae

Class: Magnoliopsida

Division: Magnoliophyta

Genus: *Tagetes*

Species: *erecta*

Vernacular Names

Marathi: Zendu

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Sanskrit: Sandu
 Hindi: Genda
 Punjabi: Tangla
 Bengali: Genda
 Malayalam: Chendumalli
 Gujarati: Guliharo
 Telugu: Bantichettu
 Manipuri: Sanarei
 Urdu: Genda
 Konkani: Gondiphool
 Kannada: Chenna mallige

Chemical Constituents

Phytochemical studies of its different parts have resulted in the isolation of various chemical constituents such as thiophenes, flavonoids, carotenoids and triterpenoids. The plant *T. erecta* has been shown to contain quercetagenin, a glucoside of quercetagenin, phenolics, syringic acid, methyl - 3, 5 - dihydroxy - 4 - methoxy benzoate, quercetin, vinyl and ethyl gallate. 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*.

3) *Crucuma Longa*^{11, 12}



Taxonomy

Kingdom: Plantae
Clade: Tracheophytes
Clade: Angiosperms
Clade: Monocots
Clade: Commelinids
Order: Zingiberales
Family: Zingiberaceae
Genus: *Curcuma*
Species: *C. longa*

Botanical Description:

C. longa is a perennial herb with no stem and rootstock. Their leaves are 1 m long, lanceolate or oblong, dark green from the upper surface and pale green from beneath. The petiole and sheath are about the same length as the blade. Spike makes its appearance before the leaves. Flowers are sterile, pale yellow with a reddish covering, and flowering bract is green with a deep ferruginous purplish color. It has a 2 - m - long, erect leafy shoot (pseudostems) bearing 8–12 leaves and is commonly grown in rural backyard gardens. The rhizomes have a balmy smell and bitter in taste. Turmeric is believed to have originated from South or Southeast Asia, more likely in Vietnam, China, or western India.

2. Objective of the Study

The purpose of the present investigation is to formulate and evaluate a herbal skin cream for Antimicrobial. Herbal plants like *Tridax Procumbens*, *Tagetes Erecta* and *Curcuma Longa* are used for formulation of herbal skin cream for wound healing. Then the formulated cream is evaluated for parameters like physical properties, pH, viscosity, spread ability and stability of the formulated cream. The excipient concentrations are varied in order to find out the best formulation with better spread ability, viscosity, stabilities.

3. Review of Literature

1) *Tridax Procumbens*

• Antibacterial activity:

A study on antibacterial activity by Aniel Kumar O et. al on whole plant and individual parts of *Tridax procumbens* against *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus vulgaris* (Gram - negative), *Bacillus subtilis* and *Staphylococcus aureus* (Grampositive) by agar well diffusion method using ethanolic and methanolic extracts displayed broad - spectrum activity against all the test organisms [13].

• Anti - cancer activity:

Aqueous and acetone flower extract of the traditional plant *Tridax procumbens* were tested on Prostate Epithelial Cancerous Cells PC - 3, determined by measuring cell viability by MTT assay. The inference of the experiments was the cleavage of the soluble yellow coloured tetrazolium salt MTT [3 - (4, 5 - dimethyl - thiazole - 2 - yl) - 2, 5 - diphenyl tetrazolium bromide] to a blue coloured formazan by the mitochondrial succinate dehydrogenase. The assay relies on the capability of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple - blue insoluble formazan precipitate which is then quantified spectrophotometrically at 570nm [14].

• Anti - fungal activity:

This study was designed to evaluate the antifungal potential of alkaloids and flavonoids of different parts (root, stem, leaf and flower) of *Tridax procumbens* L against two pathogenic fungal strains (*Aspergillus flavus* and *Aspergillus niger*) by disc diffusion assay method. Antifungal activity was screened by evaluating Minimum inhibitory concentrations (MIC), minimum fungicidal concentrations (MFC) and total activity of each active extracts [15].

• Antimicrobial activity:

This study was conducted to assess the antimicrobial potential of free and bound flavanoid extracts of pedicle and buds of *Tridax procumbens* Linn against three bacteria (*Escherichia coli*, *Staphylococcus aureus* and *Proteus mirabilis*) and four fungi (*Aspergillus flavus*, *Aspergillus niger*, *Candida albicans* and *Trichophyton mentagrophytes*) by disc diffusion assay method. Minimum inhibitory concentrations, minimum bactericidal/fungicidal concentrations were screened for determination of the antimicrobial potential of the extracts [16].

- **Analgesic and Anti - inflammatory activity:**
V Vinoth Prabhu et. al. investigated the analgesic and anti - inflammatory activity of the aqueous and ethanolic extracts of the plant *Tridax procumbens* by two analgesic and one inflammatory in-vivo pain models using male C57 BL6/J mice (25-30g) and male Sprague-Dawley rats (150-230g). In the formalin - induced pain test, late phase of moderate pain, which starts about 20 min post formalin injection and lasts about 40 min to 60 min, may be caused due to tissue and functional changes in the dorsal horn of the spinal cord [17].
 - **Wound healing activity:**
B. Yaduvanshi et. al investigated the wound healing activity of topical ointment formulation of the leaf juice of *Tridax procumbens* using excision wound model in mice. Excision wounds (4 mm, i. d.) were inflicted on depilated back of mice. Ointment formulation of *Tridax procumbens* (50 mg of either 1 or 4 mg/g) was applied twice daily for 4 days on the dermal wound. Control group was treated with VEGF ointment (50 mg of 1 µg/g). Various parameters like re - epithelization, vascularity, fibroblast number, collagen content were observed. The healing potential of *Tridax procumbens* (1 mg/g) was compared with the control group. The results of this investigation revealed that *Tridax procumbens* possesses dose - dependent pro - healing potential, and its high dose exerts an inflammatory reaction [18]
- 2) **Tagetes erecta:**
- **Mosquitocidal activity**
Mosquitocidal effects of ethanolic extract of flowers of *Tagetes erecta* and its chloroform and petroleum ether soluble fractions against the larvae of *Culex quinquefasciatus* have been investigated. The larvicidal effect of ethanol extract and their solvent fractions were determined by the standard procedure of WHO against different instars of *C. Quinquefasciatus* [19].
 - **Anti - fungal activity**
Fungitoxic activity of the essential oil of leaves of *Tagetes erecta* exhibited complete inhibition of the growth *Pythium aphanidermatum*, the damping off pathogen, at a concentration of 2000 ppm [20].
 - **Anti - cancer activity**
Marigold has long been used as a medicinal herb for a number of therapeutic activities. The cytotoxic activity of ethanol and ethyl acetate extracts of marigold flowers and their inhibitory effects on elastase and tyrosinase enzymes were investigated. An assay was performed to measure the cytotoxicity of these two extracts on the H460 lung cancer and the CaCO2 colon cancer cell lines [21].
- 3) **Curcuma Longa**
- **Anthelmintic activity:**
The hydroalcoholic extracts of *Curcuma longa*, *Zingiberofficinale* and combination of *Curcuma longa* and *Zingiberofficinale* rhizome extracts (1: 1) were evaluated for their anthelmintic activity using *Pheretimaposthuma* model (Indian earthworm). Extracts obtained from both rhizomes not only paralyzed but also killed the earthworms. Among the two drug extracts, *Curcuma longa* showed maximum vermifuge activity at the concentration of 50mg/ml. Combination of hydroalcoholic rhizome extracts of *Curcuma longa* and *Zingiberofficinale* also showed a significant anthelmintic activity. On the basis of the observations, it was concluded that both *Curcuma longa* and *Zingiberofficinale* rhizomes extracts bearing a potential anthelmintic property [22].
 - **Anticancer activity:**
The anticancer activity of turmeric was evaluated prophylactically and therapeutically (as pre induction treatment and post - induction treatment) against the MNU induced mammary tumours. The anticancer activity was assessed using latency period, tumour incidence, tumour burden, tumour volume, tumour growth inhibition, histology and haematological parameters. Oral administration of turmeric showed anticancer activity in a dose dependent manner and it was more in pre - induction treatment than in - post induction treatment groups. Topical application of turmeric was found to be more effective in pre - induction treatment and topical treatment was more effective when compared to oral treatment. Chemopreventive role of turmeric was more compared effective than therapeutic role of turmeric [23].
 - **Ameliorative Effect:**
Curcuma longa and Curcumin were evaluated for ameliorative effects on aflatoxin B1 induced serological and biochemical changes in kidney of mice. Administration of *Curcuma longa* and Curcumin lowered the level of lipid peroxidation and enhanced the antioxidant status of animal. It acts as effective compounds playing an important role in reduction of renotoxicity and hematotoxicity induced by aflatoxin B1 due to its antioxidative property. Curcumin, the major pigment in Curcuminoids of turmeric, is known to protect against AFB1 by inhibiting the biotransformation of AFB1 to aflatoxicol in kidney. Curcumin by scavenging or neutralizing free radicals, interacting with oxidative cascade, quenching oxygen, inhibiting oxidative enzymes like cytochrome P450, and by chelating metal ions like Fe, inhibits peroxidation of membrane lipids and maintains cell membrane integrity and their function. *Curcuma longa* and Curcumin exert its protective effect against aflatoxin B1 - induced toxicity by modulating the extent of lipid peroxidation and augmenting antioxidant defense system [24].
 - **Antibacterial activity:**
Xanthorrhizol, was isolated from the ethanol extract of *Curcuma xanthorrhiza* Roxb., is a sesquiterpene compound with a molecular weight of 218. The antibacterial activity of xanthorrhizol was investigated against foodborne pathogens. The activity was measured in terms of the MIC and the MBC. MICs and MBCs of xanthorrhizol against *Bacillus cereus*, *Clostridium perfringens*, *Listeria monocytogenes*, *Staphylococcus aureus*, *Salmonella Typhimurium*, and *Vibrio parahaemolyticus* were 8, 16, 8, 8, 16, 8 microg/ml and 16, 32, 16, 16, 16, 16 microg/ml, respectively. The bactericidal study, as determined by the viable cell count method, revealed that xanthorrhizol treatment at 4 x MIC reduced viable cells by at least 6 to 8 log for all six

foodborne pathogens in 4 h. Xanthorrhizol maintained its antibacterial activity after thermal treatments (121 degrees C, 15 min) under various pH ranges (pH 3.0, 7.0, and 11.0). These result suggested that xanthorrhizol, conferring strong antibacterial activity with thermal and pH stability can be effectively used as a natural preservative to prevent the growth of foodborne pathogens [25].

- **Antitumour effect:**

A compound was isolated from the rhizomes of *Curcuma zedoaria*, characterized as isocurcumenol by the MS and IR spectra significantly inhibited the cell proliferation in human lung, leukemia, nasopharyngeal carcinoma and murine lymphoma cells. Acridine orange - Ethidium Bromide and Hoechst staining revealed the apoptosis inducing capacity of isocurcumenol. GC - MS profile of the Petroleum ether extract showed isocurcumenol, methyl sterolate, elemene, and Isolongifolene as the prominent chemical constituents. The in vivo studies suggested the non toxic nature of the compound at low doses and its antitumour effects in the ascitic tumour development comparable to the standard drug used to treat lymphoma, cyclophosphamide [26].

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