INTRODUCTION
Ayurveda or herbal medicine has been in practice since long time as one of the basic treatments for cure of various diseases in India. Many indigenous plants have been evaluated and used as a source of many effective and potent drugs against various diseases. Microbial infections represent an important set of ailments challenging human health throughout the world. Researchers have great keenness in screening of medicinal plants for biochemical constituents and antimicrobial activities. The potential new therapeutics used as drugs obtained from plants are mostly secondary metabolites. Major groups of secondary metabolites include phenolics, tannins, alkaloids, flavonoids, steroids and gums.

The bacteriostatic efficacy of crude extracts derived from different parts of Argyrothamnus mexicana has been analyzed and found to be effective against a number of enterobacterial bacteria. New compounds inhibiting growth of microorganisms such as benzoin and emetine, isolated from plants are being commercially produced. Infectious diseases have become the world leading cause for death of more than 50 000 people per annum. The cause for this is the resistance being developed by bacteria against the drugs. Therefore, development of new drugs becomes crucial in curing such diseases and hence the search for new drugs remains to be an active domain of biological research. Tagetes patula L. and Tagetes erecta L. (marigold) belong to family Asteraceae. It is very popular as a garden plant and yields a strongly aromatic essential oil (tagetes oil), which is mainly used in perfumes.

Occurrence of 18 active compounds, most of them terpenoids has been reported from this plants. These compounds are known to exhibit antioxidant, antimycotic, and analgesic activities.

The current study is aimed to compare the phytochemical profile and bacteriostatic activity of partially purified ethanolic leaf & flower extracts of T. patula and T. erecta.

MATERIALS AND METHODS
Preparation of Extract
The leaves and flowers of T. patula were collected in fresh polythene bags from the vicinity of Hooghly district, West Bengal and those of T. erecta were collected from Bangalore, Karnataka. The samples were initially washed in tap water, then with distilled water to remove soil and other contaminants. They were dried on paper towel at 37°C for 72 hours in the laboratory.

50g of dried flower was extracted with 200 ml of 100% ethanol using forced evaporation method. The solidified extracts were stored in refrigerator for further use.

Biochemical Analysis for Detection of Organic compounds
Test for carbohydrates, proteins, lipids, saponins, glycosides, tannins, alkaloids, organic acids, phenolic compounds and flavonoids of all the extracts were conducted by using standard biochemical protocols [Table 1].

Test Micro-organisms
Staphylococcus aureus (ATCC29273), Staphylococcus epidermidis (ATCC12228), Escherichia coli (ATCC8739) and Pseudomonas aeruginosa (ATCC9027) obtained from Department of Microbiology, M. S. Ramaiah Medical College, Bangalore were used for the bioassay experiments. The bacteria were grown on Nutrient agar slants with pH 7±0.2 and incubated at 37°C for 24 hours in an aerobic atmosphere. The tubes were observed for the growth of the organisms and stored at 4°C in refrigerator.

Bioassay on Antibacterial Activity of the Extracts
Bioassay for antibacterial activity was carried out using agar well diffusion method. The partially purified ethanolic leaf & flower extracts of T. patula and T. erecta were dissolved in 1 ml of 0.2 M phosphate buffer. 150 µg concentrations of extract was introduced into the well (3mm depth) using a micro-pipette in Mueller Hinton swabbed agar (MHA) plates. The test organisms (0.5 Macfarland turbidity standards) were spread on the plates. Streptomycin was used as positive control. Sterile distilled water was used as negative control. The culture plates were then incubated in bacteriological incubator for 18-24 hours at 37°C. After incubation period, zone of inhibition was measured and tabulated.
The microorganisms used

**DISCUSSION**

A total of 11 tests were carried out for detection of the phytochemical components present in the plant extracts. Results of the experiments showed the presence of alkaloids, carbohydrates, tannins, phenolic compounds and flavonoids as the major constituents in the extracts. (Table 1)

**Bioassay for Antibacterial Activity of the Extracts**

Results of the antibacterial bioassay are illustrated in Table 2. The zone of inhibition varied significantly depending upon the type of microorganisms. Maximum inhibition of growth was observed in S. aureus followed by S. epidermidis and E. coli for the flower of T. patula. However the extract showed mild inhibitory effect on growth of P. aeruginosa. The zone of inhibition is more for T. erecta flower extract followed by T. patula as compared to other two samples in all the cases against all the bacteria tested. However, the inhibitory effect of the flower extract has reached comparable level to those of standard antibiotics (i.e., Streptomycin) at the concentration of 150µg/ml.

**RESULTS**

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**DISCUSSION**

Biochemical screening of T. patula and T. erecta leaf and flower extracts have indicated the presence of alkaloids, flavonoids, steroids, tannins and phenolic compounds as the major secondary metabolites. Many of these compounds have been reported to have various bioactive properties on living organisms including bacteriostatic or bactericidal action10-12. Earlier investigation on antibacterial activity of T. erecta has identified the flavonoid patulitrin isolated from the flowers of the plant as the active ingredient13. Current study has confirmed the highest antibacterial activity of the flower extract of T. erecta when compared to its leaf extract and leaf as well as flower extracts of T. patula. Therefore, T. erecta flowers can be used as the source for large scale production of the active ingredient.

The microorganisms used for bioassay in the current study are opportunistic pathogens involved in multiple types of human infections and with lot of clinical importance. Treatment against opportunistic pathogens is mainly by administration of antibiotics. Multi drug resistances by a number of pathogens have triggered an urge to find new drugs from natural sources such as medicinal plants. While considering the challenges posed by drug resistant superbugs like MRSA14, identification and sourcing of new antibacterial compounds like patulitrin appear to be of much practical significance in the current clinical scenario. Further research and developmental work is warranted for exploiting this potential natural source for real time use in healthcare system.

**REFERENCES**


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