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To study the antibacterial activity of ethanolic leaf extract of marigold on MRSA

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Abstract

This research was done to determine whether the ethanol leaf extract of marigold (*Tagetes patula*) has any antibacterial effects on Methicillin resistant *Staphylococcus aureus* MRSA was isolated and identified from mastitic samples with acute clinical manifestations. For the purpose of identifying MRSA, 167 clinical mastitic samples were collected and put in various culture media. Out of 167 samples of milk, 11 (22%) were discovered to contain MRSA. The MRSA isolates were then evaluated using the agar disc diffusion method for antibacterial susceptibility at various concentrations of ethanolic marigold leaf extract. The zone of inhibition of MRSA was examined using ethanol leaf extract at various concentrations (5, 10, 15, 20, 25, 30, 35, 40 and 50 mg/ml). The results showed MRSA antibacterial activity at a concentration of 20 mg/ml. At a concentration of 50 mg/ml, the zone of inhibition's mean value was found to be at its maximum.

Keywords: Zone of inhibition, *Tagetes patula*, ethanolic leaf extract, MRSA and antibacterial susceptibility

Introduction

Medicinal herbs have been utilised to cure many infectious diseases since the dawn of humanity. For generations, people have used medicinal plants for their ability to treat illness or heal wounds. In poor nations, 80% of the populace used these medicinal herbs to treat various diseases. In India, Ayurveda or herbal therapy has long been used as a primary form of treatment for a variety of illnesses (Valsaraj *et al.*, 1997) [3]. *T. patula*, often referred to as France Marigold and "jafri" locally, can be found throughout the world. *T. patula* is renowned for treating wounds using popular garden plants and common scented annual herbs. It creates compounds like flavonoids and carotenoids and includes patuletin and patulitrin among its constituents. Alkaloids are among the chemical components of *T. patula* (Faizi & Naz, 2002) [5]. Terpenes, carotenoids, and flavonoids have also been discovered in chemical analyses of *T. patula* flowers and leaves (Prakash *et al.*, 2012 [11]; Guinot *et al.*, 2008 [8]; Faizi *et al.*, 2011a) [10]. The leaves are useful for muscle pain and kidney issues, and the roots and seeds are purgative (Chadha, 1976) [2]. Numerous native plants have been investigated and exploited as a source of numerous powerful and effective drugs against various diseases (Shrivastva *et al.*, 1966) [1]. Evaluation of the antibacterial and antifungal properties of extracts from several *Tagetes patula* sections (Faizi *et al.*, 2008) [9]. Investigated are the antibacterial properties of an ethanol extract of *Tagetes erecta* Linn and *Tagetes patula* Linn's leaves and flowers (Bhat *et al.*, 2012) [12]. *Staphylococcus aureus*, *Enterococcus faecalis*, *E. coli*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa* are said to be susceptible to *T. patula* essential oil (Rondon *et al.*, 2006) [7]. The methicillin-resistant *S. aureus* (MRSA) and methicillin-sensitive *Staph. aureus* (MSSA) were tested for their antibacterial potential using methanolic and ethanolic extract of *Tagetes patula* flower, and the results showed similar methanolic and ethanolic potency with a zone of inhibition at 18 mm at the highest concentrations of the extract tested (50 mg/ml) (Majumdar *et al.* 2014) [13]. Remembering the aforementioned, the current study was conducted to examine the antibacterial activity of *T. patula* ethanolic leaf extract against MRSA.

Materials and Methods

Preparation of ethanolic extract of leaves of marigold

Hydro- alcoholic extract of marigold leaf was prepared for the present study as suggested by Akueshi *et al.* (2002) [4].

Hydro- alcoholic extract of marigold leaf was prepared by dissolving 300 gram of ground leaves in one litre of 70% ethanol kept at room temperature with occasional shaking. After three days, extract was filtered off by using sterile whatman filter paper no.1. (Atata *et al.*, 2003) [6]. The products obtained was poured off in sterile beaker and dried for evaporation of solvent in incubator at 40 °C for three- four days until the semi-solid material is obtained. The semi- solid dried extract was collected and weighed.

Finally, the desired concentration of extract is made by mixing it with normal saline.

Determination of *In-vitro* antibacterial activity of Herbal Extract.

Identified MRSA colony population were used for determination of *in-vitro* antibacterial activity of hydro-alcoholic leaves extract of marigold (in different concentration) were tested on Mueller- Hinton agar.

Results and Discussion

Antibacterial activity of ethanolic leaf extract of marigold (*Tagetes patula*)

The zone of inhibition of various concentrations of ethanolic extracts (5, 10, 15, 20, 25, 30, 35, 40 and 50 mg/ml) were checked against MRSA. The result shown in table represents the mean value of area of zone of inhibition.

Concentration- dependent zone of inhibition against MRSA Isolates.

Table 1: Represents the mean value of area of zone of inhibition

Concentration of the extract(mg/ml)	Mean value Zone of inhibition (mm)
50	17.4
40	15.5
35	11.5
30	9.5
25	6.7
20	5.3
15	0
10	0
5	0

Antibacterial activity of ethanolic leaf extract of marigold on MRSA (*Tagetes patula*)

The zone of inhibition of various concentrations of ethanolic extracts (5, 10, 15, 20, 25, 30, 35, 40 and 50 mg/ml) were checked against MRSA. The result shown in above table represents the mean value of area of zone of inhibition. Results showed that ethanolic extract showed antibacterial activity against MRSA at the concentration of 20 mg/ml. The highest mean value of zone of inhibition was observed at the concentration 50 mg/ml. Our finding is in accordance with Bhat *et al.*, 2012 [12], Majumdar *et al.*, 2014 [13].

Conclusion

The zone of inhibition of ethanolic marigold leaf extracts at different concentrations (5, 10, 15, 20, 25, 30, 35, 40, and 50 mg/ml) was examined against MRSA. Results indicated that ethanolic extract had anti- MRSA activity. The concentration range of 30-35 mg/ml corresponded to a mean value of 10 mm for the area of the inhibition zone. Based on the aforementioned findings, ethanolic marigold leaf extract may be used as an alternate therapy for mastitis caused by MRSA.

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