



EVALUATION OF ANTIBACTERIAL ACTIVITY OF *PEDALIUM MUREX* FRUIT AND ITS INFLUENCE IN DERMATOLOGICAL INFECTIONS

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ABSTRACT

Flavonoids are a major family of secondary metabolites, which are widely distributed in plants and are common constituents of human diet. Flavonoids have a number of biological activities, including antiviral, antibacterial, antiprotozoal and anti-inflammatory, etc. Flavonoids have been recognized as potential natural sources of antimicrobial drugs. They can inhibit the growth and replication of a variety of pathogenic bacteria that cause human illness, such as *Escherichia*, *Gingiva*, *Pseudomonas*, *Staphylococcus*, and *Candida* genera. The antibacterial targets remain largely unknown for most flavonoids. *Pedaliium murex*, called Gokhru, reported to have various pharmacological activities. The fruits of *Pedaliium murex* are rich in flavonoids. Therefore, current study was undertaken to evaluate the antimicrobial activity of various extracts (petroleum ether, acetone, methanol and water) of *Pedaliium murex* against some gram positive and negative organisms which causes dermatological infections. Methanolic and acetone extract of *Pedaliium murex* showed significant antimicrobial activity.

Key words: *Pedaliium murex*, Flavonoids, Antimicrobial activity, Dermatological infections.

INTRODUCTION

Primitive mankind recognized their dependence on nature in both health and illness. Herbal medicine is a major component in all indigenous peoples' traditional medicine and is a common element in Ayurvedic, homeopathic, naturopathic, traditional oriental and native American Indian (Red Indian) medicine. The World Health Organization (WHO) estimates that 4 billion people (80 percent of the world population) use herbal medicine for some aspect of primary health care (Farnsworth et al., 1985).

Pedaliium murex Linn, commonly called Gokhru a member of family Pedaliaceae. It is commonly found in Deccan and in some parts of Ceylon and Gujarat and in the coastal areas of southern India (Nadkarni, 1982). The leaf decoction is used to control white discharge due to

excessive body heat. Root decoction is used as an anti bilious agent, while the juice of the fruit is used as an emmenagogue and to promote lochial discharge (Satyavathi et al., 1987). The decoction of the seeds and glycosides obtained from it showed mild diuretic activity and the alcoholic extract of the fruits reduced blood pressure in dog and rat (Harvey, 1996). The fruits are rich in flavonoids, saponin soluble proteins (Mukherjee, 2002). An infusion extract prepared using cold water from the leaves, stems and fruits of *Pedaliium murex* is demulcent, diuretic and also found to be useful in the treatment of disorders of urinary systems such as gonorrhoea, dysuria, incontinence of urine, etc., (Shukla and Khanuja, 2004).

The bacteria *Staphylococcus* species is an important pathogen involved in pyoderma. Superficial pyoderma is bacterial infections and include-impetigo, superficial folliculitis, pruritic superficial folliculitis, dermatophilus infection etc. Though, a lot of drugs are being tried for skin disease, but some have indicated drug

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resistance. In spite of a lot of drugs coming in the market, which are effective against skin diseases, yet the possibility of getting treatment of skin diseases with a cost-effective drug preparation is yet to be explored. As against the scenario with allopathic drugs, we have the other side with herbal medicines, which are these days gaining significance due to their less cost, ease of use and are considered to be free from risk.

A large number of bacteria and fungi were involved in various skin infections and plants contain phytochemicals to kill bacteria involved in skin diseases (Kar and Kumar, 2010). Plants are the rich source in phytoconstituents. Among the phytoconstituents, flavonoids were responsible in treating various diseases. Flavonoids also exhibit antimicrobial activity. The fruits of *Pedaliium murex* is rich in flavonoids (Cushine and Lamb, 2005), so the current study was undertaken to evaluate the antimicrobial activity various extracts of *Pedaliium murex* fruits against certain gram positive and negative bacteria, which causes dermatological infections.

MATERIALS & METHODS

Collection and Authentication

Fresh plant of *Pedaliium murex* were collected in the month of October from Erode, Tamilnadu. The plant was identified and authenticated by the Scientist F, Botanical Survey of India, Agricultural University, Coimbatore. A voucher specimen (BSI/SRC/ 5/23/2015/Tech/2439) was deposited at the herbarium for further references.

Preparation of Plant Extract

The fruits of *Pedaliium murex* were chopped in to small pieces and shade dried for 7 days. The air dried fruit pieces were ground to coarse powder with mechanical blender. Soxhlet extracts of petroleum ether, acetone, methanol and water were made successively (Raghavendra et al., 2006).

Microorganisms

RESULT

Table 1. Antimicrobial activity of *Pedaliium murex* fruit extract (Pet. Ether, Acetone, Methanol and Water) against some Gram Positive and Negative Organisms.

S.No	Plant Extract	Zone of Inhibition (mm)			
		Gram Positive Organisms		Gram Negative Organisms	
		<i>Micrococcus luteus</i>	<i>Staphylococcus aureus</i>	<i>Pseudomonas aeruginosa</i>	<i>Escherichia coli</i>
1	Pet. Ether	6.71±0.24	8.22±0.12*	9.28±0.32*	8.38±0.29*
2	Acetone	14.04±0.72*	13.21±0.66*	15.39±0.22**	16.66±0.15**
3	Methanol	15.43±0.16**	14.93±0.18*	12.53±0.72*	10.37±0.54*
4	Water	5.22±0.17	4.32±0.22	4.92±0.11	3.89±0.77
5	Ciprofloxacin	23.63±0.43***	25.35±0.72***	28.55±0.55***	26.29±0.35***

*P<0.05, **P<0.01, ***P<0.001 Vs Control

The microbial strains were collected from Microbial Type Cell Culture, Chandigarh, India. Anti bacterial activity was tested against two strains of Gram positive bacteria viz. *Micrococcus luteus* (MTCC 106), *Staphylococcus aureus* (MTCC 3160) and two strains of Gram negative bacteria viz. *Pseudomonas aeruginosa* (MTCC 424), *Escherichia coli* (MTCC 448). All these bacteria are involved in various skin infections (Valia, 2008). The bacteria were sub cultured on nutrient agar slants, incubated at 37°C for 24 hours and stored at 4°C in the refrigerator to maintain the stock culture.

In vitro Antibacterial Assay

The antimicrobial activity of various extracts of *Pedaliium murex* fruit were studied by disc diffusion method (Bauer et al., 1966). Sterile liquid Mueller Hinton Agar media (pH 7.4) was poured into sterile petridish and after solidification, the bacteria (1ml broth of approximately 105 CFU) were swabbed with a sterile needle under aseptic conditions. Sterile discs prepared using Whatman No. 4 Filter Paper, of 5-mm diameter were used in the study. The original solvent in which the extract prepared was used as a control. Test materials were dissolved in the respective solvent to obtain a stock solution of concentration of 100 mg/ml. 10 µL of the solution was loaded per disc to attain a concentration of 1 mg/disc. Ciprofloxacin (5µg/disc) was used as positive control. The discs (including control) were used after drying them in an incubator at 40°C to remove any trace of solvent. Discs were introduced onto the surface of the medium. The plates were incubated at 37°C for 24 hours to obtain inhibition zones. Experiments were conducted in more than three replicates and average inhibitory zone diameter was determined along with standard deviation.

Statistical Analysis

The data of microbial activities were expressed as mean ± SD. One-way analysis of variance (ANOVA) was carried out to determine the significant differences (P <0.05) between the groups using graphPad version 3.

Antimicrobial activity of *Pedaliium murex* fruit extracts against some Gram Positive and Negative Organisms were studied and the results were shown on table 1. Various solvents like petroleum ether, acetone, methanol and water were used as solvents and its antimicrobial activity were compared with ciprofloxacin, reference control. Pet. Ether extract possess equal level of antimicrobial activity against both the organisms. It does not produce significant activity against *Micrococcus luteus*, but it produced significant ($P<0.05$) level of antimicrobial activity against other three organisms. Acetone extract of *Pedaliium murex* showed high level of significant ($P<0.01$) antimicrobial activity against both gram negative organism and less ($P<0.05$) against gram positive organisms. Methanolic extract produced significant antimicrobial activity against *Micrococcus luteus* ($P<0.01$), *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli* ($P<0.05$). Aqueous

extract of *Pedaliium murex* did not show significant antimicrobial activity against any of the tested organisms.

CONCLUSION

Antibacterial activity in relevance to dermatological infections were studied using petroleum ether, acetone, methanol and water extracts of *Pedaliium murex* against two species of gram positive and negative organisms. From the result it was concluded, that petroleum ether extract and acetone extract showed were active against gram negative organisms and methanol extract was active against gram positive organisms. The fruits of *Pedaliium murex* were rich in flavonoids, and it may be responsible for its antibacterial activity. Further studies on the plant to identify and isolate the active flavonoid present in the *Pedaliium murex* may bring out a new lead against the dermatological infections.

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