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ANTIMICROBIAL ACTIVITIES OF *PEDALIUM MUREX* LINN ON MICROBIAL PATHOGENS

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ABSTRACT

The antimicrobial effect of ethanolic and aqueous extract of dried fruits of *Pedalium murex* Linn on bacteria, Bacillus subtilis and fungi, Aspergillus niger were determined using cup and plate method. The ethanolic extract of *Pedalium murex* Linn gave the wider zone of inhibition (1.5cm) in comparison with Standard drug, streptomycin (1.7 cm) against Bacillus subtilis. While inhibition zone (1.3 cm) was recorded for the same organism with aqueous extract compared with Standard drug (1.4 cm). Similarly, the growth of Aspergillus niger was inhibited significantly by ethanolic extract while the aqueous extract was the least effective. The minimum inhibitory concentration (MIC) for the ethanolic extract was 20.0 and 40.0 mg/ml for both bacteria and fungi. This study revealed that the ethanolic extracts showed strong inhibitory effect on the test organisms than aqueous. The results therefore concluded a good support for the use of *Pedalium murex* Linn in folk lore traditional medicine.

KEYWORDS: *Pedalium murex* Linn, Streptomycin, Bacillus subtilis and Aspergillus niger, Antifungal, Antibacterial.

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INTRODUCTION

Pedalium murex Linn is a member of the family Pedaliaceae; it is widely distributed in Sea coastal region of India and some parts of Africa. It is a succulent herb about 15 to 40 cm in height. It mainly consist of flavonoids, alkaloids, gum resins and amino acids. Diosgenin is one of important constituent. It is used as antihyperlipidemic[1], anti arthritic[2] and in gonorrheal rheumatism, as analgesic and anti-inflammatory and also be used locally in apthae. It has high value in the treatment of lithiasis[3]. Traditional doctors in India have claimed to have successfully used the plant to cure many diseases. However, antimicrobial activities of *Pedalium murex* Linn[4] have not been properly documented. In this report, we provide new information on the antimicrobial activities of *P. murex* using known microbial pathogens as test organisms.

MATERIALS AND METHODS

Collection and Selection of Plant Samples

The dried fruits of *Pedalium murex* Linn were collected in the month of November 2009 from Green Pharmacy Garden, Pune, MS, India. It was compared with standard botanical description available with us and the plant material identification, authentication and specimen referencing was done under the guideline of a Botanist. A voucher specimen (TTS PM-23) has been kept in our college museum for future reference. The samples were stored in air tight containers for further analysis.

Test Organisms

Two microorganisms used in this study as test organisms comprising of clinical isolates of bacteria Bacillus subtilis and fungi Aspergillus niger were obtained from the Microbiology Department of JSPMs Charak College of Pharmacy and Research, Wagholi, Pune. MS. India. The typed cultures of bacteria and fungi were sub-cultured on Nutrient agar and Saboraud dextrose agar slants respectively and stored at 4^{o}C until required for study[5,6].

Extraction of Plant

About 300 g of the dried fruits were ground to fine powder using Laboratory Hammer mill. The powdered material of *Pedalium murex* Linn was extracted separately by continuous hot extraction process using soxhlet apparatus with ethanol (90%) and aqueous

extract[7]. After extraction, the extracts were concentrated under reduced pressure. The powder was stored in air and moisture tight container which was stored in a dessicator prevented from direct heat and sunlight[8].

Antimicrobial Test

The antibacterial and antifungal activities of aqueous and ethanolic extract were determined by cup and plate method.

Cup and plate Method

Sterilized the Nutrient agar and Saboraud agar medium by autoclaving and prepared Petri plate in laminar air flow. Spread the entire test microorganism on the surface of Petri plate[9]. By using flame sterilized cork borer, prepare 5-6 cups (cavities) in each plate keeping adequate distance from each other. Standard and test diluted solutions (0.1-0.2) are added in each labeled cavity of plate. The plates then kept in refrigerator for proper diffusion of antibiotics at 4^0C for 1-2 hours. Incubated all the plates in incubator for 24-48 hours at 37^0C.The zones of inhibition were measured and recorded[10].

Minimum Inhibitory Concentration

Different concentrations of the dried fruits of *Pedalium murex* Linn were prepared to obtain 20 mg/ml, and 40 mg/ml. Two-three drops of overnight broth culture of the test organisms were inoculated into the dilutions and incubated at 37^oC for 24 hours [11]. The lowest concentration of the extracts that inhibited the growth of the test organisms was recorded as the minimum inhibitory concentration (MIC)[12].

RESULTS AND DISCUSSION

The results obtained showed that dried fruits of *Pedalium murex* Linn have bactericidal effects on pathogenic microorganisms. Based on the ethno pharmacology literatures, various extracts *P.murex* Linn were screened for its anti-microbial activity against Bacillus subtilis and Aspergillus niger using cup and plate method. Table 1 showed that ethanol was the best solvent for extracting antimicrobial substances from this plant than water. The aqueous and ethanolic extract of standard drug showed 1.2cm and 1.4cm zone of inhibition respectively against Bacillus subtilis whereas the aqueous and ethanolic extract of *Pedalium murex* Linn showed 1.1cm and 1.2cm respectively. Similarly against Aspergillus species aqueous and ethanolic extract of standard drug showed 0.9cm and 1.3cm zone of inhibition respectively whereas the aqueous and ethanolic extract of *Pedalium murex* Linn showed 1.0cm and 1.15cm respectively. Thus, aqueous and ethanolic extract of *Pedalium murex* Linn showed moderate antimicrobial activity as compared to standard drug, Streptomycin in table no.1.

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REFERENCES

1. Balasubramanian, Mukundh N, Muralidharan P, Balamurugan G. Anti Hyperlipidemic Activity of *Pedalium murex Linn* Fruits On High Fat Diet Fed Rats. Int. J Pharmacol 2008; 4: 310-313.
2. Muralidharan P, Balamurugan G. Analgesic and Anti Inflammatory Activity of Aqueous Extract of *Pedalium murex Linn*. Biomedicines 2008; 28: 84-87.
3. Shelke TT, Adkar PP, Juvale KC, Kambale BB, Oswal RJ. Nephroprotective Activityof Ethanolic Extract of Dried Fruits of *Pedalium murex* Linn. J. Cell Tissue Research 2008; 9 (1):1-4.
4. Irvine FR. Woody plants of Ghana, Oxford University Press; London. 1961.p 48-50.
5. Kokare CR. "Pharmaceutical Microbiology Experiments & Techniques", 2nd Ed., Career Prakashan, 204-206.
6. Saravanan R, Ghouse BM, Amzad BK, Vivekanandan L, Ex Situ Culture Studies On A Medicinal Plant *Pedalium Murex Linn*., I J Plant Physiol, 2007; 12(2): 178-180.
7. Harbourne JB. "Phytochemical Methods A Guide to Modern Techniques of Plant Analysis", 2nd Edition, Chapman and Hall, London, 1984; 114-120.
8. Kokate CK, Purohit AP and Gokhale SB. "Pharmacognosy" 1st Edition, Nirali Prakasan, Pune, 1990; 123.
9. Mukherjee KL. Medical Laboratory technology.Vol.2.New Delhi Tata McGraw Hill Publishing Company; 1988; 616-17.
10. Hugo WB, Russell AB. Pharmaceutical Microbiology.4th edition. London: Blackwell scientific publication; 1987; 265-70.
11. Hirasawa M, Shoujii N, Neta T, Fukushinma K, Jakada K. Three kinds of antibacterial substances from Lentinus edobes (Berk) Sing. Shitake,on edible mushroom. Int J Antibacterial agent 1999; 11: 151-157.
12. Omenka CA, Osuoha JO. Antimicrobial potency of Grapefruit seed extract on five selected pathogens. N J Microbiol. 2000; 14 (2): 39-42.

Table 1: Antibacterial and antifungal Properties of *Pedalium murex* Linn using Cup and plate Method

Species	Extracts	Conc (mg/ml)	Diameter of inhibitory Zone (cm)	
			Standard	**Test**
Bacillus subtilis	Aqueous	20	1.1	0.9
		40	1.4	1.3
	Ethanolic	20	1.2	1.0
		40	1.7	1.5
Aspergillus niger	Aqueous	20	0.9	0.8
		40	1.0	1.2
	Ethanolic	20	1.1	0.9
		40	1.6	1.4

Standard Drug: Streptomycin. **Test drug:** *Pedalium murex* Linn Extracts
Test Organisms: Bacillus subtilis and Aspergillus niger

Anti-Microbial Activity

Anti-bacterial Activity

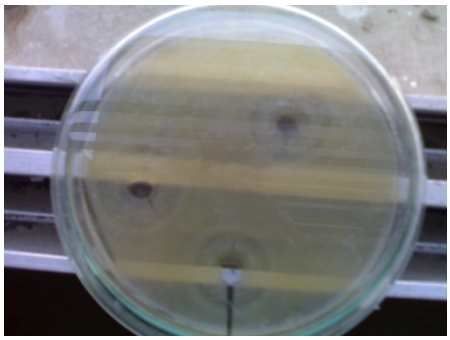

Fig.1 (a) Anti-bacterial activity of Streptomycin.

Fig.1 (b) Anti-bacterial activity of Aqueous extract.

Fig.1(c) Anti-bacterial activity of Ethanolic extract.

Anti-fungal Activity

Fig.2 (a) Anti-fungal activity of Streptomycin.

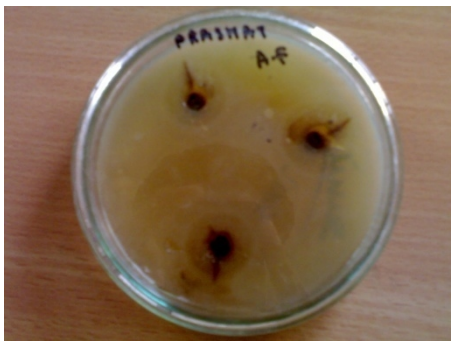

Fig.2 (b) Anti-fungal activity of Aqueous extract.

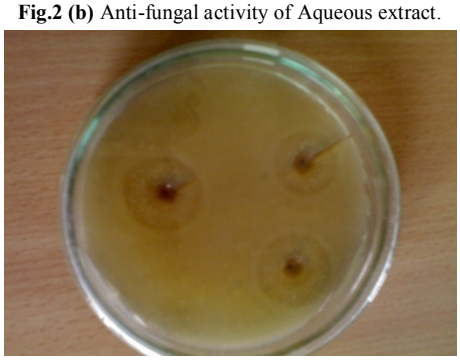

Fig.2 (c) Anti-fungal activity of Ethanolic extract.

Figure: 1. (a, b, and c).
Kinetics of antimicrobial activities of a) streptomycin, b) ethanolic and c) aqueous extracts of *Pedalium murex* Linn against *Bacillus subtilis.*
Figure:2. (a, b, and c).
Kinetics of antimicrobial activities of a) streptomycin, b) ethanolic and c) aqueous extracts of *Pedalium murex* Linn against *Aspergillus niger.*

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