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ANTIMICROBIAL ACTIVITY OF PLANT EXTRACT OF *CYCLEA PELTATA* IN TOPICAL PREPARATIONS

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ABSTRACT

The present study was under taken to evaluate *in vitro* antimicrobial activity of the successive leaf extracts of *Cyclea peltata* against various gram positive and gram negative bacterial strains using zone of inhibition. Disc diffusion method was used to evaluate the anti bacterial efficacy. The various strains were used for antibacterial examination such as *E.coli, Staphylococcus aureus, Bacillus subtilis, Salmonella typhi. Aspergillus nigrum* was used to evaluate the antifungal potential of the said plant extract. The reference antibiotics Gentamycin (antibacterial) and clotrimazole (antifungal) were also used to compare with that. The present research has been undertaken with the aim to evaluate the herbal ointment containing plant extract of *Cyclea peltata* have the antibacterial properties. Phytochemical screening of *Cyclea peltata* reveals the presence of alkaloids, glycosides, carbohydrates, saponins, tannins and phenol. The ointment was prepared by levigation method using ointment base. The physiochemical parameters of formulation such as pH, homogeneity and spreadability were determined. The *Staphyllococcus aureus* was more susceptible to the plant.

INTRODUCTION

The antibacterial activity have been screened in many plants because of its great medicinal relevance with the recent years, infections have increased to a great extent and resistant against antibiotics, become an ever increasing therapeutic problem. Due to the indiscriminate application of antibacterial drugs most of the microbial organisms have developed high resistance to a good number of the commercial antibiotics [1]. This coupled with other problems like the dangerous side effects of some commercial antibiotics have led the scientists to think of other alternatives like new antimicrobial substitutions from other sources especially medicinal plants. The presence of antimicrobial substances in the higher plants is well established fact and they provided a source of inspiration for novel drug compounds as plant derived medicines have made significant contribution towards human health [2]. According to World Health Organization (WHO), medicinal plants would be the best source to obtain a variety of drugs. Therefore, such plants should be investigated to obtain a thorough knowledge about their properties, safety and efficacy.

This study describes the antibacterial properties of *Cyclea peltata*. It is a member of family Menispermaceae, commonly known as 'Padathaali' or 'Padakkilangu'. The plant grows throughout India and Sri Lanka, up to 800-900m elevation. It is a slender twining shrub, frequently climbing up on tall trees and has tuberous roots. The flowers are yellowish in colour with drupaceous fruits and it has antipyretic and astringent properties. The roots of

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Cyclea peltata is also used to treat jaundice and digestive disorders. The plant is also used against malarial disease [3].

Pharmacological study of *Cyclea peltata* was carried out by Kupchan and isolated d-tetrandrine, di-tetrandrine, dischondrodendrine and fangchinoline from the roots and found these compounds have activity similar to that seen with d-tubocurarine. In another study, isolated five bisbenzyl isoquinoline alkaloids from the roots of the plant. The pleasant investigation was carried out to test the antibacterial efficacy of the whole plant extract of *Cyclea peltata* against some pathogenic bacterial strains [4].

Antifungal drugs are used to kill or prevent further growth of fungi. In medicine they are used as a treatment for infections such as athlete's foot, ringworm and thrush and work by exploiting difference between mammalian and fungal cells. They kill off the fungal organism without dangerous effects on the host. Unlike bacteria, both fungi and humans are eukaryotes [5]. Thus, fungal and human cells are similar at the molecular level, making it more difficult to find a target for an antifungal drug to attack that does not also exist in the infected organism.

Generally, the fungal infections are the most common cause of many skin diseases in developing countries. Opportunistic fungal infections, mainly resulting from the species of *Candida*, *Cryptococcus* and *Aspergillus* are life-threatening in immune compromised patients (with AIDS, cancer, or organ transplant). Due to the increasing number of individuals of this category, fungal infections have increased in the last two decades, affecting millions of people worldwide. Using of synthetic chemicals for controlling these skin diseases is not ecofriendly and they are not providing environmental security. Therefore, it is necessary to search for more effective and less toxic novel antifungal agents that would overcome these disadvantages. Interestingly, plants are widely employed in folk medicine, mainly in communities with inadequate conditions of public health and sanitation. The antimicrobial compounds produced by plants are active against plant and human pathogenic microorganisms. Several medicinal plants have been extensively studied in order to find more effective and less toxic compounds.

MATERIALS AND METHODS

Collection & Authentication of Plant Material

The plants were collected in the sides of rice field from Varandarappilly, Thrissur and authentified (Coll.No.GCP-0104-2015) by Leena, Assistant Professor Dept. of Botany, Govt. Victoria College, Palakkad. The leaves and roots were washed with tap water and dried under shade for about 20-25 days and made to coarse powder and stored in a container for further studies.

Extraction of active ingredients

Leaves and roots for extraction were powdered separately. The powdered parts of the roots and leaves of *Cyclea peltata* were packed in the soxhlet extractor and extracted with 99% ethanol. Both roots and leaves were extracted separately.

Phytochemical screening of the plant extracts

Phytochemical screening of the leaves of *Cyclea peltata* was performed in order to detect the bioactive components. The plant *Cyclea peltata* containing phenol, tannins, alkaloids and saponins are the common active.

Antimicrobial Study

Mix required quantity of micro organism (*Bacillus subtilis, E.coli, Staphylococcus aureus, Salmonella typhi)* to liquefied Nutrient Agar medium at a temperature between 40-50°c and immediately poured the inoculated medium into petridishes. The layer of medium was in uniform thickness; the plate or dishes were kept in a leveled surface. When the surface of agar was dry, disc dipped in the control, standard and the test (drug) solution were placed on the surface one by one [5]. The entire work was done using the horizontal laminar flow hood so as to provide aseptic condition. It was then incubated at (25°) for 24-48 hours. Observations were made zone of growth inhibition around the disc and compared with that of Gentamycin as standard, plant extract dissolved in ethanol as test. Ethanol is used as control.

Anti fungal activity

By using L-rod spread the fungi (*Aspergillus nigrum)* on the surface of SDA medium. When the surface of agar layer was dried, disc was dipped in to the control, test and standard solution and placed on the surface of agar layer and the plate was allowed to incubate at 25°c or 24-48hrs. Observation was made for zone of inhibition around the disc containing the drug and compare with that of Clotrimazole as standard. Plant extract was dissolved in ethanol and is used as test. Ethanol is used as control.

FORMULATION OF HERBAL OINTMENT

Preparation of simple ointment base

Mix the wool fat, cetosteryl alcohol, hard paraffin and white soft paraffin in a china dish then, heat the mixture gently with stirring until homogenous mass produced and stir continuously until cold.

Formulation of herbal ointment

The extract is placed in the centre of the slab and mixed with small quantity of simple ointment base by rubbing with stainless steel spatula. Then it is levigated with remaining quantity of base thoroughly and packed in a container [6].

EVALUATION OF OINTMENT

Organoleptic parameters

Organoleptic parameters like colour, odour and consistency of all the formulations were checked

Determination of pH

The pH value of the solution was determined by digital pH meter (Mettler Toledo). First the apparatus was calibrated using buffer of 4, 7, and 9 pH. The electrodes were immersed in the solution and the pH was measured.

Homogeneity

All the developed ointments were tested for homogeneity by visual inspection. They were tested for their appearance.

Determination of spreadability

For the determination of spreadability excess of sample was applied in between two glass slides and was compressed to uniform thickness by placing 1000gm weight for 5 minutes. Weight was added to the pan. The time required to separate the two slides, i.e. the time in which the upper glass slide moves over the lower plate was taken as as measure of spreadability [7].

$S = m \times L/T$

Where, m = weight tide to upper slide

L = length moved on the glass slide

T = time taken

RESULT AND DISCUSSION

The herbal ointment of *Cyclea peltata* was prepared and evaluated the various parameters. The soft semisolid ointment has characteristic odour with green in colour. The pH was found to be 6-7 and was compatible with the skin secretions. The formulated herbal ointment showed good homogeneity with absence of any flocculate or lumps. The spreadability was found to be 10g/cm.

The plant extract of *Cyclea peltata* showed comparatively higher zone of inhibition toward the gram positive bacteria *Staphylococcus aureus* and is more susceptible to the plant extract. The zone of inhibition of gram negative bacteria and gram positive bacteria is given in the table 3 and 4 respectively. Anti fungal activity carried out and the plant extract do not show any significant antifungal activity.

Table 1. Phytochemical screening of the plant extracts

S.No	Chemical constituents	Inference
1	Alkaloids	+ve
2	Flavanoids	-ve
3	Carbohydrate	+ve
4	Glycosides	+ve
5	Tannins	+ve
6	Steroids	-ve
7	Proteins	-ve
8	Saponins	+ve
9	Phenol	+ve

Table 2. Formulation of *Cyclea peltata* herbal ointment

S No	Ingredients	Working formula(20g)
1	Wool fat	1gm
2	Hard paraffin	1gm
3	Cetosteryl alcohol	1gm
4	White soft paraffin	16gm
5	Extract of *Cycleapeltata*	1gm

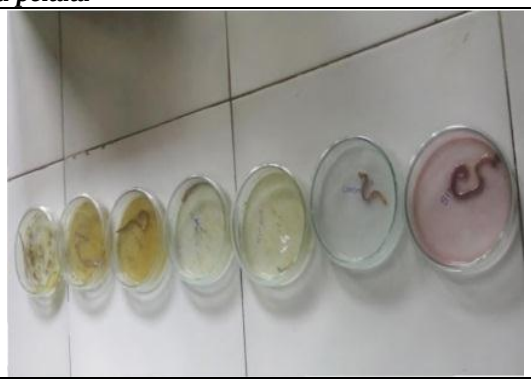
Table 3. Zone of inhibition of different bacteria (Gram negative bacteria)

S No	Organism used	Sample	Zone of inhibition(cm)	
			Test	Standard
1	*E.coli*	*Cyclea peltata*	2	2
2	*Salmonella typhi*		1.3	2.1

Table 4. Zone of inhibition of different bacteria (Gram positive bacteria)

S No	Organism used	Sample	Zone of inhibition(cm)	
			Test	
1	*Staphylococcus aureus*	*Cyclea peltata*	2.2	1
2	*Bacillus subtilis*		2.1	2

Fig 1. Leaves of *Cyclea peltata*



CONCLUSION

Traditionally used medicinal plants produce a variety of compounds of known therapeutic properties. In recent years, antimicrobial properties of medicinal plants are being increasingly reported from different parts of world [10]. The study observed a significant inhibition of growth of bacteria. In this study the herbal ointments were prepared and various parameters were evaluated. The formulation shows good spread ability, homogeneity and pH and also the formulation found to be non-irritant in nature. The leaf extract was used for the preparation of herbal ointment. The formulation exhibit significant antibacterial activity and the leaf extract of plant can be recommended for further studies and for the effective treatment of skin infections.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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CONFLICT OF INTEREST

No interest

REFERENCES

1. Pandey A, Mishra R. (2011). Antibacterial properties of *Aegle marmelos* leaves, fruits and peels against various pathogen. *Journal of Pharmaceutical and Biomedical Sciences*, 13(13), 1-6.
2. Odimegwu D, Ibezim DC, Esimone EC. (2008). Wound healing and antibacterial activities of the extract of *Dissotis theifolia* (Melastomataceae) Stem Formulated in a Simple Ointment Base. *J Medicinal Plant Res*, 2(1), 011-016.
3. Hullatti KK, Gopikrishna UV, Kuppast IJ. (2011). Phytochemical investigation and diuretic activity of *Cyclea peltata* leaf extracts. *Journal of Advanced Pharmaceutical Technology & Research*, 2, 241-244.
4. Jyothi A and Dennis TT. (2012). Antibacterial activity of medicinal plant *Cyclea peltata* (Lam) Hooks & Thoms. *Asian Pacific Journal of Tropical Disease*, S280-S284.
5. Abhijeet P, *et al*. (2012). formulation and evaluation of anti- bacterial and anti- fungal activity of a herbal ointment containing Aloe-Vera, *Azadirachta indica* and *Curcuma longa. Journal of chemical and Pharmaceutical Research*, 2(3), 23.
6. Pulak M, *et al*. (2013). Preparation and characterization of some herbal ointment formulations with evaluation of Antimicrobial property. *Indian journal of research in pharmacy and biotechnology*, 1(3), 45.
7. Himal PC. (2010). Formulation and Evaluation Of antimicrobial herbal ointment, *Journal of Science Engineering and Technology*, 6(1), 102-107.
8. Dhanaraj TS, Murugaiah K, Jegadeesan M. (2011). Phytochemical analysis and antimicrobial activity of *Aegle marmelos* (L.) *Corr. Herbal Tech Industry*, 7-10.
9. Sivaraj R, Balakrishnan A, Venckatesh R. (2011). Preliminary phytochemical analysis of *Aegle marmelos, Ruta graveolens, Opuntia dellini, Euphorbia royleana* and *Euphorbia antiquorum*. *International Journal of Pharmaceutical Sciences and Research*, 2(1), 132-136.
10. Pandey A, Jagtap JV, Patil AA, Joshi RN, Kuchekar BS. (2010). Formulation and evaluation of antibacterial and antifungal activity of a herbal ointment containing Aloe-Vera, *Azardirachta indica* and *Curcuma longa*. *Journal of Chemical and Pharmaceutical Research*, 2(3), 182-186.