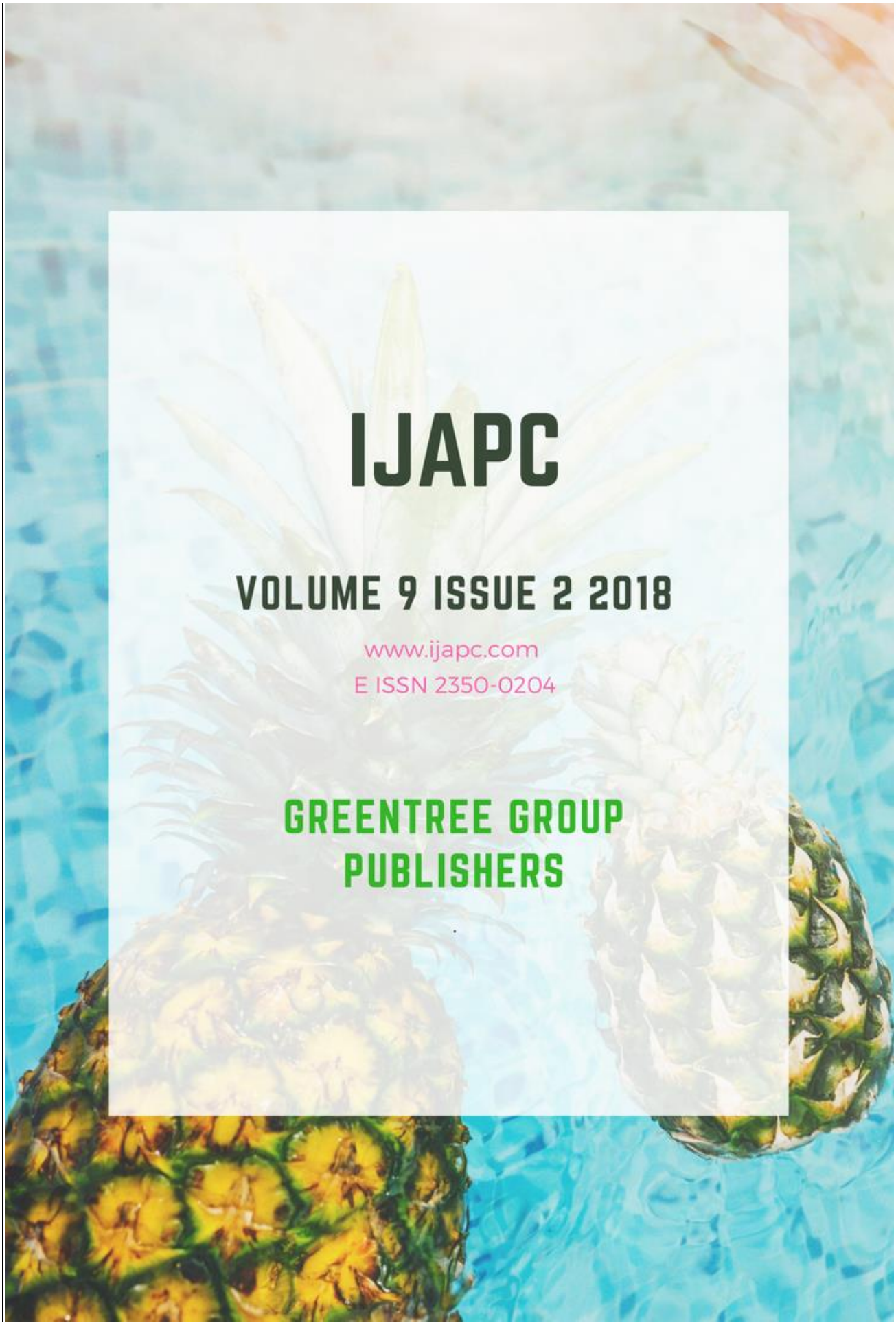

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In vitro Antibacterial Activity of Rhizome of *Curcuma longa* Linn. Against Pathogenic bacteria

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ABSTRACT

The aqueous, ethanol and petroleum ether extracts of the rhizomes of *Curcuma longa* Linn. (Family: *Zingiberaceae*) were screened for antimicrobial activity against five human pathogenic bacterial strains (gram positive bacteria i.e. *Streptococcus pyogenes, Staphylococcus aureus, β-Haemolytic streptococcus* and gram negative bacteria i.e. *Pseudomonas aeuriginosa, Klebsiella pneumonia*) responsible for skin and respiratory tracts infections commonly found in local community. **Aim-**The aim of the present study was to evaluate the antimicrobial activity of various solvent extracts of *Curcuma longa* Linn.(Family: Zingiberaceae). **Methods-**In vitro antimicrobial study of formulations was carried out by using the Agar well diffusion method for the assessment of anti- microbial activity. Three samples i.e. aqueous, alcoholic and petroleum ether extracts of the test drug (10 mg/ml each) along with Ciprofloxacin (5µg/ml) used as standard antibacterial drug were taken. **Results and discussion-**Ethanol extract showed significant sensitivity against*Streptococcus pyogenes, Pseudomonas aeuriginosa, Staphylococcus aureus, Klebsiella pneumonia and Beta-haemolytic streptococcus* with activity index as 0.66, 0.75, 0.6, 0.54 and 0.68respectively whereas Petroleum ether extract showed significant sensitivityagainst *Klebsiellapneumonia* with activity index0.72**. Conclusion-**Alcoholic extract was found effectiveagainst all five strains whereas aqueous extract was found effective against *Klebsiella pneumonia*but definite validation requires further studies in animal models and in clinical studies on Respiratory tractand skin infections caused by these bacteria.

KEYWORDS

Antibacterial activity, Curcuma longa Linn., Haridra, Krimighna

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INTRODUCTION

Turmeric (*Curcuma longa Linn.*) is a rhizomatous herbaceous perennial plant of the ginger family, *Zingiberaceae* (Purseglove, 1972). Infectious diseases seems to be a major health problem in underdeveloped countries and makes a trouble for human beings. Infections involve complicated interactions of parasites and their effects. Microbes inhabit every corner of our environment; colonize skin and parts of our respiratory tracts. Despite decade of dramatic progress in their treatment and prevention, infectious diseases remains a main cause of death and debility and are responsible for worsening the living conditions of many millions of people around the world. The antibiotic resistance is occurring at an alarming rate among all the classes of mammalians pathogens. The Antimicrobials which were effective yesterday are not effective today. Antimicrobials have potentially serious adverse effect and are often expensive. Problems that arise with the use of Antimicrobials agents are toxicity, hypersensitivity reactions, drug resistance, Supra added infections, nutritional deficiencies and masking of infections.In present scenario of emergence of multi drug resistance to human pathogenic organisms, there is aconstant need for development of new anti-microbial agents from other sources involving plants. It is our moral duty towards the society to search for an ideal remedy which is safer, cost effective and easily available. *Haridra* (*Curcuma longa Linn.*) is easily available plant and is being used as food and medicine and has been described as *krimighna,kushthaghna* in *Dhanvantri nighatu.* The study was undertaken to evaluate the antimicrobial activity of the ethanol,petroleum ether and aqueous extracts of the rhizomes *Curcuma longa*. This study assesses the in vitro antimicrobial activity against five common pathogenic microorganisms that cause the most common type of diseases.

MATERIALS AND METHODS

Plant material:

Rhizomes of *Haridra* were collected from Khowai District of Tripura and authentication was done at Herbarium section, Botany department, University of Tripura, Suryamaninagar-799022, Tripura State, India, with Authentification Accession No.1662 as *Curcuma longa*Linn.The collected plant material was washed with running water and kept for drying under shade.The procured dried parts were powderedand stored in sterile containers for further use.

Preparation of plant extracts:

Aqueous extract-Macerate 5 gram of coarsely dried powdered rhizomes with 100 ml of water of the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tarred flat bottomed shallow dish, and dry at 105º, to constant weight and weigh. The aqueous extracts was concentrated and residue was then dried and refrigerated.

Alcoholic extract- Ethanol extracts were prepared in a way similar to aqueous extract as mentioned above.

Petroleum ether extract-Macerate 5 gram dry powdered rhizomes material was extracted with 500 ml solvents petroleum ether, with Soxhlet's extractor for 6 hrs or till the plant material gets colourless. The solvent was removed using a rotary vacuum evaporator to give a concentrated extract, which was dried and refrigerated.

Bacterial strains:

Five bacterial strains were used for the present study which are described in Table 1.

Antimicrobial activity using agar well diffusion method[1]:

Preparation of inoculums:

Test Procedure:-In vitro antibacterial activity of formulations was carried out by using the Agar Well Diffusion Method[2].This method yields a zone of inhibition measured in millimeter which gives an estimate of the amount of antibacterial that is needed to inhibit growth of specific microorganisms.

Table 1 Bacterial strain with their MTCC No.

S. No.	Microbes	Species	MTCC No
1.	Gram positive	*Staphylococcus Aureus*	MTCC No. 737
2.	Gram positive	*Streptococcus Pyogenes*	MTCC No. 443
3.	Gram negative	*Klebsiella Pneumonia*	*MTCC No.432*
4.	Gram negative	*Pseudomonas Aeruginosa*	*MTCC No.7925*
5.	Gram positive	*Beta-heamolytic Streptococcus*	MTCC No. 3269

For the determination of zone of inhibition (ZOI),Muller Hinton agar plates for bacteria were seeded with liquid culture of bacterial strains and allowed to stay at 37°C for 24 hours.Diameter of Well was kept as 6 mm.The dilution (10 mg/ml) of each test sample in DMSO (Dimethyl Sulphoxide) and Ciprofloxacin (5µg/ml), an established antibacterial as positive reference standards was prepared in double distilled water.100 µl volume was applied in each well.The zones of growth inhibition around the wells were measured after 18 to 24 hours of incubation at 37°C for bacterial.The sensitivity of the microorganism species were determined by measuring the sizes of inhibitory zones (including the diameter of well) on the agar surface with comparison to the standard antibiotic zones.

Determination of the activity index:

Zone of inhibition was measured in mm. with the help of a scale. Hence activity index was calculated. (P. Jayanthi et. al Der phama chemical 2013, 5(3):135-140).The activity index of the test samples extract was calculated as

Activity index (AI) = Zone of inhibition of the extract

Zone of inhibition obtained for standard antibiotic drug.

The activity Index of the test substance above 0.5 is considered as significant activity.

is considered as significant activity.

OBSEVATION AND RESULTS

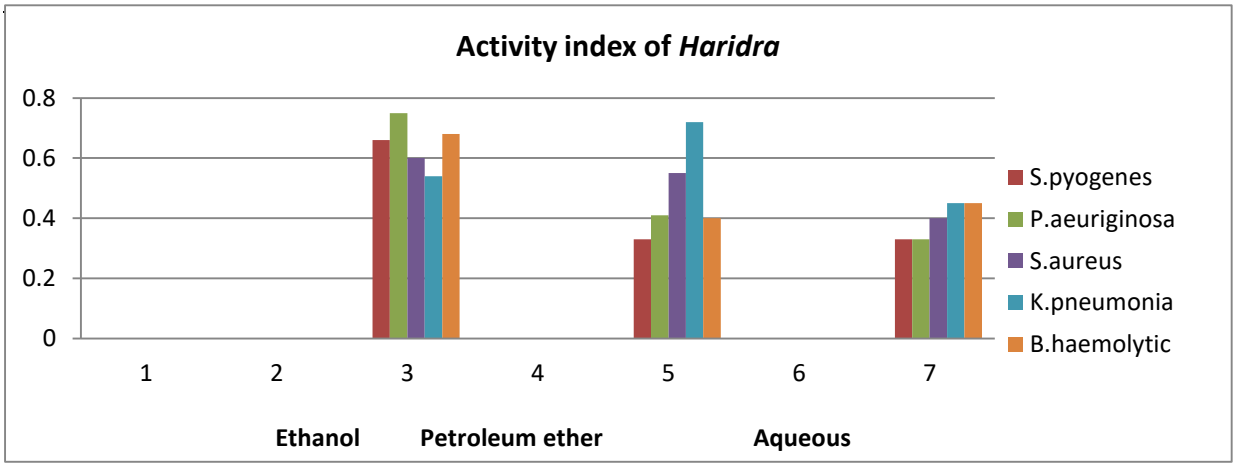
Observations are tabulated showing effect on different strain and their result are interpreted on the basis of ZOI (Zone of inhibition)and activityindex (Table 2 and 3) (Graph 1).

Table 2 ZOI(in mm) of different extractsof*Haridra*at 10 mg/ml conc. with standard drug Ciprofloxacin 5 µg/mlagainst different bacteria

S.No	Extracts	*S.pyogenes*	*P.aeuriginosa*	*S.aureus*	*K.pneumonia*	*B.haemolytic*
1.	Ethanol	16	18	12	12	15
2.	Petroleumether	8	10	11	16	9
3.	Aqueous	8	8	8	10	10
4.	Standard	24	24	20	22	22

Table 3 Activity index of different extracts of *Haridra*at 10 mg/ml conc. with standard drug Ciprofloxacin 5 µg/mlagainst different bacteria

S.No	Extracts	*S.pyogenes*	*P.aeuriginosa*	*S.aureus*	*K.pneumonia*	*B.haemolytic*
1.	Ethanol	0.66	0.75	0.6	0.54	0.68
2.	Pet.ether	0.33	0.41	0.55	0.72	0.40
3.	Aqueous	0.33	0.33	0.4	0.45	0.45



Graph 1 Activity index of different extracts of *Haridra* against *Streptococcus pyogenes*,*Pseudomonas aeruginosa*.*Staphylococcus aureus, K.pneumonia, Beta-haemolytic streptococcus*

DISCUSSION

Ethanol extract of *Haridra* showed significant sensitivity against *Streptococcus pyogenes, Pseudomonas aeuriginosa, Staphylococcus aureus, Klebsiella pneumonia and Beta-haemolytic streptococcus* with Activity index 0.66, 0.75, 0.6, 0.54 and 0.68 respectively. Petroleum ether extract showed significant sensitivity against *Klebsiella pneumonia* with Activity index0.72**.** Aqueous extract was not found sensitive against any of the five bacteria.

CONCLUSION

Alcoholic extract of rhizomes of *Curcuma longa* were found to be effective in all five strains whereas ether extract was found effective against *Klebsiella pneumonia* which justifies the *Krimighna* action of *Haridra* mentioned in *Ayurveda* texts. But for practical applicability, definite validation through further studies on animal models and clinical studies in Respiratory tract and skin infections caused by these bacteria.

REFRRENCES

1. R. Ananthanarayana and C.K. Jayanam Paniker, (Reprint 2002),Textbook of Microbiology, 6th edition,ublished by Orient Longman Pvt. Ltd.

2. Valgas C, Souza SM,(2007 Jun; 38(2): 369-80).Screening methods to deermine antibacterial activity of natural products, Brazilian Journal of Microbiology.