IJBPAS, November, 2022, 11(11): 5056-5061

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

EFFICACY OF AQUEOUS EXTRACT OF TAMALA PATRA (*CINNAMOMUM TAMALA*) AGAINST *ESCHERICHIA COLI* FROM *PITTAJA MUTRAKRICHRA* (URINARY TRACT INFECTION)

AISWARYA EK[1*], AJANTHA[2], SHASHIREKHA KS[3]

1: P G Scholar, Department of Roga Nidana Evam Vikruti Vijnana, SDM College of Ayurveda and Hospital, BM Road, Thanniruhalla, Hassan, Karnataka, India

2: Professor, Department of Roga Nidana Evam Vikruti Vijnana, SDM College of Ayurveda and Hospital, B M Road, Thanniruhalla, Hassan, Karnataka, India

3: Microbiologist, Department of Roga Nidana Evam Vikruti Vijnana, SDM College of Ayurveda and Hospital, B M Road, Thanniruhalla, Hassan, Karnataka, India

***Corresponding Author: Dr. Aiswarya EK: E Mail: draiswaryanair1992@gmail.com**

Received 26th Feb. 2022; Revised 24th March 2022; Accepted 9th May 2022; Available online 1st Nov. 2022

https://doi.org/10.31032/IJBPAS/2022/11.11.6544

ABSTRACT

Urinary tract infection (UTI) is the second most common infectious presentation in community medical practice that is associated with high morbidity and long-term complications. *Tamala patra* is a drug mentioned among *kushtagna gana* in Ayurveda, and studies have shown its anti-microbial effect against various microorganisms. In the current study, the action of aqueous extract of *Tamala patra (Cinnamomum tamala*) against *Escherichia coli* is evaluated in a urine sample of subjects diagnosed with *Pittaja mutrakruchra* (UTI) by culture and sensitivity. With the current study, it is evident that the mean zone of inhibition of aqueous extract of *Tamala patra* possesses anti-microbial action against the bacterium *E. coli.* Further, it is also obvious that as the concentration of aqueous extract of *Tamala patra* increases, the zone of inhibition also increases.

Keywords: Urinary tract infection, *Pittaja mutrakrichra*, *Tamala patra,* Urine culture and sensitivity, *E. coli*

INTRODUCTION

UTI is defined as bacteriuria i.e., multiplication of bacteria in the urinary tract. It is usually associated with the presence of neutrophils and > 10^5 organisms/ml in midstream urine (MSU). An infection restricted to the lower urinary tract i.e., urethra, bladder, and prostate, is termed as lower urinary tract infection (LUTI) **[1]**. Predominantly UTI results from gram-negative bacteria. *Escherichi*a *coli (E-coli*) is one of the principal causative organisms responsible for the causation of UTI. Urine culture and sensitivity is identified as a tool to identify such organism responsible for the infection and through sensitivity evaluation appropriate drug is selected for the management. Even though many drugs are attributed with *krimighna* action in Ayurveda, there are only a few works done on establishing the effectiveness of specific drug activity on specific micro-organisms. Hence such drugs need to be analysed for action against specific micro-organisms so that an *upashaya* effect of such drugs can be generated on micro-organisms invitro. *Tamala patra* is ascribed with *krimighna* **[2]** and *basthi dosha hara* activity in *Ayurveda* literature. But its efficacy on *E. coli* from urine samples has not been investigated. Hence in present work, aqueous extract of *Tamala patra* (*Cinnamomum tamala*) for culture and sensitivity against *E. coli* from urine sample of the UTI subject are to be evaluated.

AIMS AND OBJECTIVES

To evaluate the sensitivity of aqueous extract of *Tamala* (*Cinnamomum tamala*) *patra* against *E.coli* from urine sample of *Pittaja mutrakruchra* (Urinary Tract Infection) patients by culture and sensitivity in vitro.

MATERIALS AND METHODS

A minimum of 30 subjects aged between 18-60 years of either gender irrespective of caste and religion, presenting with urinary tract infection with following *lakshanas* like*; Muhurmuhu mutra pravruthi, Basthi shoola, Mutra daha, Saruja mutratha, Peeta mutratha, Sarakta mutram* **[3]** from out-patients and in-patients departments of tertiary ayurvedic hospital, Hassan was included in the study. Subjects with any other complications that may interfere during study like; chronic kidney failure, HIV, Tuberculosis, CA prostrate, STDs were excluded from the study.

RESEARCH DESIGN

An observational experimental study

METHODOLOGY

Aqueous extract of *Tamala patra* was prepared by cold maceration method **[4]** using 50gm of fresh and clean *Tamala* leaves weighed using a weighing balance. The leaves were then crushed in a clean

mortar and pestle coarsely without adding water. Crushed *Tamala patra* were added to 250 ml distilled water taken in a 1000 ml capacity conical flask. This was then plugged tightly with cotton and was sealed with tape. The conical flask was shaken manually for 10-15min at an interval of every 3 hours. The procedure was continued for 7 days during daytime. On the 7 th day, the content of the conical flask was filtered, that obtained 210ml of filtrate. The filtrate was then kept over water bath in a China dish at 70^0C. 7gms of Tamala patra extract were obtained from this process.

Mid-stream urine sample was collected from the subjects fulfilling the diagnostic and inclusion criteria **[5]**. Further culturing was done on McConkey and Muller Hinton Agar (MHA) plates by streaking method using one loop full of inoculum. The plates were then kept for 24–48-hour culture in incubator at 37^0C. After 24-48 hours of incubation, the cultural characteristics like colony morphology were studied and microscopic observation was done by gram staining techniques to confirm the organisms as gram negative **(Table 1) [6]**. Different concentrations of aqueous extract of *Tamala patra* were prepared by dissolving 5gm of aqueous extract in 15ml of distilled water that gave a stock solution carrying 5000µl of drug concentration. From the stock solution, different concentrations like 4000µl, 3000µl, 2000µl, 1000µl, 900µl of the aqueous extract were prepared. MHA plates were uniformly swabbed with sterile non-toxic cotton swab (lawn culture). The different concentrations of drug were then subjected to anti-bacterial sensitivity test by agar well diffusion method. Six equidistant wells were made on the plates with the help of a sterile cork baurer. 5000µl of aqueous extract of different concentrations were poured into labelled wells on different plates. All the plates were incubated at 37°C for 24 hours and then zone of inhibition was measured with a ruler in mm.

Table 1: Colony morphology and identification

CULTURE CHARACTERS	GRAM STAINING	ORGANISM IDENTIFIED
Size (in mm) – 2-3mm Shape - Round Surface - smooth Elevation-low convex Edge -circular Opacity- opaque Colour of colony -Grey to white Consistency – buttery Haemolysis - Nil Other properties-lactose fermenting	**Gram-negative**	***E. coli***

ASSESSMENT CRITERIA

If the drug is sensitive, a clear circular 'halo' (zone of inhibition) appears around the well that denotes the absence of bacteria which indicates the drug is effective against that bacterium.

OBSERVATION AND RESULTS

Invitro anti- bacterial activity of aqueous extract of *Tamala patra* was evaluated by agar well diffusion method and zone of inhibition was measured as shown in **Table 2**.

Table 2: Mean values of zone of inhibition at different concentrations of aqueous extract of *Tamala patra* against *E. coli.*

Different concentration of aqueous extract of Tamala patra (µl)	5000	4000	3000	2000	1000	900
Total number of patients (N)	30	30	30	30	30	30
Mean zone of inhibition (mm)	16.73	16.10	15.53	13.83	11.57	7.47

The present study shows that the susceptibility of *E. coli* against the aqueous extract of T*amala Patra* is fairly evident between 20mm to 18mm. Hence it is considered as sensitive. 16 to 14mm is considered as moderately sensitive. 12 to 10mm is considered as resistant. Therefore, with the current study it is evident that *E. coli* organism is sensitive to 5000µl, 4000µl; moderately sensitive to 3000µl, 2000µl, 1000µl whereas it is resistant to 900µl of aqueous extract of *Tamala Patra.*

DISCUSSION

In the present study, 50 subjects with *pittaja mutrakrichra* (urinary tract infection) were screened. Among them, 30 subjects fulfilled the diagnostic inclusion criteria, and the remaining 20 subjects were excluded. Among excluded 16 samples had bacteria other than E coli on culture and 4 subjects presented with chronic kidney failure.

Plants and their constituents are the finest choice than any other synthetic chemical. Most of the formulations consist of plants and their phytochemical constituents as the chief component. In *Raja nighantu* and *Madanadi nighantu, Tamala patra* has been mentioned under *krimigna* and its therapeutic uses like *basthi- kandu tridoshagnam. Tamala Patra* possesses *Madhura* and *tikta rasa; teekshna, laghu guna, ushna* virya and *Madhura vipaka*. It is *tridoshagna, basthi dosha hara, Krimigna*, and *kandugna* **[7, 8]**. In the present study, the cold maceration method was selected as it is easy to perform, economical and simple without using any complex instruments but yields a highly potent extract with several active principles. By assessing the mean values of the zone of inhibition shown by the aqueous extract of *Tamala Patra (Cinnamomum Tamala)* against *E.coli,* it was observed that the organism is sensitive

to 5000µl and 4000µl; and moderately sensitive to 3000µl, 2000µl, 1000µl; whereas it is resistant to 900µl.The phytochemical constituents present in the *Tamala Patra* aqueous extract interferes with different mechanisms of *E.coli*, like altering the surface tension of the extracellular medium of organism cells, obtruding DNA of organism cells, complexing with extracellular and soluble proteins, etc. Different strains of gram-negative bacteria have anti-microbial effects including inhibition of various cellular processes followed by an increase in plasma membrane permeability and, finally, ion leakage from the cells **[9]**. Different concentrations of aqueous extract of *Tamala patra* showed different zones of inhibition. This is because different components diffuse at different rates that produce varying zones of inhibition against the bacterium *E. coli*. In higher concentrations of aqueous extract, the drug content is more, hence showing a significant zone of inhibition. On diluting the concentrations, the active constituents fully dissolve into the solution. So, the drug is incapable of giving antimicrobial action even though it reaches and is set at the cell membrane.

CONCLUSION

From this study, it is evident that the mean zone of inhibition of aqueous extract of *Tamala patra* (*Cinnamomum tamala*) possesses antimicrobial action against *E. coli* obtained from the urine sample of subjects diagnosed with *pittaja mutrakrichra* (Urinary tract infection). It is also evident that as the concentration of aqueous extract of *Tamala patra* (*Cinnamomum tamala*) increases, the zone of inhibition for *E. coli* also increases.

REFERENCES

[1] Nicolas A Boon, Nicki R Colledge, Brian R Walker. Davidson's Principle and Practice of Medicine. 20th ed. London: Churchill Livingstone Elsevier publication; 2006. pp.467

[2] Chandranandana- *Madanadi nigantu* (gana nigantu) edited by Vaidya N.S moos and published from Kottayam (1985).

[3] Ramkaran Sharma, Agnivesa's Caraka Samhitha chikitsa sthana, 26th chapter. Chaukhambha Sanskrit series Varanasi; 2012, 26 th chapter pp. 477-78.

[4] Jasmine john- In vitro study Efficacy of aqueous extract of Jati patra (*Jasminum grandiflorum* L), Sri Dharmasthala Manjunatheswara College of Ayurveda, Hassan, RGUHS, Bangalore 2020.

[5] Godkar P.B, Godkar D.P, reprinted, Textbook of Medical Laboratory Technology.2nd ed. Mumbai: Bhalani Publishing; 2011. pp. 303

[6] B.S. Nagoba, Clinical microbiology, BI Publications, 2005. p. 110

[7] Pandit Narahari, Raja Nighantu Pippalyadi varga sloka 175 Indradeo Tripathi editor. 2nd ed. Varanasi: Krishnadas Academy; 1998. Pg. 170

[8] Bapalal G. Vaidya, Nighantu Adarsha poorvardha karpuradi varga.1st ed. Varanasi: Chaukhamba Bharati Academy; 1984. Pg.380

[9] L. M. Kaur, N.K. Aggarwal, and R. Dhiman, 2016. Antimicrobial Activity of Medicinal Plant: *Parthenium hysterophorus* L. Research Journal of Medicinal Plants, 10: 106-112.