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RESEARCH ARTICLE

Evaluation of antibacterial activity of *Asparagus racemosus* in urinary tract infection

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ABSTRACT

Background: *Asparagus racemosus* (Shatavari) is widely used in Kerala, for the treatment of urinary tract infection (UTI) both by the rural folks and by traditional doctors without any scientific evidence. In this context, we decided to evaluate the antibacterial property of *A. racemosus* against common organisms causing UTI. **Aims and Objective:** To evaluate and compare the antibacterial activity of alcoholic extracts *A. racemosus* against common organisms causing UTIs against a standard drug. **Materials and Methods:** Fresh roots of *A. racemosus* were obtained from an organic farm and shade dried, and the ethanolic extract was obtained. The antibacterial activity of three different concentrations 100, 200, and 300 µg was studied using disc diffusion method. The standard drug used for comparison is ciprofloxacin 30 µg. Disc diffusion method was used. Quantitative variables will be expressed in mean standard deviation and their confidence interval. The significance of the difference between groups will be tested using ANOVA, and $P < 0.05$ will be considered as significant. **Results:** The ethanolic extract of *A. racemosus* does not demonstrate any antibacterial activity when compared to the standard drug ciprofloxacin. **Conclusions:** No antibacterial activity for *A. racemosus* against common organisms which cause UTIs.

KEY WORDS: *Asparagus racemosus*; Antibacterial Activity; Urinary Tract Infections

INTRODUCTION

Asparagus racemosus is a plant grown in most of the rural areas in India. The roots of the plants are fleshy and tuberous and are widely used in traditional medicine for a variety of diseases such as nervous disorders, gastric ulcers, cancers, diarrhea, dysentery, urinary tract infections (UTIs), and as galactogogue.[1,2] UTIs are one of the most frequent clinical bacterial infections, especially in women, accounting for nearly 25% of all infections. Around 50-60% of women will develop UTIs in their life time.[3] In contrast to men, women are more susceptible to UTI, and this is mainly due to the short urethra, the absence of prostatic secretion, pregnancy, and easy contamination of the urinary tract with fecal flora.[4] UTIs are common in diabetic patients also. The common organisms that cause UTI includes *Escherichia coli*, *Proteus*, *Pseudomonas,* and *Staphylococcus aureus*.[5,6] A lot of people used to take water or milk boiled with the root of the plant *A. racemosus* for treating dysuria and UTIs. However, many patients are not cured of UTIs even after consuming the root for 3-5 days. Some patients even admitted with complications such as sepsis and diabetic ketoacidosis.[7,8] It is in this context we decided to scientifically evaluate whether it has got significant antibacterial activity or not.

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MATERIALS AND METHODS

Asparagus racemosus belongs to family Liliaceae and commonly known as Satawar, Satamuli, Satavari, Shatavariis found at low altitudes throughout India. It is a spinous under shrub, with short rootstock bearing numerous succulent tuberous roots. The plant grows throughout the tropical and subtropical parts of India up to an altitude of 1500 m. The dried roots of the plant are used as a drug.[9,10] Fresh roots of the plant *A. racemosus* were procured from a farm using organic fertilizers and were authenticated by the Pharmacognosy unit, Ayurveda Research Institute, Poojappura, Thiruvananthapuram. The roots were then washed thoroughly with water, shade dried, and coarsely powdered. The root powder was repeatedly macerated with 95% ethanol in a percolator.[11] The combined filtrate was evaporated to dryness under reduced pressure at 40-50°C. The resulting crude ethanol extract was then stored at 10-15°C. The bacterial strains that commonly cause UTI-like *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa,* and *Proteus mirabilis* were obtained from the Department of Microbiology, Medical College, Kottayam. Ethanolic extract of *A. racemosus* root in three concentrations 100, 200, and 300 µg was dissolved in sterile dimethyl formamide (DMF). Susceptibility testing was performed by Kirby-Bauer technique.[12,13] The test organism was uniformly seeded over the Mueller-Hinton agar surface and exposed to a concentration gradient of the extract diffusing from antibiotic-impregnated autoclaved Whatman 6 mm paper disk into the agar medium.[14] They were incubated at 37°C for 24 h. Control tests were performed with the solvent DMF. The standard drug used is ciprofloxacin 30 µg.[15] The plates were then examined for the presence or absence of a zone of inhibition at the end of 24 h. The test was done in triplicate.

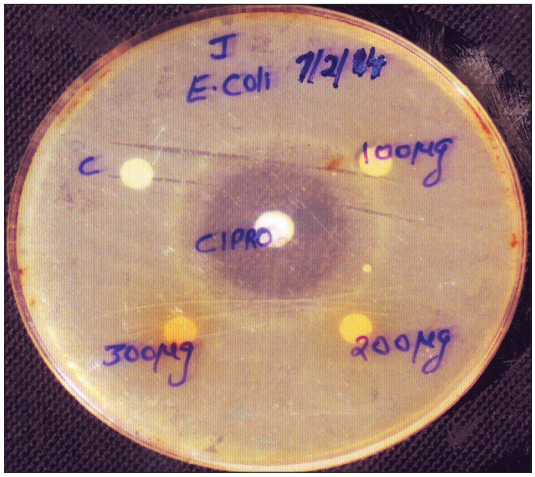

Figure 1: Testing the extract on *Escherichia coli*

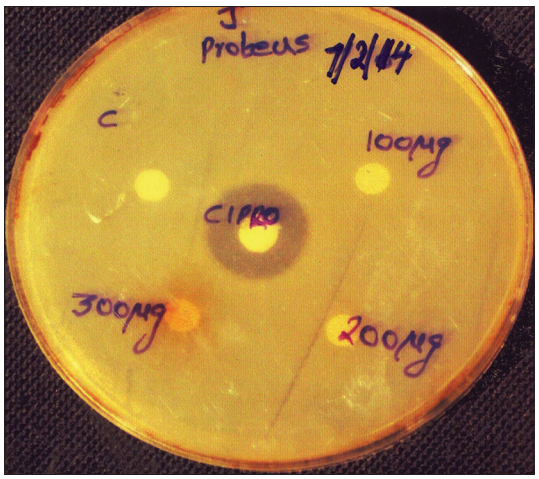

Figure 2: Testing the extract on *Proteus*

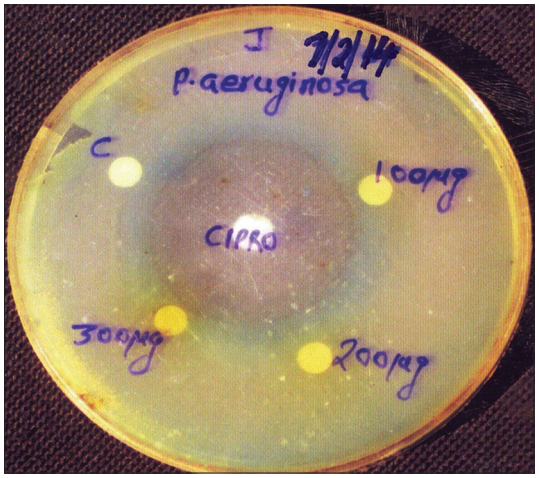

Figure 3: Testing the extract on *Pseudomonas*

RESULTS

There is no zone of inhibition for the ethanolic extract of *A. racemosus* when compared to the standard drug ciprofloxacin indicating the absence of antibacterial activity against organisms causing UTIs (Figures 1-4).

DISCUSSION

Patients in immunocompromised state such as diabetes mellitus get recurrent UTIs.[16] In diabetic patients, this can lead to worsening of the diabetic status and development of ketoacidosis. Most of the UTIs in diabetic patients are relatively asymptomatic, which can lead to severe kidney damage and renal failure.[17] Bacteriuria is more common in diabetics than in non-diabetics due to a combination of host and local risk factors. Disturbances (low complement factor 4, decreased cytokine response) in humoral innate immunity have been described in diabetic patients.[18] Diabetic patients have an inclination for traditional medicine as they may be taking multiple medications and are afraid of the adverse effects of drugs used in modern medicine. Pregnancy is another condition where UTI is common. UTI in pregnancy is associated with significant morbidity for both mother and baby.[19] The combination of mechanical, hormonal, and physiologic changes during pregnancy

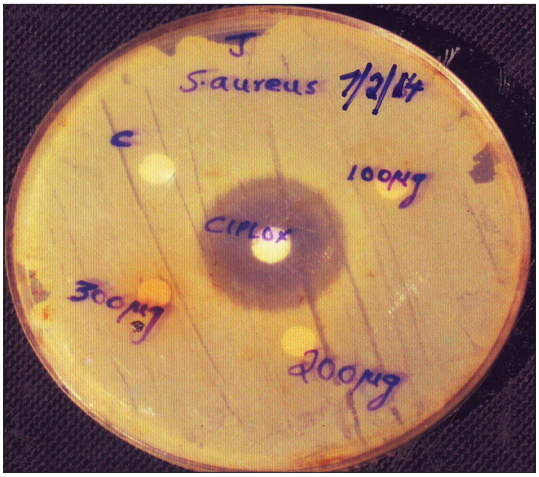

Figure 4: Testing the extract on *Staphylococcus aureus*

contributes to significant changes in the urinary tract, which has a profound impact on the acquisition and natural history of bacteriuria during pregnancy.[20] UTIs in pregnancy may lead to unfavorable pregnancy outcomes and complications such as preterm delivery, low birth weight, and toxemia. So, it must always be screened and treated timely. Even though *A. racemosus* has got a lot of medicinal properties, it does not have any antibacterial activity against common organism causing UTIs, contrary to the popular belief. Although there is one previous study which demonstrated the antibacterial activity of the root of *A. racemosus* against organisms causing dysentery our study did not show any antibacterial activity for the plant.[21] So, it can be disastrous if immunocompromised patients such as those suffering from diabetes mellitus, HIV, pregnancy take this alone for treating UTI, which is common in them as it can cause worsening of the disease leading to various complications. India is now becoming the capital of those persons having diabetes mellitus. Hence, it is important to disseminate this information to all health-care professionals.

CONCLUSIONS

No antibacterial activity for *A. racemosus* against common organisms which cause UTIs.

REFERENCES

1. Goyal RK, Singh J, Lal H. *Asparagus racemosus* - An update. Indian J Med Sci. 2003;57(9):408-14.
2. Nadkarni AK. Indian Materia Medica. Vol. 1. Bombay: Popular Book Depot; 1954. p. 153-5.
3. Al-Badr A, Al-Shaikh G. Recurrent urinary tract infections management in women: A review. Sultan Qaboos Univ Med J. 2013;13(3):359-67.
4. Haider G, Zehra N, Munir AA, Haider A. Risk factors of urinary tract infection in pregnancy. J Pak Med Assoc. 2010;60(3):213-6.
5. Eshwarappa M, Dosegowda R, Aprameya IV, Khan MW, Kumar PS, Kempegowda P. Clinico-microbiological profile of urinary tract infection in south India. Indian J Nephrol. 2011;21:30-6.
6. Demilie T, Beyene G, Melaku S, Tsegaye W. Urinary bacterial profile and antibiotic susceptibility pattern among pregnant women in North West Ethiopia. Ethiop J Health Sci. 2012;22(2):121-8.
7. Mignini L, Carroli G, Abalos E, Widmer M, Amigot S, Nardin JM, et al. Accuracy of diagnostic tests to detect asymptomatic bacteriuria during pregnancy. Obstet Gynecol. 2009;113:346-52.
8. Mohsin R, Siddiqui KM. Recurrent urinary tract infections in females. J Pak Med Assoc. 2010;60(1):55-9.
9. Alok S, Jain SK, Verma A, Kumar M, Mahor A, Sabharwal M. Plant profile, phytochemistry and pharmacology of Asparagus racemosus (*Shatavari*): A review. Asian Pac J Trop Dis. 2013;3(3):242-51.
10. Bopana N, Saxena S. *Asparagus racemosus* - Ethnopharmacological evaluation and conservation needs. J Ethnopharmacol. 2007;110(1):1-15.
11. Potduang B, Meeploy M, Giwanon R, Benmart Y, Kaewduang M, Supatanakul W. Biological activities of *Asparagus recemosus*. Afr J Trad CAM. 2008;5(3):230-7.
12. Bauer AW, Kirby WM, Sherris JC, Turck M. Antibiotic susceptibility testing by a standardized single disk method. Am J Clin Pathol. 1966;45(4):493-6.
13. Anguzu JR, Olila D. Drug sensitivity patterns of bacterial isolates from septic post-operative wounds in a regional referral hospital in Uganda. Afr Health Sci. 2007;7(3):148-54.
14. Oakes AR, Badger R, Grove DI. Comparison of direct and standardized testing of infected urine for antimicrobial susceptibilities by disk diffusion. J Clin Microbiol. 1994;32(1):40-5.
15. Kyabaggu D, Ejobi F, Olila D. The sensitivities to first-line antibiotic therapy of the common urinary tract bacterial infections detected in urine samples at a hospital in metropolitan Kampala (Uganda). Afr Health Sci. 2007;7(4):214-22.
16. Aswani SM, Chandrashekar U, Shivashankara K, Pruthvi B. Clinical profile of urinary tract infections in diabetics and non-diabetics. Australas Med J. 2014;79(1):29-34.
17. Patterson JE, Andriole VT. Bacterial urinary tract infections in diabetes. Infect Dis Clin North Am. 1997;11(3):735-50.
18. Geerlings SE, Hoepelman AI. Immune dysfunction in patients with diabetes mellitus (DM). FEMS Immunol Med Microbiol. 1999;26(3-4):259-65.
19. Taher Aseel M, Al-Meer FM, Al-Kuwari MG, Ismail MF. Prevalence and predictors of asymptomatic bacteriuria among pregnant women attending primary health care in Qatar. Middle East J Fam Med. 2009;7:10-3.
20. Colgan R, Nicolle LE, McGlone A, Hooton TM. Asymptomatic bacteriuria in adults. Am Fam Physician. 2006;74(6):985-90.
21. Mandal SC, Nandy A, Pal M, Saha BP. Evaluation of antibacterial activity of *Asparagus racemosus* willd. root. Phytother Res. 2000;14(2):118-9.

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