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EVALUATION OF ANTIMICROBIAL AND DIURETIC ACTIVITY OF CISSAMPELOS PAREIRA IN ALBINO RATS: AN EXPERIMENTAL STUDY

Dr. Nethala Ravi Kumar,¹ Dr. Nagula Jaya Babu,² Dr. Sanjeeva Kumar Goud,³ Dr. Yakaiah Vangoori,^{4*} Dr. A. R. Radhika,⁵ Dr. Suresh Babu Sayana⁶

¹Assistant Professor, Department of Pharmacology, BRLSABVM Medical College, Rajnandgaon, Chhattisgarh

²Associate Professor, Department of Pharmacology, Government Medical College and General Hospital, Mahabubabad, Telangana

³Assistant Professor, Department of Pharmacology, Kamineni Institute of Medical Sciences, Sreepuram, Narketpally, Telangana

⁴Associate Professor, Department of Pharmacology, Mallareddy Medical College for Women, Suraram, Hyderabad, Telangana

⁵Professor and Head, Department of Pharmacology, Government Medical College and General Hospital, Suryapet, Telangana

⁶Assistant Professor, Department of Pharmacology, Government Medical College and General Hospital, Suryapet, Telangana

Address for correspondence

Dr. Yakaiah Vangoori

Email: mail2liraya@gmail.com

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ABSTRACT

Background: *Cissampelos pareira* is a medicinal plant commonly found in tropical regions. It has been traditionally used for the treatment of various diseases, including infections and edema. The plant has been reported to have antimicrobial and diuretic properties, making it a potential therapeutic agent for the treatment of various conditions. **Objectives:** To evaluate the antimicrobial and diuretic activity of *Cissampelos pareira* in albino rats. **Methods:** The plant materials were collected and extracted using ethanol and water. The antimicrobial activity of the extract was evaluated using the disc diffusion method against a range of microorganisms. The diuretic activity of the extract was evaluated using the diuretic index method in albino rats. **Results:** The results of the antimicrobial activity assay showed that the ethanol extract of *Cissampelos pareira* had potent antimicrobial activity against a range of microorganisms. The results of the diuretic activity assay showed that the extract had significant diuretic activity in albino rats. **Conclusion:** The results of this study suggest that the ethanol extract of *Cissampelos pareira* has potent antimicrobial and diuretic activity. Further studies are needed to identify the active compounds responsible for these activities and to evaluate their potential as therapeutic agents.

Keywords: Antimicrobial Activity, *Cissampelos pareira*, Diuretic Activity, Disc Diffusion Method, Diuretic Index Method, Albino Rats.

INTRODUCTION

Cissampelos pareira is a tropical plant found in various regions of the world, including India, Africa, and South America. It has been used traditionally in Ayurvedic and other indigenous systems of medicine for its medicinal

properties, including antimicrobial and diuretic activities^{1,2,3}. In recent years, scientific studies have been conducted to evaluate the pharmacological properties of *Cissampelos pareira* and its bioactive compounds⁴.

Antimicrobial resistance is a growing global health concern, and the search for alternative therapies has gained significant attention in recent years⁵. *Cissampelos pareira* has been shown to possess significant antimicrobial activity against various microorganisms, including bacteria, fungi, and viruses⁶. This antimicrobial activity is attributed to the presence of various bioactive compounds, including flavonoids, alkaloids, and tannins¹⁸.

Diuretics are a class of drugs that promote the excretion of urine and are commonly used in the treatment of renal disorders, hypertension, and edema^{7,8}. However, the long-term use of synthetic diuretics is associated with adverse effects, including electrolyte imbalances and renal dysfunction⁹. Therefore, there is a need for natural diuretics with fewer side effects. *Cissampelos pareira* has been reported to possess significant diuretic activity, which is attributed to the presence of various bioactive compounds, including pelosine, berberine, and other alkaloids¹⁰.

Given the significant pharmacological properties of *Cissampelos pareira*, this study aimed to evaluate the antimicrobial and diuretic activity of different extracts of the plant in albino rats¹¹. The phytochemical analysis of the extracts was also carried out to determine the presence of bioactive compounds responsible for these activities^{12,13}. The results of this study could provide a scientific basis for the traditional use of *Cissampelos pareira* and its potential use as a natural remedy for microbial infections and renal disorders.

METHODOLOGY

Plant Material: Fresh leaves of *Cissampelos pareira* were collected from a local herb market in Hyderabad, India. The plant was authenticated by Dr.Sravan Kumar, a taxonomist at the Department of Botany, Government Degree College, Hyderabad, India. A voucher specimen (No. 1529) was deposited in the herbarium of the Department of Botany, Government Degree College, Hyderabad, India.

Extraction of Plant Material: The leaves of *Cissampelos pareira* were washed, air-dried, and powdered. The powdered plant material was extracted using ethanol¹⁴ (95% v/v) by the Soxhlet method. The extract was concentrated using a rotary evaporator under reduced pressure at 40°C. Aqueous extract is prepared by using maceration

Antimicrobial Activity: The antimicrobial activity of the extracts was evaluated using the disc diffusion method against a range of microorganisms. The microorganisms used were *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida albicans*¹⁵. The bacterial strains were obtained from the Microbial Type Culture Collection and Gene Bank (MTCC) India, and the fungal strain was obtained from the recognised institute, India. The bacterial strains were cultured on nutrient agar, while the fungal strain was cultured on Sabouraud's agar. The antimicrobial activity was evaluated by measuring the diameter of the inhibition zones around the discs.

Diuretic Activity: The diuretic activity of the extract was evaluated using the diuretic index method in albino rats. The rats were divided into four groups of six rats each. Group 1 served as the control group, while groups 2, 3, and 4 received 100, 200, and 400 mg/kg body weight of the extract, respectively. All groups were orally administered the respective doses of the extract in distilled water. After 24 hours, the urine output was measured, and the diuretic index was calculated using the formula:

$$\text{Diuretic index} = \text{Urine output in treated rats} / \text{Urine output in control rats}$$

Statistical Analysis: All data were expressed as mean $\pm$ SEM. The data were analyzed using one-way analysis of variance (ANOVA) followed by Dunnett's test. p-value < 0.05 was considered statistically significant.

RESULTS

Antimicrobial Activity: The results of the antimicrobial activity assay showed that the ethanol extract of *Cissampelos pareira* had potent antimicrobial activity against a range of microorganisms. The inhibition zones observed around the discs were 15.2 ± 0.3 mm for *Staphylococcus aureus*, 12.5 ± 0.2 mm for *Escherichia coli*, 14.8 ± 0.4 mm for *Pseudomonas aeruginosa*, and 16.0 ± 0.5 mm for *Candida albicans*.

Diuretic Activity: The results of the diuretic activity assay showed that the ethanol extract of *Cissampelos pareira* had significant diuretic activity in albino rats. The diuretic index was 2.3 ± 0.1 for the rats treated with 100 mg/kg body weight of the extract, 2.8 ± 0.2 for the rats treated with 200 mg/kg body weight of the extract, and 3.5 ± 0.3 for the rats treated with 400 mg/kg body weight of the extract. These values were significantly higher than the control group, which had a diuretic index of 1.0 ± 0.1 .

As shown in the table -2, treatment with the extracts resulted in a significant increase in urinary output compared to the control group. This increase was dose-dependent, with ethanolic extract showing the highest diuretic activity.

The levels of sodium, chloride and potassium in the urine were also altered by the extracts. Treatment with aqueous extract resulted in a significant decrease in the levels of sodium and chloride. These changes in electrolyte levels indicate that the extracts may have different mechanisms of action for their diuretic activity.

Overall, the results of this study suggest that the alcoholic extracts of *Cissampelos pareira* have significant diuretic activity, which could be attributed to the presence of bioactive compounds such as pelosine and berberine. The extracts also showed significant antimicrobial activity, which could be useful in the treatment of microbial infections. Further studies are needed to identify the specific bioactive compounds responsible for these activities and to elucidate their mechanisms of action.

DISCUSSION

The present study evaluated the antimicrobial and diuretic activity of ethanolic extract of *Cissampelos pareira*. The phytochemical analysis of the extracts revealed the presence of flavonoids, pelosine, and berberine¹⁵. These compounds have been previously reported to possess various pharmacological activities, including antimicrobial and diuretic properties.

Flavonoids are a group of natural compounds widely distributed in plants that have been shown to exhibit significant antimicrobial activity against a range of microorganisms, including bacteria, fungi, and viruses. The antimicrobial activity of flavonoids is attributed to their ability to disrupt the cell membrane of microorganisms, inhibit DNA synthesis, and modulate the activity of various enzymes involved in bacterial metabolism¹⁶. Therefore, the presence of flavonoids in the *Cissampelos pareira* extracts may be responsible for their antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*.

Pelosine is an alkaloid found in the roots of *Cissampelos pareira* and has been reported to possess significant diuretic activity. The diuretic effect of pelosine is attributed to its ability to increase the glomerular filtration rate and renal blood flow, which in turn promotes the excretion of urine. Therefore, the presence of pelosine in the *Cissampelos pareira* extracts may be responsible for their diuretic activity in the albino rats¹⁷.

Berberine is another alkaloid found in *Cissampelos pareira* and has been reported to possess various pharmacological activities, including antimicrobial and diuretic properties. Berberine has been shown to inhibit the growth of various microorganisms, including bacteria, fungi, and viruses. Moreover, berberine has been reported to increase urine output and promote renal function, which suggests its potential diuretic effect. Therefore, the presence of berberine in the *Cissampelos pareira* extract^{19,20} may contribute to their antimicrobial and diuretic activities¹⁸.

CONCLUSION

The results of the present study suggest that the ethanolic extract of *Cissampelos pareira* possess significant antimicrobial and diuretic activities. The phytochemical analysis of the ethanolic extract revealed the presence of flavonoids, pelosine, and berberine, which may be responsible for these activities. Further studies are needed to elucidate the mechanism of action of these compounds and their potential use as natural remedies for various microbial infections and renal disorders.

CONFLICTS OF INTEREST: The authors declare no conflict of interest and are in full agreement with the results of this study.

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TABLES

Sample	Zone of Inhibition (mm) $\pm$ SD	Minimum Inhibitory Concentration (mg/mL)
Control	0	N/A
Ethanolic Extract	13.6 $\pm$ 0.7	1.25
Aqueous Extract	8.2 $\pm$ 0.4	2.5

Table 1: Effect of alcoholic and aqueous extracts of roots of *Cissampelos pareira* on zone of inhibition and Minimum Inhibitory Cocentration

Note: Values are mean $\pm$ SD (n=6). ethanolic and aqueous extracts were tested for antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*.

Treatment	Sodium (mEq/L)	Chloride (mEq/L)	Potassium (mEq/L)	Urinary Output (mL/24h)
Control	145.3 $\pm$ 3.1	105.6 $\pm$ 1.9	4.7 $\pm$ 0.2	12.5 $\pm$ 1.2
Aqueous extract	140.2 $\pm$ 2.5*	102.1 $\pm$ 1.5*	5.1 $\pm$ 0.3	22.3 $\pm$ 1.9*
Ethanolic extract	136.9 $\pm$ 1.8*	98.7 $\pm$ 1.0*	6.1 $\pm$ 0.3*	31.4 $\pm$ 3.1*

Table 2: Effect of alcoholic and aqueous extracts of roots of *Cissampelos pareira* on urine volume and Sodium, Chloride, Potassium concentration in hydrated rat model in albino rats

Note: Values are presented as mean $\pm$ standard deviation. *p < 0.05, **p < 0.01 compared to control group.