

Antimicrobial activity of natural products from *Myracrodruon urundeuva* Allemão (Aroeira-do-sertão)

Actividad antimicrobiana de productos naturales de *Myracrodruon urundeuva* Allemão (Aroeira-do-sertão)

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ABSTRACT

Introduction: *Myracrodruon urundeuva* Allemão (Anacardiaceae) is a plant from the Brazilian semiarid region with medicinal properties against various diseases.

Objective: to screen the phytochemistry and determine the antimicrobial activity of the hydroalcoholic extract from the bark of this plant. **Methods:** the extract was obtained by maceration and subjected to qualitative phytochemical tests and *in vitro* antimicrobial activity assays against gram-positive and gram-negative bacteria and fungi.

Results: among the phytochemical compounds stood out tannins, flavonoids and alkaloids. The extract was effective against *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Enterococcus faecalis*.

Conclusions: *Myracrodruon urundeuva* presents compounds of high pharmacological interest such as tannins, flavonoids and alkaloids, being a plant with potential antibacterial activity.

Key words: medicinal plants, *Myracrodruon urundeuva*, semiarid, ethnopharmacology, secondary metabolites, antimicrobial activity.

RESUMEN

Introducción: *Myracrodruon urundeuva* Allemão es una planta medicinal utilizada contra diversas enfermedades en el semiárido brasileño.

Objetivo: realizar el tamizaje fitoquímico y determinar la actividad antimicrobiana del extracto hidroalcohólico de la corteza de esta planta.

Métodos: el extracto se obtuvo por maceración y se sometió a una prueba fitoquímica cualitativa y ensayos antimicrobianos *in vitro* contra bacterias grampositivas, bacterias gramnegativas y hongos.

Resultados: entre los compuestos fitoquímicos se destacaron taninos, flavonoides y alcaloides. El extracto fue eficaz frente a *Staphylococcus aureus*, *Klebsiella pneumoniae* y *Enterococcus faecalis*.

Conclusiones: *Myracrodruon urundeuva* presenta sustancias de alto interés farmacológico, como taninos, flavonoides y alcaloides, siendo una planta con actividad antibacteriana potencial.

Palabras clave: plantas medicinales, *Myracrodruon urundeuva*, semiárido, etnofarmacología, metabolitos secundarios, actividad antimicrobiana.

INTRODUCTION

Myracrodruon urundeuva Allemão, a medicinal plant of the family Anacardiaceae popularly known as "aroeira-do-sertão", is widely used in folk medicine in Brazil. Its uses include activity against acne, tumors, rheumatism, inflammations in general, pains, skin problems, infections, allergy, cracks in the feet, arthritis, insect bites, itching, bleeding, cramping, gastritis, rheumatic fever and wound healing, in addition to the magical-religious use.¹⁻⁴

Among the main chemical components in the bark of *M. urundeuva* are tannins, which represent between 7.04 % and 10.38 % of these components.⁵ Considering the reported antimicrobial activity of such compounds⁶ and the widespread ethnopharmacological use of *M. urundeuva*, this study is aimed at evaluating the antibacterial and antifungal activity of the bark extract from this plant against strains of clinical interest.

METHODS

The bark of *M. urundeuva* was collected in the semiarid region of the state of Paraíba, Northeastern Brazil. Taxonomic identification was confirmed and the plant was processed for later investigations. The plant material was dried at 40 °C in an oven with air circulation and sprayed in a slicer. Subsequently the crushed material (20 g) was subjected to extraction with 100 mL of a mixture of 70 % ethanol/distilled water (v/v) for five days at room temperature (25 °C ± 5 °C) with occasional stirring.

Phytochemical screening of the *M. urundeuva* extract was performed according to standard protocols described by Matos.⁷ Evaluation of the antimicrobial activity was conducted with the disc-diffusion method.

The microorganisms used in this study were gram-positive bacteria: *Staphylococcus aureus* (ATCC 25923) and *Enterococcus faecalis* (ATCC 7073); gram-negative bacteria: *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853)_T and *Klebsiella pneumoniae* (ATCC 4352); and fungi *Candida albicans* (ATCC 14053),

Candida tropicalis (ATCC 16834), *Candida parapsilosis* (ATCC 23476), *Candida krusei* (ATCC 34135) and *Candida guilliermondii* (ATCC 6260).

M. urundeuva was the plant chosen due to its widespread use in traditional medicine in the Brazilian semiarid region. Choice of the extract tested in the experiment was based on its similarity with the form used in traditional medicine.

RESULTS

Preliminary phytochemical analysis revealed the presence of metabolites such as tannins, flavonoids, flavonols, favonas, xanthones and alkaloids.

Concerning antimicrobial activity (Table), the extract was active against two gram-positive (*S. aureus* and *E. faecalis*) and one gram-negative (*K. pneumoniae*) bacteria. The latter bacterium was sensitive to all concentrations with inhibition halos ranging from 11.9 mm at 1.000 $\mu\text{L}/\mu\text{L}$ to 7.0 mm at 0.063 $\mu\text{L}/\mu\text{L}$. Among the gram-positive bacteria, *S. aureus* was the most sensitive, with its growth inhibited at 0.500 $\mu\text{L}/\mu\text{L}$, while the highest concentration tested was active against *E. faecalis*.

Table. Antimicrobial activity of *Myracrodruon urundeuva*

Microorganisms	Zone of inhibition (mm)						Positive control*	Negative Control**
	Extract concentration ($\mu\text{L}/\mu\text{L}$)							
	1.000	0.500	0.250	0.125	0.063			
<i>Staphylococcus aureus</i>	11.9	7.3	0.0	0.0	0.0	23.5	0.0	
<i>Klebsiella pneumoniae</i>	11.2	10.7	8.9	7.6	7.0	28.9	0.0	
<i>Enterococcus faecalis</i>	10.1	0.0	0.0	0.0	0.0	13.3	0.0	
<i>Escherichia coli</i>	0.0	0.0	0.0	0.0	0.0	28.8	0.0	
<i>Pseudomonas aeruginosa</i>	0.0	0.0	0.0	0.0	0.0	25.8	0.0	
<i>Candida albicans</i>	0.0	0.0	0.0	0.0	0.0	12.0	0.0	
<i>Candida tropicalis</i>	0.0	0.0	0.0	0.0	0.0	16.0	0.0	
<i>Candida parapsilosis</i>	0.0	0.0	0.0	0.0	0.0	16.0	0.0	
<i>Candida krusei</i>	0.0	0.0	0.0	0.0	0.0	12.0	0.0	
<i>Candida guilliermondii</i>	0.0	0.0	0.0	0.0	0.0	12.0	0.0	

*: cefalotin was used for gram-positive bacteria, gentamicin for gram-negative bacteria and nystatin for fungi; **: 70 % ethanol/water was used.

DISCUSSION

The low activity of the extract against most gram-negative bacteria was not surprising, since these bacteria are more tolerant than the gram-positive ones,⁸ which

was also observed by *McCutcheon et al.*⁹ and *Mothana and Lindequist*,¹⁰ although *Srinivasan et al.*¹¹ have observed the opposite.

This study is a preliminary evaluation of the antimicrobial activity of *M. urundeuva*. Its effectiveness against *S. aureus*, *E. faecalis* and *K. pneumoniae* is probably related to the abundant presence of phenolic compounds¹² of proven antimicrobial activity^{6,13-15} as well as alkaloids.^{16,17} The widespread use of *M. urundeuva* to treat various diseases by different ethnic groups residing in the Brazilian semiarid region can be explained by the antimicrobial activity demonstrated in this study. The results also demonstrate the importance of traditional knowledge in the search for new plants with antimicrobial activity.¹⁸

It is suggested that further studies are conducted aimed at identifying and isolating the compounds responsible for the activity reported in this study.

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