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EVALUATION OF THE *IN VITRO* ANTIMICROBIAL ACTIVITY OF CRUDE EXTRACTS OF THREE *MICONIA* SPECIES

Andréa Carla Celotto; Daniela Zaupa Nazario; Marcela de Almeida Spessoto; Carlos Henrique Gomes Martins; Wilson Roberto Cunha*

Núcleo de Pesquisa em Ciências Exatas e Tecnológicas, Universidade de Franca, Franca, SP, Brasil.

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SHORT COMMUNICATION

ABSTRACT

The antimicrobial activity of nine crude extracts of three *Miconia* species *(M. albicans, M. rubiginosa* and *M. stenostachya)* was tested against eleven selected microorganisms: *Staphylococcus aureus, Staphylococcus saprophyticus, Proteus mirabilis, Escherichia coli, Enterococcus faecalis, Shigella flexneri, Klebsiella pneumoniae, Salmonella* sp, *Pseudomonas aeruginosa, Streptococcus agalactiae* and *Candida albicans.* The results of the test showed that three extracts had some antimicrobial activity by well diffusion method. The ethanol extracts of *Miconia albicans* and *Miconia rubiginosa* were the most active.

Key words: antimicrobial activity, *Miconia,* Melastomataceae.

In many parts of Brazil there is a tradition in the use of herbal medicine for treatment of infectious diseases (11,12).

On account that pathogenic microorganisms can develop resistance against antibiotics, attention has been paid to extracts and biologically active compounds isolated from plant species (5). Antimicrobials of plant origin are efficient in the treatment of infectious diseases mitigating simultaneously many of the side effects that are often associated with synthetic antimicrobials (8).

The current study was carried out to determine the *in vitro* antimicrobial activity of crude extracts of *Miconia* species. *Miconia* is a genus with approximately 1,000 species (10), which belongs to Melastomataceae family. Studies on *Miconia* species are scarce. *Miconia* extracts and their isolated compounds have demonstrated biological activities such as antimalarial, antitumoral, analgesic and antifungal action (1,2,6,9).

Miconia species *(M. albicans, M. rubiginosa* and *M. stenostachya)* were collected along Franca-Claraval highway, São Paulo, Brazil and identified by Dr. Angela Borges Martins, Instituto de Biologia, UNICAMP, Brazil. Vouchers specimens have been deposited in the Herbarium of the same Institute. The aerial parts of the plants were dried at 40ºC, powdered and extracted at room temperature with hexane, methylene chloride and ethanol, respectively.

Four Gram-positive bacteria *(Staphylococcus aureus* ATCC 25923, *Staphylococcus saprophyticus* ATCC 35552, *Enterococcus faecalis* ATCC 19943 and *Streptococcus agalactiae)*, six Gram-negative bacteria (*Proteus mirabilis* NCTC 8309, *Escherichia coli* ATCC 14942, *Shigella flexneri* ATCC 12022, *Klebsiella pneumoniae* ATCC 11296, *Salmonella* sp ITAL SM SN 004 and *Pseudomonas aeruginosa* ATCC 27853) and one yeast specie *(Candida albicans)* were studied. *S. agalactiae* and *C. albicans* were isolated from patients of the Laboratório de Análises Clínicas (Universidade de Franca).

Antimicrobial activity of the extracts was determined by well diffusion method on plates with a double layer of Brain Heart Infusion agar (7). The inocula were subcultured in Brain Heart Infusion broth. After complete solidification, wells were

*Corresponding author. Mailing address: Núcleo de Pesquisa em Ciências Exatas e Tecnológicas da Universidade de Franca. Av. Dr. Armando Salles de Oliveira, 201, Parque Universitário. 14404-600, Franca, SP, Brasil. Fax: (+5516) 3711-8886. E-mail: wrcunha@unifran.br

prepared by removing the agar with plastic straws. Prior to the antimicrobial testing each organic extract was dried and the residue was dissolved in DMSO at concentration of 300 mg/mL. The wells were then filled with 20 µL of the extracts solution. One well was filled with DMSO as negative control. Then, the plates were preincubated for 2 h at room temperature and then incubated for 24 h at 35ºC. Antimicrobial activity was determined by measuring the inhibition halos around the wells in millimeters. All samples were tested in triplicate. A total of nine extracts of three *Miconia* species were investigated and the ethanol extracts exhibited an antimicrobial effect against some of the eleven tested microorganisms (Table 1).

Results showed that ethanol extracts of *M. albicans* and *M. rubiginosa* were the most active. The ethanol extract of *M. stenostachya* was active only against *C. albicans, E. coli, P. aeruginosa, P. mirabilis, Salmonella* sp and *E. faecalis* were resistant for all extracts. A previous study on these species of *Miconia* has revealed the presence of triterpene acids (3,4,13). The antimicrobial activity observed for the ethanol extracts can be explained by the presence of a mixture of substances, including triterpene acids, in these extracts with antimicrobial properties, indicating that *M. albicans* and *M. rubiginosa* are a valuable source for the discovery of new antimicrobial products.

Table 1. Antimicrobial activity of ethanol extracts of *Miconia* species[a].

Microorganisms	*M. albicans* (300 mg/mL)	*M. rubiginosa* (300 mg/mL)	*M. stenostachya* (300 mg/mL)
S. aureus	16.7 ± 1.53	19.0 ± 1.73	-
S. saprophyticus	13.7 ± 0.58	14.0 ± 0.58	-
S. agalactiae	11.0 ± 0.00	13.7 ± 0.58	-
E. faecalis	-	-	-
P. aeruginosa	-	-	-
P. mirabillis	-	-	-
E. coli	-	-	-
Salmonella sp.	-	-	-
S. flexneri	11.7 ± 1.15	13.0 ± 1.00	-
K. pneumoniae	15.3 ± 0.58	15.7 ± 1.15	-
C. albicans	19.7 ± 0.58	20.7 ± 1.15	10.7 ± 0.58

[a]Values are inhibition halos (mm) and an average of triplicate (Mean ± S.D.); -, no inhibition.

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RESUMO

Avaliação da atividade antimicrobiana *in vitro* de extratos brutos de três espécies de *Miconia*

A atividade antimicrobiana de nove extratos de três espécies de *Miconia (M. albicans, M. rubiginosa* e *M. stenostachya)* foi avaliada frente a onze microrganismos: *Staphylococcus aureus, Staphylococcus saprophyticus, Proteus mirabilis, Escherichia coli, Enterococcus faecalis, Shigella flexneri, Klebsiella pneumoniae, Salmonella* sp, *Pseudomonas aeruginosa, Streptococcus agalactiae* e *Candida albicans.* Três destes extratos apresentaram atividade antimicrobiana pelo método de difusão de poço. Os extratos etanólicos de *Miconia albicans* e *Miconia rubiginosa* foram os mais ativos.

Palavras-chave: atividade antimicrobiana, *Miconia,* Melastomataceae.

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