

Bioactive potential of the Ethyl Acetate Extract from *Prosopis laevigata*: Antimicrobial and Anti-inflammatory effects"



Beatriz Elizabeth Utrera Hernández¹*, Ever A. Blé Gonzalez¹*, Manases Gonzalez Cortazar²*, Maria Perez Garcia², Alejandro Zamilpa² ¹Universidad Juárez Autónoma de Tabasco, División Académica de Ciencias Básicas Carretera Cunducán-Jalpa Km. 0.5, Cunduacán, Tabasco 86690, México; 212a18001@alumno.ujat.mx (B.E.U.-H.); ever.ble@ujat.mx (E.A.B.-G.)

²Centro de Investigación Biomédica del Sur, Instituto Mexicano del Seguro Social (IMSS), Argentina 1, 62790 Xochitepec, Morelos, México; gmanases2000@gmail.com (M.G.-C.); lola_as@yahoo.com.mx (M.D.P.-G.); azamilpa_2000@yahoo.com.mx (A.Z)

Introduction

Antimicrobial resistance (AMR) has become one of the most serious public health problems in the world. It occurs when microorganisms such as bacteria, fungi or parasites develop the ability to survive exposure to drugs that once eliminated them, leading to longer and more difficult infections [1] This phenomenon represents a threat to the global health progress. Considering the increasing demand for alternative therapies with fewer side effects, this study aimed to evaluate the antimicrobial and anti-inflammatory activity of the ethyl acetate extract of *Prosopis laevigata*. [2]

Methodology

Fractions R4, R7 and R9 from the ethyl acetate extract of *Prosopis laevigata* were used to follow the methodology for determining antimicrobial activity shown in **Figure 1** and anti-inflammatory activity shown in **Figure 2**.

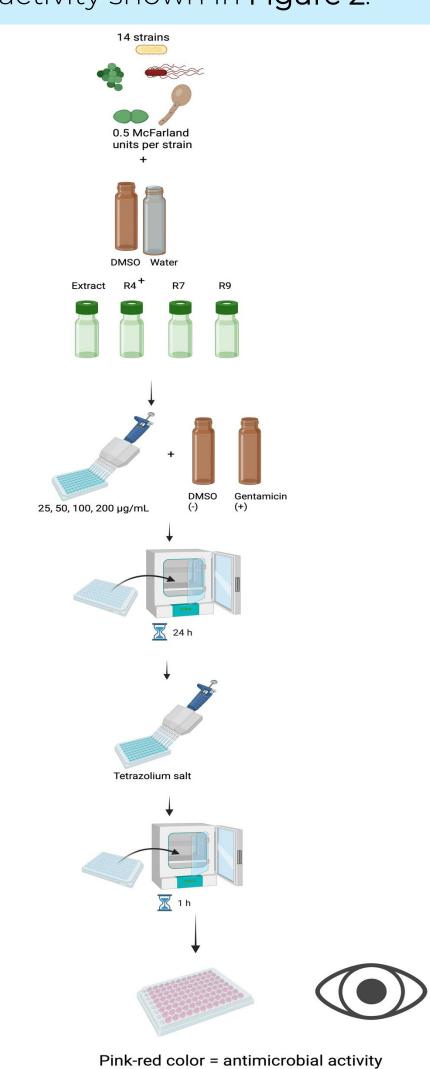


Figure 1. Microdilution plate method.

Created with BioRender.com

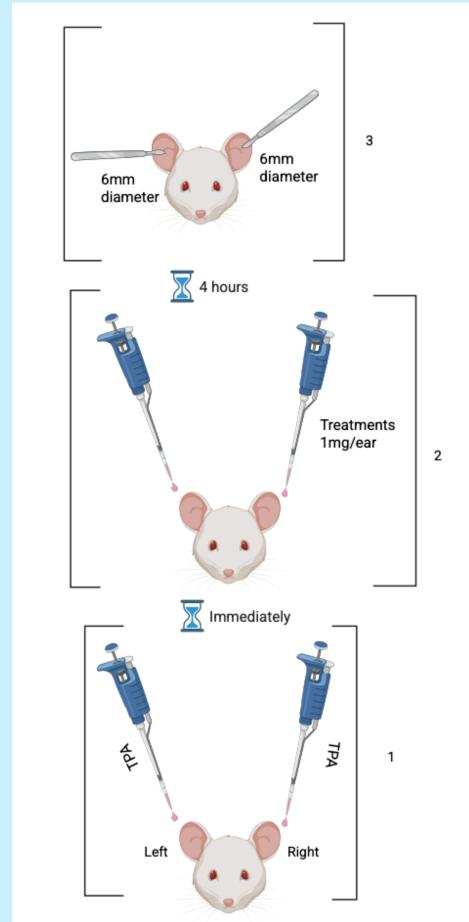


Figure 2. TPA-induced inflammation edema method Created with BioRender.com

Results

Antimicrobial analysis using a 96-well Elisa plate showed that the fraction with the highest activity was R9 (11 strains), followed by R4 (10 strains) and R7 (6 strains).

Antimicrobial activity was found against two methicillin-resistant strains.

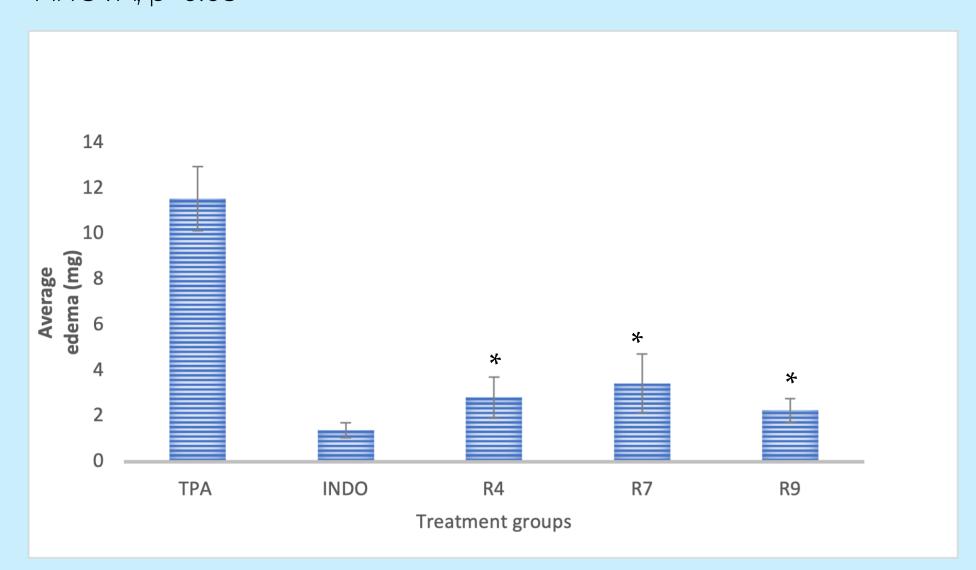
All treatments used (extract and fractions) were active against the fungus evaluated.

Table 1. Antimicrobial analysis of the extract and 3 fractions against 14 strains using the plate microdilution methodology. Positive control: gentamicin (10 µg/mL). Negative control: DMSO 2%. No activity: n/a.

Microorganism	Extract	R4	R7	R9
Staphylococcus aureus ATCC 29213	n/a	50	n/a	100
Staphylococcus aureus MR 43300	n/a	100	n/a	100
Staphylococcus epidermidis ATCC 35984	200	<25	n/a	<25
Staphylococcus epidermidis ATCC 12228	50	200	n/a	100
Staphylococcus epidermidis ATCC 1042	n/a	n/a	n/a	<25
Staphylococcus haemolyticus MR isolated	n/a	n/a	n/a	<25
Enterococcus faecalis ATCC 29212	<25	<25	<25	<25
Klebsiella pneumoniae ATCC 700603	n/a	<25	<25	<25
Pseudomonas aeruginosa ATCC 27853	<25	<25	<25	<25
Escherichia coli ATCC 1042	n/a	n/a	50	n/a
Escherichia coli ATCC 25922	n/a	n/a	n/a	n/a
Salmonella dublin ATCC 9676	n/a	<25	<25	<25
Enterobacter cloacae ATCC 700323	200	<25	n/a	n/a
Candida albicans ATCC 10231	<25	<25	<25	<25

The results of the anti-inflammatory test with TPA were statistically similar to indomethacin, the reference drug, which means that treatments R4, R7, and R9 act in a similar way.

Table 2. Average edema (mg) and treatment groups. **TPA**: 12-O-tetradecanoylphorbol-13-acetate **INDO**: Indomethacin. **R4**, **R7** and **R9**: Fractions from the ethyl acetate extract of *P. laevigata*. Dunnett post-hoc ANOVA, p<0.05



Conclusion

Regarding antimicrobial activity, fractions R4, R7, and R9 demonstrated efficacy against several clinically relevant strains. The concurrent anti-inflammatory and antimicrobial effects observed in both R4 and R9 suggest the presence of secondary metabolites with dual or combined bioactivity. This multifunctional activity is pharmacological as it can reduce the need for more drugs or inspire the design of hybrid therapeutic compounds. This type of therapeutic activity is especially valuable as it can help reduce polypharmacy or serve as a model for multifunctional drugs. This type of therapeutic activity is particularly valuable, as it could contribute to reducing polypharmacy or serve as templates for multi-target drugs. These results provide a solid basis for future studies focused on the isolation of active compounds and a deeper understanding of their mechanisms of action. The evidence highlights the potential of P. laevigata as a promising source of natural agents with antimicrobial and anti-inflammatory properties. The anti-inflammatory activity of all tested fractions did not differ significantly from that of the positive control (indomethacin).

References

[1] De la Salud OM. Plan de acción mundial sobre la resistencia a los antimicrobianos. Organización Mundial de la Salud; 2016. 30 p. [2] Tang KWK, Millar BC, Moore JE. Antimicrobial Resistance (AMR). Vol. 80, British Journal of Biomedical Science. Institute of Biomedical Science (IBMS); 2023.