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Antimycobacterial activity of extracts from *Cissus incisa* leaves on multi-drug resistant strain

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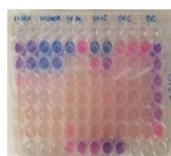
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Graphical Abstract

Screening for the discovery of natural antimycobacterial agents



Cissus incisa leaves



Novel Potential Drugs

- Growing infectious diseases
- Antibacterial Resistance
- Multidrug-resistant tuberculosis

Abstract

The Multidrug-resistant Tuberculosis (MDR-TB) is considered a public health crisis and a threat to health security. The multi-resistant form can be treated and cured with second-line medications. However, second-line treatment options are limited and require long-term chemotherapy (up to two years of treatment) with drugs that, besides being expensive, are toxic. Thus, the need to find new antimicrobial agents to cope with this phenomenon increases. In this sense, the exploration of natural plants is valuable. Natural products from plants could be interesting alternatives. Some plant extracts are known to have antimycobacterial properties, and can be of great significance in therapeutic treatments. We carried out the study of antimycobacterial activity of *Cissus incisa* leaves. Three extracts were prepared from the leaves of this plant: hexane, chloroform/methanol (1:1) and aqueous. Their antitubercular activities were evaluated using Alamar Blue assay. The hexane and chloroform/methanol extracts were the most active, with MIC values between 125-250 µg/mL. Until our knowledge, there are no studies to support the traditional use of this plant in relation to the mycobacterial infection diseases. This research contributes both to the knowledge of the Mexican flora, as well as the discovery of potential antibacterial agents derived from plants.

Introduction

A growing number of infections, such as pneumonia, tuberculosis, septicemia, gonorrhoea or foodborne diseases, are increasingly difficult to treat, as antibiotics are losing effectiveness. The MDR-TB is considered a public health crisis and a threat to health security. It is caused by a strain that does not respond to treatment with Isoniazide and Rifampicin, the two most effective first-line anti-TB drugs available. This multi-resistant form can be treated and cured with second-line medications. However, second-line treatment options are limited and require long-term chemotherapy (up to two years of treatment) with drugs that, besides being expensive, are toxic. In some cases, even more worrying levels of drug resistance can be achieved. Ultra-resistant tuberculosis (XDR-TB) is a more severe form of drug-resistant tuberculosis caused by bacteria that do not respond to the most effective second-line anti-TB drugs, leaving many patients with no other treatment options. Although the global incidence of TB is decreasing by approximately 2% per year, this rate is considered slow, according to the World Health Organization's estimations [1, 2, 3].

The aim of this study was to evaluate the antimycobacterial activity of three extracts from the leaves of *C. incisa*, a specie used into traditional Mexican medicine.

Materials and Methods (optional)

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Results and Discussion

Strains tested	MIC ($\mu\text{g/mL}$)					
	Hexane Extract	CHCl ₃ /MeOH Extract	Aqueous Extract	Isonizide	Rifampicin	Ethambutol
Mt-G122 <i>M. tuberculosis</i>	250	250	500	> 50	> 50	50

Conclusions

This is the first time that the *C. incisa* has been studied to evaluate its antimycobacterial properties. The chloroform/methanol and hexane extracts were active on the G122 strain (MIC=250 $\mu\text{g/mL}$) which is very valuable. The potential of *C. incisa* on resistant strains needs to be explored, as it is essential to find compounds that shorten or contribute to the treatment of MDR *M. tuberculosis* and extremely drug resistant tuberculosis (XDR-TB) in the face of growing phenomenon of bacterial resistance.

References

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