

Antimycobacterial activity of Brazilian Amazon plants extracts

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Abstract

Tuberculosis (TB) is one infectious disease responsible for more than 2 million of deaths worldwide. The increase of TB cases resistant to drugs normally used in treatment has reinforced the necessity of development of new antimicrobials, which should be active to resistant strains and latent bacilli, further it should reduce the treatment duration. Thus fifty-six plants extracts obtained from Brazilian Amazon forest were tested in three strains of *Mycobacterium tuberculosis*, being one pan-susceptible strain (H₃₇R_v), one isoniazid resistant and one rifampicin resistant. Twenty-nine plants extracts were active against pan-susceptible strain, twenty-four against isoniazid resistant and thirteen against rifampicin resistant. These results indicate the potential of the Brazilian Amazon plants products as source of new antimicrobials.

Keywords: *Mycobacterium tuberculosis*; microbial resistance; plant extract.

Introduction

One third of the worldwide population is infected with the *Mycobacterium tuberculosis*, etiological agent of tuberculosis (TB)[1]. In 2010, there were about 8.8 million incident cases of TB, around 128 cases/100,000 habitants, including 1.1 million deaths in HIV-negatives and 350 thousand in HIV-positives[1]. In Brazil, were reported 81.570 new TB cases in 2011[2]. These data corroborates with the affirmative that TB is a serious problem of public health[1]. In Brazil, the treatment regimen has duration of six months and consists in a drug combination including isoniazid (INH), rifampicin (RMP), ethambutol (EMB) and pyrazinamide (PZA) for two months and INH and RMP, for more four months[2]. However, the lengthy six month therapy makes patient compliance difficult, and noncompliance is frequently associated with drug-resistant, multidrug-resistant (MDR, resistant at least to INH and RMP) and extensively drug-resistant (XDR, a MDR resistant also to a fluoroquinolone and an injectable drug, as amikacin, kanamycin or capreomycin) strains[1]. This picture added to the fact that no new specific antimicrobial for TB were introduced in the last 40 years, reinforce the necessity to develop new drugs that must be more efficient against resistant strains, reduce the treatment duration and act against latent bacilli[3].

Most of XIX century pharmacopoeia were constituted of animal, mineral and specially plant products, responsible for the majority of drugs which were just a little bit different from those used in popular medicine and were qualitatively the more important part of therapeutical researches in that period[4]. In the beginning of last

century, the study of active substances presents in plants boosted a scientific and technological revolution.

The development of drugs derived from natural products became possible with the advancement of technologies associated with combinatorial chemistry, biotechnology and genomics knowledge[5]. Even with the development in the areas of organic synthesis, industrial microbiology and molecular biology, many drugs continued to be obtained from natural sources, maybe because the difficulty of obtain molecules with same stereochemistry or the economic viability of producing them synthetically[6,4].

A large number of plant species are founded in South America equatorial areas.[7] In Brazil is the largest plant genetic diversity of the world, once in the Amazon, can be founded 17% of Brazilian diversity[8]. Data of 2002 indicate that plants medicinal therapy moves a market around 500 million U.S. dollars only in Brazil[9] and the demand for new drugs derived from plant genetic resources arouses great interest[10].

Given the need for news drugs that act more effectively to control TB and chemical diversity of plant origin products, this study evaluated the antimycobacterial activity of various plants extracts belonging to Brazilian Amazon flora.

Material and Methods

Plant species collected

The plants were collected near the Manaus city- Brazil and were chosen to be of plant families for which there are reports in the literature to produce substances with biological activities (Table 1).