Could the bicyclogermacrene concentration be associated to anti-*Leishmania (L.) amazonensis* activity of crude volatiles oils from leaves of *Guarea macrophylla* Vahl. ssp. tuberculata Vellozo (Meliaceae)?

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Abstract

The present work reported the chemical composition of intra/interpopulational variations of the volatile oils contained on *G. macrophylla* leaves, which indicated a relationship between the concentration of sesquiterpene bicyclogermacrene and the index of infection by *Leishmania (L.). amazonensis*.

Introduction

Guarea macrophylla (Meliaceae) is popularly known as Ataúba and grows in Brazil from Rio Grande do Sul State to the Amazonas region. Chemically, *G. macrophylla* produces several metabolites, including flavonoids, lignoids and terpenoids[1]. As part of our continuous studies with volatile oils from this species, in this work was evaluated the anti-leishmanial activity of volatiles oils from leaves, obtained in different periods of collections.

Results

Experimentally, were collected five samples of two different specimens located on the cities of São Paulo (I) (S23°33.929´–T046°43.850´) and Cubatão (II) (S23°50.567´-T046°24.874´) during February, May, August, November/2013 and in February/2014. Crude oils, obtained by hydrodistillation using a Clevenger apparatus, were analyzed by GC-FID and GC-MS as well as determination of Kovats index[1]. The *in vitro* antileishmanial activity to each obtained oils were assessed against promastigote and amastigote forms of *Leishmania (Leishmania) amazonensis*.[2]

These analyses allowed the identification of fifty-seven compounds. A phytogeographical variation was observed, being that the oil collected from specimen I showed higher qualitative diversity (57 compounds) in comparison to the oil from specimen II (32 compounds). The oils from these two different plants showed chemical similarity since the sesquiterpenes were identified as main compounds. Specimen I oils were composed mainly by *cis-β*-guaiene (7±1 – 18±4%), bicyclogermacrene (7±2 – 13±2%), viridiflorol (6.3±0.6 – 8.4±0.6%) and isolongifolan-7α-ol (6.6±0.6 – 11±4 %). Specimen II oils were composed mainly by α-copaene (4±2 – 14±2%), (*E*)-caryophyllene (9±3 – 18±8%), *cis*-β-guaiene (7±3 – 18±7%) and δ-amorphene (3.9±0.8 – 7±1%). The anti-promastigote evaluation the crude volatile oils showed CE_{50} results ranging from 11.8±5.2 to 17.2±5.1 µg/mL (specimen I) and 12.0±1.2 to 20.5±2.7 µg/mL (specimen II), indicating a strong anti-promastigote action to the oils from both specimens. The results of the anti-amastigote activity (infection index) indicated that the more active oils are those from specimen I, As could be seen in fig 1, was observed a correlation between the concentrations of bicyclogermacrene, suggesting a direct action of this compound.

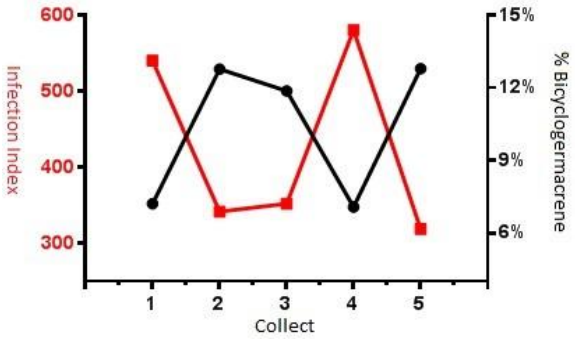

Fig. 1. Concentration of bicyclogermacrene in the crude oils from *G. macrophylla* X infection index against amastigotes from *L. (L.) amazonensis*.

After chromatographic separation, was observed that the anti-leishmanial activity of crude oils was concentered in the portion composed by hydrocarbon sesquiterpenes as well as to the fractions composed by pure bicyclogermacrene. These data confirmed that antiparasitic potential of crude oils from leaves of *G. macrophylla* could be related, at least in part, to the concentration of this compound.

Conclusions

Based in chemical and antiparasitic activity results, was observed that the volatile oils from leaves of *G. macrophylla* composed by bicyclogermacrene were the more actives, suggesting an important effect of this compound. After chromatographic separation, the obtained results confirm the antiparasitic potential of bicyclogermacrene against *L. (L.) amazonensis.*

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