Monoamine oxidase inhibition by monoterpene indole alkaloids and fractions obtained from Brazilian Southern Psychotria species

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Keywords: Psychotria; MIAs, MAO-A, MAO-B.

Introduction: Psychotria L. is a taxonomically complex genus whose neotropical species (subg. Heteropsychothria) are characterized by the presence of monoterpene indole alkaloids (MIAs) possessing biological and pharmacological properties on the CNS, mainly related with the serotonergic and glutamatergic transmission (F. M. Farias et al. Phytomedicine, 17, 289, 2010). Most of the indole alkaloids isolated from Brazilian Southern Psychotria are derived from the common precursor strictosidine and, therefore, they can present βC, DHβC or THβC nuclei in their indole portions (S. LOPES et al. Biochem Syst Ecol 32, 1187, 2004). Thus, considering the presence of THβCs and βCs compounds in Psychotria, and the previous effects described for these alkaloids on the CNS, it becomes relevant to investigate the effects of fractions and MIAs of Psychotria on MAO-A and MAO-B activity.

Experimental: Alkaloid fractions of Psychotria suterella Müll. Arg. (SAE) and P. laciniata Vell. (LAE) as well as two monoterpene indole alkaloids (MIAs) isolated from these fractions were evaluated against monoamine oxidases (MAO-A and -B) obtained from rat brain mitochondria, using kynuramine as non-specific substrate, and clorgyline and pargyline as selective inhibitors of MAO-A and MAO-B, respectively.

Results: SAE and LAE were analysed by HPLC-PDA and UHPLC/HR-TOF-MS leading to the identification of lyaloside (1), strictosamide (2), E-vallesiahtatomamine (3) and Z-vallesiahtatomamine (4), whose identity was confirmed by NMR analyses. Further, SAE and LAE were submitted to the enzymatic assays, showing a strong activity against MAO-A, characterized by IC₅₀ values of 1.37 ± 1.05 and 2.02 ± 1.08 µg/mL, respectively. Both extracts were also able to inhibit MAO-B, but in higher concentrations. In a next step, SAE and LAE were fractionated by RP-MPLC affording three and four major fractions, respectively. The RP-MPLC fractions were subsequently tested against MAO-A and -B. The RP-MPLC fractions containing E/Z-vallesiahtatomamine (3, 4), SAE-F3 and LAE-F4, displayed a strong inhibition against MAO-A with IC₅₀ values of 0.57 ± 1.12 and 1.05 ± 1.15 µg/mL, respectively. The MIAs 1 and 2 also inhibited MAO-A (IC₅₀ of 50.04 ± 1.09 and 132.5 ± 1.33 µg/mL, respectively) and -B (IC₅₀ of 306.6 ± 1.40 and 162.8 ± 1.26 µg/mL, respectively), but in higher concentrations when compared with the fractions.

Conclusions: The present work describes the effects of fractions and MIAs from neotropical species of Psychotria on MAO activity, suggesting the role of vallesiahtatomamine-like alkaloids in MAO-A inhibition.

Financial Support: CNPq/Brazil and CAPES/Brazil

Acknowledgments: Authors are thankful to Dr. Sergio Bordignon for the identification of the species employed in this work.