EFFECTS OF MATÉ (Ilex paraguariensis) ON ADIPOGENESIS IN VITRO

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INTRODUCTION

Ilex paraguariensis A. St.-Hil. is a South American tree from which leaves and twigs are used to prepare a tea known as maté (“yerba mate”). It is one of the most commonly consumed beverages in several South American countries, including Brazil (especially the Southern states), Uruguay, Paraguay and Argentina. Since a long time, leaves from Ilex species are being studied(1). Efforts are being made to study also the saponins present in the fruits of maté in order to use this raw material as a source of industrial saponins(2). More recently, our group initiated medicinal chemistry studies in order to find relationships between the chemical structure of saponins and their biological activity, as for example antimalarial one(3). In addition to polyphenols such as flavonoids (quercetin and rutin) and phenolic acids (chlorogenic and caffeic acids), maté is also rich in caffeine and saponins(4). Recently, evidences have shown some beneficial effects of maté which include antioxidant activity(5), a protective effect against induced DNA damage(5), vasodilatation effects(6), and antiobesity effects(7). This study presents the action of fractions from the hydroethanolic extract of I. paraguariensis leaves in reducing adipogenesis in cell culture.

MATERIALS AND METHODS

Maté tea extract

Leaves from Ilex paraguariensis A. St. Hil. were harvested in a cultivated area. Fresh leaves were grounded and submitted to maceration in EtOH 70% (1:10, plant:solvent, 2 x 7 days). After ethanol elimination, one half part of this residual aqueous phase was fractionated with ethyl acetate to obtain the ethyl acetate fraction and the aqueous residue. The other half part was subjected to column chromatography using molecular permeation and a gradient of H₂O: EtOH as eluent. Collected fractions were grouped together according similar profile at thin layer chromatography (TLC). Substances were visualized at TLC using SI gel, BAW (4:1:5) as eluent and spraying with anisaldehyde sulfuric acid/100 ºC. It was obtained two fractions: the saponin and the flavonoid fractions. All fractions were chemically characterized by TLC with reference substances found in maté as rutin and saponins.

Determination of triglyceride accumulation

Cells pre adipocytes 3T3-L1 were acquired from American Type Culture Collection (Manassas, VA) and maintained in culture until the period of maturation according to the manufacturer. Fractions of Ilex paraguariensis (50 to 100 µg/mL) were added to cultured cells until mature adipocytes when the amount of their fat were measured through the test of Oil Red O. Data in triplicate were analyzed by Student’s t-test (p ≤ 0.05).

RESULTS

Maté extract was fractionated in order to find which groups of compounds are responsible for the biological activity. Fractions presented rutin and saponins by TLC. The flavonoid fraction and the aqueous residue presented a better result in the reduction of fat accumulation in adipocytes in comparison to the control.

CONCLUSIONS

The flavonoid fraction and the aqueous residue from maté may be potentially useful in obesity treatment by demonstrating a decrease in fat accumulation in 3T3-L1 adipocytes.

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