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Pharmacological Evidences and chemical compounds of Platonia insignis Mart: A review

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ABSTRACT:

Platonia insignis Mart., is a plant from Clusiaceae family. It is a native tropical fruit from the Brazilian Amazon and Northeast Regions. Its seeds was used to treat inflammatory diseases, diarrhea and skin problems intraditional medical practices. The bark is astringent and it was used to treat diarrhea. Chemical composition showed high water content (76%), 20% of carbohydrate, 3% of lipids, less than 1% of proteins and other chemical compounds. Pharmacological studies proved its bactericide, antifungal, spasmogenic and anti-protozoal activities.

KEY WORDS: Platonia insignis, phytoconstiuents, plants, bioactivities

INTRODUCTION

Plants can be considered as a rich source of therapeutic agents for the prevention and treatment of numerous diseases [1]. The increase search for new drugs from plants led to the discovery of many metabolites with potential for drug development through the isolation, elucidation of structure, composition and evaluation of bioactivity based on phytochemical composition and uses in traditional medicine [1,2]. Clusiaceae family had many potent medicinal value [3]. This family includes trees, shrubs, lianas and herbs of economic interest for the production of edible fruits, woods, chemicals of pharmaceutical interest and paints [4]. Previous studies on the chemical composition of the plants of this family proved that they are rich in xanthones and polyisoprenylated benzophenones that were isolated not only from the resins, but also in other parts of the plants [5,6] and also the known biological activities as antidepressive, antioxidant, antifungal, anti-HIV and antibacterial activity. Platonia insignis is an evergreen species belonging to the Clusiaceae family. It is popularly known as “bacurizeiro It is found mainly in open areas, especially anthropozoic areas, and is rarely found in dense primary forests. The greases obtained from Platonia insignis seeds are commonly used as cicatrizantes and anti-inflammatory agents [7]. There are reports in the literature where the extracts of the seeds, fractions and isolated compounds were tested in several biological activities and presented promising results as, reduction of oxidative stress [8-10], Immuno-modulatory effects and low in vivo toxicity have also been reported for extracts obtained from the seeds [11]. P. insignis seeds are vert rich in fatty acids, triacylglycerols and metabolites with potential therapeutic activity, such as xanthones that exhibit antiepileptic and antiparasitic effects [12] and polyisoprenylated benzophenones, with vasorelaxant effect in animal models [13]. A triacylglycerol isolated from the hexane extract of its seeds, 1,3-distearyl-2-oleylglycerol (TG1), in formulations, was effective in healing wounds in rats [14]. This review gave information on previous chemical compounds isolated from the plant and biological studies of the plant.

Phytoconstituents and BIOLOGICAL ACTIVITIES

Stem bark and its major compound Lupeol and its antileishmanial effect

This study evaluated the antileishmanial effects of the ethanol extract (EtOH-Ext), hexane fraction (Hex-F), and its main isolated obtained from stem barks of P. insignis against Leishmania (Leishmania) amazonensis, as well as their cytotoxicity and possible mechanisms of action. The EtOH-Ext, Hex-F, and Lupeol inhibited the growth of L. amazonensis promastigote forms at IC50 of 174.24, 45.23, and 39.06 μg/mL, respectively, as well as L. amazonensis axenic amastigote forms at IC50 of 40.58, 35.87, and 44.10 μg/mL, respectively.The mean cytotoxic concentrations for macrophages (CC50) were higher than those for amastigotes (341.95, 71.65, and 144.0 μg/mL, resp.), indicating a selective cytotoxicity towards the parasite rather than the macrophages. Interestingly, all treatments promoted antileishmanial effect against macrophage-internalized amastigotes at concentrations lower than CC50. Furthermore, increases of lysosomal volume of macrophages treated with EtOH-Ext, Hex-F, and Lupeol were observed. Only Lupeol compound stimulated increase of phagocytic capability of macrophages, proved that compound can be as biomarker for the antileishmanial effect of P. insignis stem bark, as well as the involvement of immunomodulatory mechanisms in this effect [15].

Ctotoxic and Immunomodulatory effects

This study investigated the in vitro cytotoxic and immunomodulatory effects of the hexanic extract of P. insignis seeds, and also in vivo acute oral toxicity. The biological evaluation was performed by the determination of cyto-toxic (MTT and hemolysis assay) and immunomodulatory (phagocytic capacity, lysosomal volume andnitrite production) activities of EHSB in murine peritoneal macrophages. In addition, the oral acute tox-icity was evaluated using female Wistar rats treated with EHSB (2.0 g/kg), in accordance with the OECD423 Guideline. The EHSB showed low toxicity for macrophages in the MTT test (CC50value: 90.03 g/ml), as well as for erythrocytes, which caused only 2.5% hemolysis at the highest concentration. A strongimmunomodulatory activity was observed by a markedly increase of the NO production, phagocytic abil-ity and lysosomal volume. On the other hand, it was not observed deaths or changes in the clinical andbehavioral parameters in the toxicological evaluation. So this study proved the immunomodulatory and toxicological effects of P. insignis [16].

Antioxidant effect

The fruit of P. insignis were studied in relation to their Antioxidant chemical constitution. The total phenolic content ranged from 3.86 ± 0.47 to 33.38 ± 1.51 mg GAE/100 g, and the total flavonoid content ranged from 1.75 ± 0.22 to 19.44 ± 0.87 mg QUERE/100 g, where the contents showed a significant correlation with DPPH and ABTS antioxidant assays. Bacuri showed the highest antioxidant and α-glycosidase inhibitory capacity (IC50 15.20 µg/mL) [17].

Hypotensive Effect

This study evaluated the biological potential of the ethanol extract (Pi-EtOH) and ethyl acetate fraction (Pi-EtOAc) of P. insignis fruit shells on the cardiovascular system of rats. Pi-EtOH or Pi-EtOAc (12.5, 25, and 50 mg/kg) was administered intravenously in normotensive rats (260–300 g), and the mean arterial pressure and the heart rate were monitored. The Pi-EtOH induced hypotension (−11.56±0.89, −7.43±0.85, and −17.56±1.97 mmHg) followed by bradycardia in two highest doses (−8.89±3.62 and −15.79±1.83 beats/min) and Pi-EtOAc, at the same doses, induced hypotension (−11.2±1.03, −14.48±1.13, −29.89±2.67 mmHg) more intensively, followed by tachycardia at the dose 12.5 and 25 mg/kg (15.64±2.06, 19.31±1.92 beats/min) and bradycardia at a dose of 50 mg/kg (−9.98±7.33 beats/min). Hence, Pi-EtOAc can act similarly to the α2-adrenergic as hypotensive agent (18).

Antibacterial and antifungal effects

Hydroalcoholic and ethanol extracts of the bark, pulp and seeds of Açaí (Euterpe precatoria), Bacuri (Platonia insignis), Ingá (Inga edulis) and Pequiá (Caryocar villosum) were used. The minimum inhibitory concentrations (MIC) of the extracts were obtained by the microdilution broth method. The results showed low antimicrobial effect of Acaí, Bacuri and Ingá extracts, and more relevant was just the action of ethanolic extracts of bark and seeds from Bacuri and Ingá against C. albicans with MIC 500µg/mL. The Pequiá extracts showed significant antibacterial activity against many pathogens. Salmonella choleraesuis was inhibited by hydroalcoholic extracts of bark, pulp and seeds with MIC ranging 125, 500 and 125µg/mL respectively and the ethanolic extract from bark and pulp with MIC 500 and 62.5µg/mL. S. arizonae and S. Typhi were also inhibited, with better results for the ethanolic extract of pulp on the first bacteria and the hydroalcoholic of bark to the second one with MIC 250 and 125µg/mL, respectively.

Streptococcus pyogenes was sensitive to hydroalcoholic extracts of bark, pulp and seeds with MIC of 125µg/mL for the first two extracts and MIC 62.5µg/mL to seed extract. Other significant results were the activities of hydroalcoholic extract from the pulp of Pequiá against Yersinia enterocolitica with MIC 250µg/mL, and ethanolic and hydroalcoholic extracts of pulp against Shigella dysenteriae with MIC 250 and 500µg/mL, respectively (19).

Cytotoxicity, mutagenicity and in vitro antioxidant of of 2-oleyl-1,3-dipalmitoyl-glycerol

2-oleyl-1,3-dipalmitoyl-glycerol (ODG) isolated from Platonia insignis (bacurizeiro) seeds showed a median lethal dose (LD50) greater than 1200 µg mL. ODG compound at the highest concentration was slightly cytotoxic with decrease in the size of roots and mitotic indexes, but did not induce chromosomal alterations. ODG (8.75–140.00 µg mL−1) was found to reduce nitric oxide production by 41.6 %, while the antioxidant standard ascorbic acid (AA) reduced 54.14 %. ODG (15.625–250.00 µg mL−1) promoted removal of the hydroxyl radical by 35.69 % at the highest concentration and was able to prevent lipid peroxidation induced by 2,2'-azobis-2-amidinopropane (AAPH), inhibiting the amount of TBARS formed, up to 35.69 %, a result close to that obtained with AA. So ODG moderately reduced the levels of hydroxyl radicals, nitric oxide, and TBARS in vitro and was nontoxic at low concentrations (20).

Volatile Composition of bacuri

The volatile profiles were studied by two High Concentration Capacity Headspace techniques (HCC-HS), Headspace Solid Phase Microextraction (HS-SPME) and Headspace Sorptive Extraction (HSSE), in combination with GC–MS. Bacuri is characterized by terpenes (41%), non-terpenic alcohols (24%), esters (15%), aldehydes (6%), and others (12%) (21).

CONCLUSION

This review showed the Chemical compounds and pharmacological effects of Platonia insignis Mart.

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