Obtaining alcoholic extract from leaves from species Sapindus Saponarial. (sapindaceae) for phytochemical analysis

10.56238/homeinternationalanais-020

Heloíza Rabêlo Cunha
Pharmacognosy and Phytochemistry Laboratory - Federal University of Amapá – UNIFAP

Johann Victor Neves de Souza
Pharmacognosy and Phytochemistry Laboratory - Federal University of Amapá – UNIFAP

Ana Luzia Ferreira Farias
Instituto federal do Amapá - IFAP

Patrick de Castro Cantuária
Instituto de Pesquisa Cientificas e Tecnologicas do Estado do Amapá – IEPA

Sheylla Susan Moreira da Silva de Almeida
Laboratório de Farmacognosia e Fitoquímica - Universidade Federal do Amapá - UNIFAP

Keywords: Monkey soap, Saponins, Secondary metabolites.

1 INTRODUCTION

Phytochemical analysis aims to know the secondary metabolites. According to Simões et. al. (2010), metabolism is the set of chemical reactions that are continuously occurring in each cell, being divided into primary and secondary. Beings and general m have primary metabolism (carbohydrates, lipids, proteins, and nucleic acids). Plants, micro-organisms and a few animals also have secondary metabolism (whose products, although not necessarily essential for the producing organism, guarantee advantages for their survival and the perpetuation of their species, in its ecosystem). Such metabolites can trigger reactions in the body, which according to dosage can be toxic or beneficial, which is why there is interest in the study of plant extracts (FRANCO et al., 2021).

In some plant families the majority presence of a certain class of metabolites is characteristic. In the family Sapindaceae, for example, in which the species Sapindus saponaria L. belongs, identification is common by phytochemical tests and saponins. This study aimed to obtain an alcoholic extract from sapindus saponaria L leaves. Phytochemical analysis in order to identify the secondary metabolites present in the species.

The Sapindaceae family comprises about 1756 species and 136 genera with cosmopolitan distribution. It consists of tree, shrub and liana species with tendrils. The stems of liana species usually have multiple vascular cylinders and often white latex es. The leaves are composed pinadas or ternadas, rarely simple or unifolioladas, alternating, arranged in spiral, and rarely opposed. Inflorescences are
determined, axillary or terminal, racemos, paniculated, or in single or double tirso. In vines the pedicel of basal inflorescence flowers is modified in tendrils (SPRENGEL-LIMA; REZENDE, 2013).

The species of the genus Sapindus have been researched as a source of saponins for cosmetic use, for their tensoactive properties. In addition, their pharmacological use is a target of great interest, because these compounds have activity: antiulcerative, antineoplastic, hemolytic, ichthyotoxic, antimicrobial and hypcholesterolemiante (ALBIERO, BACCHI, MOURÃO, 2001; SIMÕES, 2010).

*Sapindus saponaria* L., Sp. (Pl. 1: 367. 1753), also known by popular names: soap dish, monkey soap, soldier soap, monkey whistle, demico soap, soap and soap plant is a tree 6 meters high, cylindrical branches, pubescent, then glabrous. They have leaves with 6 to 12 folioloes, with 9 to 21 cm d and length, rudimentary distal, in the form of apiculus; alate petiolo; cartace, asymmetric, narrow-elliptical to ovado-lanceolate; obtuse apex, acuminate or sickle cell; asymmetric or cuneada base; entire margin; discolores, light green adaxial face, with rare scattered tricomas, yellowish-green abaxial face, puberula or pubescent, with absent domes. In Brazil, it has confirmed occurrences in five states of the Northern region (Acre, Amazonas, Pará, Tocantins), Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Rio Grande do Norte, Sergipe), Midwest (Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Minas Gerais, Rio de Janeiro, São Paulo (SOMNER, FERRUCCI, ACEVEDO-RODRÍGUEZ, 2015).

In one study, an excellent in vitro inhibiting activity of *s. saponaria* extract against *C. albicans* and not *C. albicans* isolated from patients with vulvovaginal candidiasis, indicating that this plant can be used as an antifungal agent for this pathology (TSUZUKI, et al., 2007). In general, in the case of antifungal action, saponins demonstrated tivity against *C. glabrata, C. albicans, Trichosporon beigeli, Penicillium avellaneum, Pyricularia oryzae, Cryptococcus neoformans, Coccidioides immitis and Saccharomyces cerevisiae*, as well as against dermatophytes *Microsporum canis* and *Trichophyton mentagrophytes* (TAMURA et al., 2001).

Fernandes et al. (2005) identified the potentium larvicidal of *S. saponaria* for the control of bovine tick *B. microplus* through the crude ethanol extract (EEC) obtained from the bark and stem of the plant. Tick larvae were obtained by incubation of fattened females, collected from naturally infested cattle, were placed in filter paper envelopes impregnated with different Concentrations of EEC in the test group and distilled water in the control group. Four repetitions were performed with each solution (n > 120). Mortality was evidenced after 48 hours.

The effect of aqueous extracts of *Talisia esculenta* and *S. saponaria* were evaluated for the development and mortality of *Spodoptera frugiperda* of 8 to 14 days, an important corn pest. Corn leaves were dipped in aqueous extracts (1% w/v) and offered as food for caterpillars. *S. saponaria* appeared better than *T. squire*, mostrando that *S. saponaria* inhibits trypsin activity around 30% in samples with a concentration above 9.0 μg of proteins (SANTOS et al., 2008).
Studies prove the allelopathic potential of *S. saponaria*, with the extract of its leaves and fruits. The extract of mature leaves linearly increased the time of weed germination, while the extracts of young leaves of *S. saponaria* strongly inhibited germination (GRISI et al., 2012). As for the extract of fresh fruit from *S. saponaria* it was found that lettuce cipselas presented higher average germination speed than onion seeds. However, the latter species was the one that suffered the highest inhibition in germination percentage, presenting the highest sensitivity to the effect of the extract (GRISI et al., 2011).

The species, vernaculamente named monkey soap, is used in folk medicine to cure ulcers, external wounds and inflammations. The extract or syrup derived from the bark, root and fruits are used for astringent, antitussive, diuretic, calm, tonic and expectorant purposes. In Ceará (Brazil), the local population of the rural area uses the peel of the boiled fruit as a scar of injuries and scratches (CARVALHO, 2014). According to Pelegrini et al. (2008) the species has antimicrobial activity, molluscicidal activity, antiulcerogenic activity and antifungal activity against funds of the genus Candida.

Given the above and taking into account the importance and use in folk medicine, this study aimed to obtain alcoholic extract from *sapindus saponaria* L. leaves to perform phytochemical analysis in order to identify the secondary metabolites present in the species.

2 METHODOLOGY

The leaf samples of *S. saponaria* were collected near a lake located on a private property in the Maruanum community, rural area of the city of Macapá-AP, under the coordinates 0° 14.762' Latitude N and 51° 18.331'. No fertile materials of this species were collected in the area of study. However, according to records in the herbaria consulted, this species blooms from May to June and fruits from August to December. The plant was identified by the owner of the area who observed that the leaves rubbed with water formed a large amount of foam.

For dehydration, the vegetable material was placed in the drying oven for 40 minutes at 45°C. After this stage, 400 g of dry and ground plant material was obtained. For the preparation of the alcoholic extract, 2 L of alcohol 92.8% of concentration were used, it remained submerged for 2 days in this solution. Then filtering and adding alcohol was carried out.

The extract was concentrated in a round-bottomed glass balloon under low pressure in a rotary evaporator at a temperature of 59 °C. After the solvent was eliminated, the extract was transferred to a properly horny vial. After all the preparation of the show, phytochemical tests were performed. 18 qualitative phytochemical tests were performed, among which 4 gave positive results.

The qualitative phytochemical analysis for the detection of secondary metabolites such as saponins, reducing sugars, pyrocaric tannins, azulenos and depisidia and depsidonas were used the colorimetric
Obtaining alcoholic extract from leaves from species Sapindus Saponarial. (sapindaceae) for phytochemical analysis

3 CONCLUSION

Five positive tests and thirteen negative tests were obtained in the phytochemical analysis. The secondary metabolites identified were foamy saponins, reducing sugars, phenols and tannins, azulenos and desidious and depsidons (Table 1).

<table>
<thead>
<tr>
<th>Secondary Metabolites</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac glycosides</td>
<td>-</td>
</tr>
<tr>
<td>Saponis</td>
<td>+</td>
</tr>
<tr>
<td>Polysaccharides</td>
<td>-</td>
</tr>
<tr>
<td>Reducing sugars</td>
<td>+</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>-</td>
</tr>
<tr>
<td>Organic acids</td>
<td>-</td>
</tr>
<tr>
<td>Proteins and amino acids</td>
<td>-</td>
</tr>
<tr>
<td>Purines</td>
<td>-</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
</tr>
<tr>
<td>Anthraquinonas</td>
<td>-</td>
</tr>
<tr>
<td>Catechins</td>
<td>-</td>
</tr>
<tr>
<td>Phenols and tannins</td>
<td>+ (pyrogalic tannis)</td>
</tr>
<tr>
<td>Azulenos</td>
<td>+</td>
</tr>
<tr>
<td>Carotenoides</td>
<td>-</td>
</tr>
<tr>
<td>Coumarin derivates</td>
<td>-</td>
</tr>
<tr>
<td>Steroids and Triterrnoides</td>
<td>-</td>
</tr>
<tr>
<td>Delipidias and depsidonas</td>
<td>+</td>
</tr>
<tr>
<td>Sesquiterpenolacones and other lactose</td>
<td>-</td>
</tr>
</tbody>
</table>

Parameters: + Presence; He’s out of absence

Saponins could be identified by the formation of a layer of foam that remained for more than half an hour. Saponins can be described as steroid glycosides or polycyclic terpenes, have a lipophilic part (triterpene or steroid) and another hydrophilic part (sugars) that enables the property of reducing surface water tension, in addition to detergent and emulsifier action (DAMKE, 2009).

They are classified according to the fundamental number of aglycone, and also by their acidic, basic or neutral character. Thus, as for aglycone, steroidal saponins and triterpene saponins are called. Saponins are mainly related to the defense system. They are found in tissues that are most vulnerable to fungal, bacterial or predatory attack of insects (WINA et al., 2005).

The amphiphilic behavior of saponins and the ability to form complexos with steroids, proteins and membrane phospholipids enable varied biological actions. It is worth mentioning the action on cell membranes that can alter permeability or even lead to destruction. Related to this action onmembrane s are hemolytic, ichthyotoxic and molluscicidal activities (SIMÕES et al., 2010).
Its hypocholesterolemic action can be explained through the ability to link saponins with sterols (cholesterol), the mechanism of action could be explained by increased excretion of cholesterol by formation saponins administered orally, or by increasing fecal elimination of bile acids with greater use of cholesterol for the synthesis of these substances. Another proposal takes into account the irritating properties of saponins. membranes of the cells of the intestinal mucosa, an exfoliation would occur with loss of function and reduction of the absorption area. In addition, saponins may be associated with expectorant action, as they cause irritation in the respiratory tract, increasing the volume of respiratory fluid and reducing its viscosity. Another possibility would be related to its originating surface tension, lower viscosity and greater ease of mucus expulsion, diuretic activity is attributed to irritation of the renal epithelium caused by saponins. (SIMÕES et al., 2010).

The identification of reducing sugars was caused by the appearance of a red brick precipitate at the bottom of the test tube. Reducing sugars are electron donor carbohydrates (reduce oxidizing agents) because they have free or potentially free aldehyde groups or ketones, capable of reducing oxidizing agents. They are important in plants when there is water deficit, as it generates an increase in sucrose production that contributes to osmotic adjustment without increasing in the growth and photosynthesis of the planta (ROSÁRIO; ALMEIDA, 2016).

After performing the technique to identify tannins, the result was the formation of a dark precipitate of blue hue, indicating the presence of pyrogalic tannins (hydrolysable tannins). Plants rich in tannins are used in traditional medicine in the treatment of various diseases, such as diarrhea, hypertension, rheumatism among others besides esports biological activities such as bactericidal action, fungicide, antiviral, antitumor and molluscidal.

It is believed that the pharmacological activities of tannins are associated with three general characteristics that are common to a greater or lesser degree to the two groups of tannins, condensates and hydrolysable: complexion with metal ions (iron, manganese, vanadium, copper, aluminum, calcium, among others); antioxidant activity and free radical hijacking and also ability to complex with other molecules including macromolecules such as proteins and polysaccharides. Tannins help in the healing process of wounds, burns and inflammations by the formation of a protective layer on the damaged skin or mucosa. The antibacterial and fungicide actions are explained by 3 hypotheses, the first presupposes the inhibition of enzymes of bacteria and fungi and the complexion of the substrates for these enzymes; the second would be the action of tannins on the cell membranes of microorganisms, modifying their metabolism. And the third hypothesis speaks of the complexion of tannins with metal ions, thus decreasing the availability of these essential elements for the metabolism of microorganisms (SIMÕES et al., 2010).

The greenish coloration observed in the aqueous phase showed a small amount of pro-azulenos (sesquiterpene lactone). Sesquiterpenic lactones belong to a large group of natural products mainly found in plants. Its biosynthesis is due to the condensation of three isoprenic units and, subsequently, byenzyme-
mediated cycling and oxidative transformations, producing cis or trans lactone. The presence of the α-methylene-γ-lactone is usually a common feature among sesquiterpene lactone (DUKE; ROMAGNI; DAYAN, 2000; NEERMAN, 2003). They have given considerable attention due to their ecological functions, biological activities and taxonomic significance (STANEVA; TODOROVA; EVSTATIEVA, 2008).

Depídeos and depsidons are molecules of a phenolic nature. Phenolic compounds are from a group of metabolites that have a great structural diversity being simple or complex and that in at least one aromatic ring the atom replaced by hydroxyl group (SIMÕES et al., 2010).

This study is contrary to the explanation of the authors mentioned, since it proves the existence of this species in amapaense territory, with rare distribution, contributing to the enrichment of scientific studies about this species.

In this study, five class of secondary metabolites were identified and the identification of the species S. saponaria L. in amapaense soil, thus contributing to the scientific data regarding this species. It is important to highlight the need for further studies on the specimens of this plant encontradas here in the amapaense soil, in order to analyze whether our climate and soil influence many differences when compared with species from other regions.
REFERENCES


