Anti-Leishmania and immunomodulatory potential of extracts of *Campsiandra laurifolia* Benth. (Fabaceae)

Potencial anti-Leishmania e imunomodulador dos extratos de *Campsiandra laurifolia* Benth. (Fabaceae)

Potencial anti-*Leishmania* y inmunomodulador de extracto de *Campsiandra laurifolia* Benth. (Fabaceae)

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ABSTRACT

Infusions of leaves, bark and seeds of *Campsiandra laurifolia* Benth. (Fabaceae) are used by communities of African-American descendants of slaves (*quilombolas*) mainly for treatment of cutaneous leishmaniasis (CL), wounds, ulcers and tinea. Hydroalcoholic and aqueous extracts of *C. laurifolia* were investigated for anti-*Leishmania* activity on promastigotes and amastigotes of *Leishmania* (*L.*) *amazonensis* and immunomodulatory responses, including cell proliferation of splenocytes and NO production by peritoneal macrophages from BALB/c mice. The hydroalcoholic extracts of the bark and the aqueous extracts of the leaves and seeds presented a reduced activity against amastigotes and promastigotes (<20%), and the same result was observed for the inhibition of NO production by activated macrophages (<23%). Most of the extracts displayed a moderate immunosuppressive potential (32.6 to 38.5%); on the other hand, the aqueous extracts of seeds inhibited up to 87% of the growth of splenocytes of BALB/c mice stimulated with mitogens. Such activity may explain the use of *C. laurifolia* for the treatment of CL by *quilombolas*. Its use may not be mainly associated with a direct action on the parasite but with an anti-inflammatory activity because such activity decreases the tissue damage caused by the immune system in response to the infection and, consequently, aids the healing process of leishmanial lesions.

Keywords: Phytotherapy; Plant Extracts; Fabaceae; Leishmaniasis; Immunosuppression.

INTRODUCTION

Leishmaniasis is a complex of diseases that affects humans. The infection is caused by the inoculation of species from the genus *Leishmania* during blood feeding of insect vectors. Among these diseases, cutaneous leishmaniasis (CL) is particularly important in South America because of its chronicity, latency, and the potential to develop metastases that can lead to disfiguring lesions. Chemotherapy with pentavalent antimonial compounds is extensively used to treat this illness; however, its adverse effects, such as parenteral administration, extended treatment regimens, and the appearance of resistance warrant a search for alternative drugs that can be more effective[10,21].

Several classes of substances have already been isolated and have been shown to be bioactive, such as alkaloids, lignans, neolignans, terpenes and benzoic acid. However, out of the 97 substances discussed in the paper by Chan-Bacab and Pena-Rodriguez[4], only 2-n-propylquinoline, an alkaloid derived from the leaves of *Galipea longiflora* (Rutaceae), has been under clinical development for treatment of CL[9,10] because most substances tested in vivo show high levels of cytotoxicity and low activity when administered in moderate doses[4,2]. Notwithstanding, such efforts should be continued in order to develop new drugs because of the high variability of the lineages of *Leishmania* and the emergence of forms that are resistant to current treatments[10].

The *Campsiandra laurifolia* Benth. species, a leguminous plant from the family Fabaceae, is found in *igapós* (flooded areas) and on the banks of *igarapes* and

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rivers in the Brazilian states of Pará, Amapá and Amazonas. The *Manaiara*, as it is commonly known, is used mainly for the treatment of wounds, impetigo, malaria, and ulcers[23]. The community of Arancuã, one of the 27 remaining *quilombos* (settlements of African descendents who resisted slavery) in this region, lies on the banks of the Trombetas river, close to the city of Oriximiná in the western part of the state of Pará. This population is often annually exposed to the CL vector from January to March. During this period, the members reside in forest areas to collect Brazil nuts[1]. This community uses both infusion of the leaves and the starch of the fruit obtained from aqueous maceration and drying under in the sun for the treatment against cutaneous leishmaniasis. The absence of chemical and biological studies on *C. laurifolia*, its common use and the large number of prescriptions for use justify the need for a preliminary screening of this species. The main objective of this study was to investigate the immunomodulator and anti-Leishmania potentials of analyzed extracts of *C. laurifolia* according to the traditional knowledge of the *quilombo* communities, as well as toperform, a preliminary chemical study of the extracts that presented biological activities.

METHOD AND MATERIALS

COLLECTION OF BOTANIC MATERIAL

In September 2002 we collected leaves, stem bark and seeds of *C. laurifolia* in the community of Arancuã (596,083.59 E; 9,833,128.18 N-UTM), one of 27 remaining *quilombos* situated on the banks of the Trombetas River in Oriximiná, Pará. This species was selected from an ethnobotanical survey conducted in May 2002[3], which focused on the identification of the species most frequently used by the community for the treatment for CL. Species identification was conducted by botanist Elisabeth van den Berg in the herbarium of the Museu Paraense Emílio Goeldi, Belém, Pará.

ETHICAL CONSIDERATIONS

Collection activities were initiated after obtaining the consent of the community through signatures on an informed consent form (ICF) by its main representatives.

PRODUCTION OF THE EXTRACTS

After grinding the collected material (Wiley Mill), aqueous extracts were prepared through maceration of the leaves (1000 g) in water at room temperature (cold water leaf extract, CWLE) and at 50° C (hot water leaf extract, HWLE) for eight days. The filtrate was then concentrated using a lyophilizer. The stem bark (550 g) was ground in the mill and macerated in hydro alcoholic solvent (ethanol/water, 1:1) for 15 days. Following this, the filtrate was concentrated in a rotary evaporator at 50° C (hydro alcohol shell extract, HASE). To prepare the aqueous extract of the seeds, the material was ground in a domestic grater, steeped in water at room temperature and then immediately filtered. The solids were then obtained using a freeze dryer (aqueous extract of seed produced in the laboratory, ASL). In this study, ASC (aqueous extract of seed produced by the community) was also tested because the aqueous-phase macerate generated by this extraction results in a dry powder that is different in texture and color from the extract obtained in the laboratory. All extracts were diluted to 1% DMSO (Sigma, USA) to prepare a stock solution (10 mg/mL) that was stored at -20° C until use.

ANIMALS

The female BALB/c mice, aged between 2 and 3 months (n = 1/essay) used in this study were obtained from the vivarium of the Instituto Evandro Chagas, Belém, Pará. The animals were euthanized in a chamber with CO_2 and ether.

CULTIVATION OF PARASITES

Promastigotes of *Leishmania* (*Leishmania*) *amazonensis* (IFLA/BR/67/PH8) were grown at 27° C in a complete medium consisting of RPMI 1640 (Sigma, USA), containing 10% inactivated fetal bovine serum (FBS) (Gibco, USA), L-glutamine, 2 mM (Sigma, USA), sodium pyruvate, 1.25 mM (Merk, Germany), penicillin, 100 IU/mL, streptomycin 100 μg/mL (Sigma, USA) and 2-mercaptoethanol, 50 M (Gibco, USA).

OBTAINING SPLEEN CELLS AND PERITONEAL MACROPHAGES

Mice were euthanized with CO_2 or ether and spleen cells or resident peritoneal cavity cells were thereafter removed in an aseptic environment. To obtain splenocytes, the spleen was homogenized in RPMI-1640, and then the supernatant of this suspension was washed twice in RPMI-1640 (10 min at 1500 rpm at 10° C). Resident macrophages were collected from the peritoneal cavity in Hank's medium (Sigma, USA) and washed in RPMI-1640 twice (10 min at 1500 rpm at 10° C). The number of spleen cells and macrophages after washing was determined using an optical microscope and adjusted according to tests in RPMI-1640 containing 10% fetal bovine serum, 100 IU/mL penicillin and 100 g/mL streptomycin (complete medium).

ASSESSMENT OF THE CYTOTOXICITY OF PLANT EXTRACTS

Spleen cells (6 x 10^6 cells/well) were distributed in 96-well culture plates (Costar) and incubated (37° C for 24 h, 5% CO_2 and 95% air) in the presence of the plant extracts (1 and 0.1 mg/mL) and ^{3}H-thymidine (1 C/well) (Amersham Life Science, England). Controls that consisted of (i) suspension of cells and culture medium (negative control) and (ii) suspension of cells and saponin (Sigma, USA) (1 mg/mL) (positive control) were used. After incubation, cells were collected in fiberglass membranes for the counting of incorporated radioactivity by a counter (scintillator, Tri-cab-2100TR, Packard). The percentage of viable cells was determined by the cytotoxicity index (CI) provided by the amount of ^{3}H-thymidine incorporated by cells treated with extracts compared to cells of the negative control.

EVALUATION OF THE ANTI-PROMASTIGOTE ACTIVITIES

Promastigotes of *L. (L.) amazonensis* that were produced during the logarithmic growth phase (3-4 days) were collected by centrifugation and suspended in complete RPMI (5 x 10^7 parasites/mL) for distribution in a 96-well culture plate. Suspensions were then incubated (26° C for 24 h) in the presence of extracts (0.1 mg/mL). Controls consisted of (i) suspension of promastigotes and culture medium and (ii) suspension of promastigotes and amphotericin B (Sigma, U.S.) (25 g/mL). After incubation, MTT (3 - (4,5-dimethyithiazol-2-yl) -2,5-diphenyltetrazolium bromide) (Sigma, USA) (5 mg/mL) was added to the culture and reincubated (3 h at 26° C). The viability of promastigotes was evaluated based on the metabolism of MTT, which is proportional to the absorbance value generated through the use of a spectrophotometer on a wavelength of about 570 nm. The percentage of viable parasites was determined by the inhibition of promastigote growth (IP), provided by the absorbance rate of the parasites treated with the extract compared to the negative control.

EVALUATION OF THE ANTI-AMASTIGOTE ACTIVITY

Peritoneal cells (1 x 10^5 macrophages/well) were added to Eppendorf tubes and incubated in a humid atmosphere (37° C for 3 h, 5% CO_2 and 95% air) with promastigotes of *L. (L.) amazonensis* (5 x 10^5 parasites/well) in a ratio of 5:1 (macrophage/promastigote). After infection of the macrophages, they were incubated (37° C for 24 h, 5% CO_2 and 95% air) in the presence of plant extracts (1 mg/mL). After incubation, a volume of 100 L of culture was removed and transferred to slides for cytospin centrifugation (Fanem, São Paulo) for 5 min at 500 rpm. These slides were then fixed with absolute methanol (Cromato Produtos Químicos Ltda.) for staining with Giemsa dye and subsequently analyzed under a microscope. The number of intracellular amastigotes was determined by counting amastigotes in 100 macrophages per sample. The results were expressed as percentage of inhibition in relation to the negative control wells containing only cells and RPMI medium[7,24].

EVALUATION OF THE INHIBITION OF CELL PROLIFERATION

Spleen cells (4 x 10^6 cells/well) were distributed in a 96-well plate and incubated (37° C for 36 h, 5% CO_2 and 95% air) with concanavalin A (1 g/mL) and extracts of *C. laurifolia* (0.1 mg/mL). After incubation, a volume of 10 L of ^{3}H-thymidine (1 Ci) was added and the mixture was reincubated (37° C for 12 h, 5% CO_2 and 95% air). The cells were then collected in glass fiber membranes and placed in a radiation counter[15]. The percentage of inhibition of lymphoproliferation was measured according to an index of incorporation inhibition of ^{3}H-thymidine in cultured cells stimulated with concavalin A (ConA) in the presence of extracts compared to cells grown only in the presence of the extracts.

EVALUATION OF THE INHIBITION OF NITRIC OXIDE PRODUCTION

Peritoneal macrophages (1 x 10^6 cells/well) were distributed onto a 96-well culture plate for incubation in a humid atmosphere (37° C for 2 h, 5% CO_2 and 95% air). After the removal of non-adherent cells, IFN- (5 ng/mL) and extracts of *C. laurifolia* (0.1 mg/mL) were added to the LPS culture (Sigma, USA) (*Escherichia coli lipopolysaccharides* 0111: B4) (500 ng/mL)s. The negative control consisted of adhered cells, complete RPMI, LPS (500 ng/mL) and IFN- (5 ng/mL), and the positive control contained only adhered cells and complete RPMI. Plates were then incubated (37° C for 24 h, 5% CO_2 and 95% air). Next, the culture supernatants were aspirated and the nitric oxide (NO) produced was measured according to the Griess method[5]. The percentage of inhibition was determined by an index of inhibition of NO production in cells treated with the extract compared to the production of NO in cells not treated with the extract.

SPECTRUM OF NUCLEAR MAGNETIC RESONANCE AND PHYTOCHEMICAL SCREENING

The ^{1}H NMR spectra at 300 MHz were recorded on a Mercury 300/Varian (DQ-UFPA) spectrometer, whereas those at 500 MHz were recorded on a DRX500/Bruker spectrometer (CENAUREN-DQ-UFC). To perform the phytochemical analysis, a standard solution with a lyophilized extract of the seeds was prepared. About 5 g of extract were transferred to a beaker and dissolved in 30 mL of 80% alcohol. The resulting solution was placed in a water bath for 30 min and filtered under pressure. Chemical tests were made with the remaining solution to verify the presence of the following classes of secondary metabolites: alkaloids, flavonoids, tannins, saponins, steroids, triterpenoids, and anthraquinone.

STATISTICAL ANALYSIS

The data obtained in this study were analyzed using the analysis of variance (ANOVA) test in the GraphPad InStat program.

RESULTS

In the biological tests, none of the *C. laurifolia* extracts were cytotoxic in concentrations of 0.1 mg/mL, ranging from 0.6% (HASE) to 14.4% (HWLE), which are lower than the rate considered positive for cytotoxicity (30%) as well as the saponin control (p 0.01) (data not shown). Although this concentration has been standardized for almost all tests, the concentration of 1 mg/mL was later evaluated and used to investigate intracellular antiamastigota activity. However, despite the concentration, which was 10 times greater than the first, the CI ranged from 0% (HWLE, CWLE) to 3.8% (HASE); this result suggests the absence of toxic activity against the macrophages, even when high concentrations of the extracts are used. The extracts also revealed low levels of

cytotoxins for both the promastigotes (3.3%) (Figure 1) and the intracellular *L. (L.) amazonensis* amastigotes (20%) (Figure 2). The inhibition of NO production in activated macrophages also presented low rates. This percentage ranged from 14% (ASL) to 23% (HASE), differing significantly from the negative control (Figure 3). However, these extracts significantly inhibited the proliferation of spleen cells isolated from BALB/c mice cultured with ConA. The inhibitory effect of lymphocyte proliferation was more evident in the ASC extract, reaching 86% (Figure 4A), and could be observed to a lesser extent in the other extracts (33.8% to 38.5%) when evaluated at a concentration of 0.1 mg/mL. The ASL extract showed levels of inhibition similar to ASC only when tested at a concentration 10 times higher (1 mg/mL) (Figure 4B).

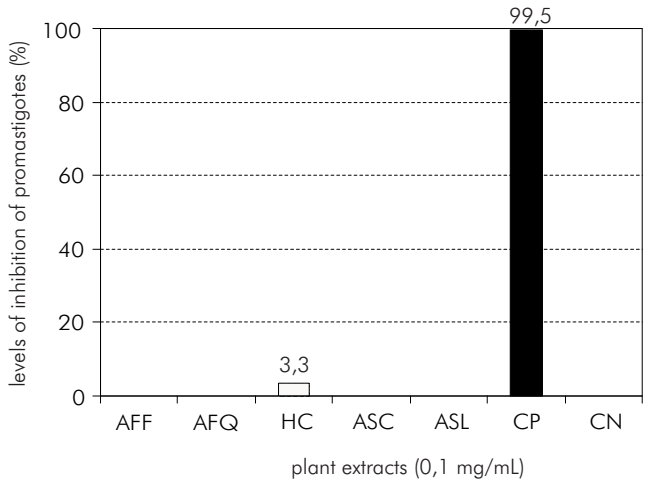

Figure 1 — Leishmanicidal effect of *Campsiandra laurifolia* Benth. extracts on promastigotes of *Leishmania (Leishmania) amazonensis* grown in the presence of the following plant extracts (0.1 mg/mL): cold water leaf extract (CWLE), hot water leaf extract (HWLE), hydro alcoholic shell extract bark (HASE), aqueous seed produced by the community (ASC) and aqueous seed produced in the laboratory (ASL). The negative and positive controls are the culture medium (NC) and amphotericin B 0.025 mg/mL (PC), respectively. The inhibition rate of the promastigotes expresses the ratio between viable promastigotes* treated with the test extract and those that were not treated. Difference between the positive control and the other treatments was defined as p 0.001

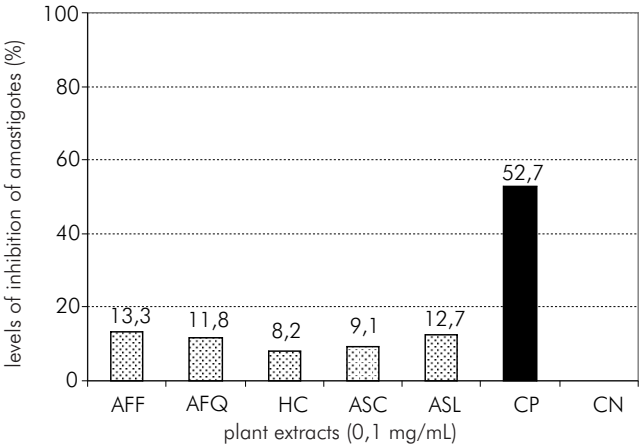

Figure 2 — Leishmanicidal effect of *Campsiandra laurifolia* Benth. extracts on amastigotes of *Leishmania* (*Leishmania*) *amazonensis*. Peritoneal macrophages (MØ) of BALB/c mice infected with promastigotes of *L. (L.) amazonensis* and cultured in the presence of the following plant extracts (1 mg/mL): cold water leaf extract (CWLE), hot water leaf extract (HWLE), hydro alcoholic shell extract bark (HASE), aqueous seed produced by the community (ASC) and aqueous seed produced in the laboratory (ASL). The negative and positive controls were the culture medium (NC) and amphotericin B 0.025 mg/mL (PC), respectively. The inhibition rate of the amastigotes expresses the ratio between viable amastigotes† treated with the test extract and those that were not treated. The difference between the positive control and other treatments was defined as p 0.05

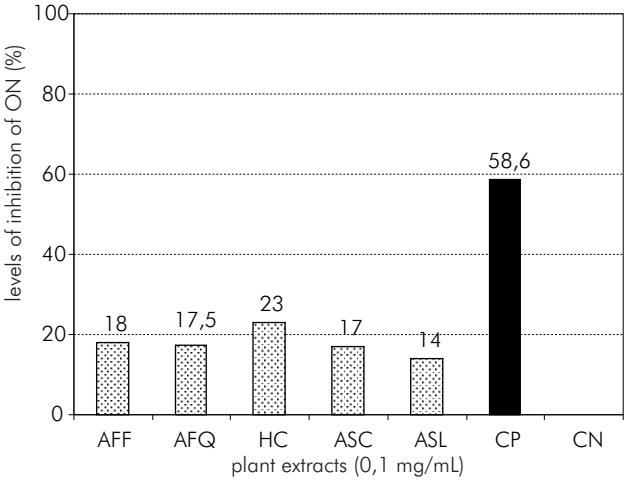

Figure 3 – Effect of extracts of *Campsiandra laurifolia* Benth. on the production of nitric oxide (NO) in activated macrophages. Peritoneal macrophages (M) from BALB / c mice cultured in the presence of LPS (500 ng/mL) and IFN- (5 ng/mL) and the following plant extracts: [**A**] cold water leaf extract (CWLE), hot water leaf extract (HWLE), hydro alcoholic shell extract bark (HASE), aqueous seed produced by the community (ASC) with a concentration of 0.1 mg/mL; [**B**] aqueous seed produced in the laboratory (ASL) with concentrations of 0.01, 0.1, 1 mg/mL. The negative and positive controls were the culture medium with LPS and IFN- (NC) and medium culture (PC), respectively. The inhibition rate of nitric oxide production was expressed by the ratio between levels of NO‡ produced by treated cells and those not treated with the test extract. The difference between the positive control and other treatments was defined as p 0.001

* Metabolization of MTT.

† Microscopic analysis of samples stained with Giemsa.

‡ Griess method.

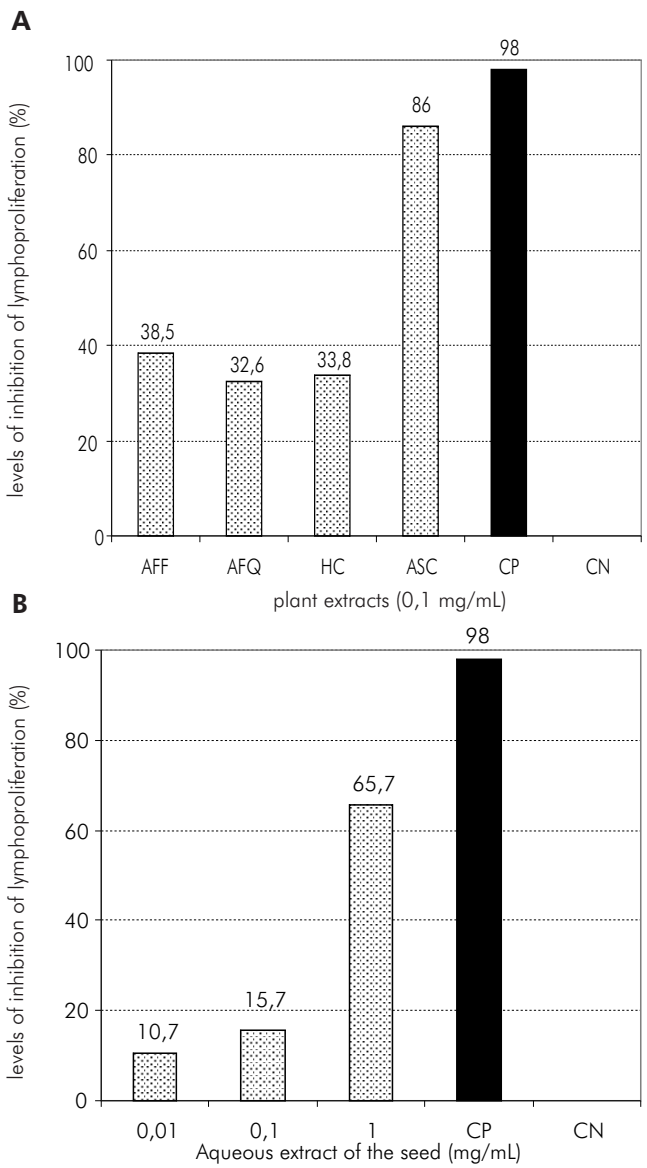

Figure 4 – Effect of extracts of *Campsiandra laurifolia* Benth. on cell lymphoproliferation. Splenocytes from BALB / c mice cultured in the presence of mitogen (ConA, 0.001 mg/mL) and the following extracts: [**A**] cold water leaf extract (CWLE), hot water leaf extract (HWLE), hydro alcoholic shell extract bark (HASE), aqueous seed produced by the community (ASC) with a concentration of 0.1 mg/mL; [**B**] aqueous seed produced in the laboratory (ASL) with concentrations of 0.01, 0.1, 1 mg/mL. The negative and positive controls were the culture medium with mitogen (NC) and medium culture (PC), respectively. The inhibition rate of lymphocyte proliferation was expressed by the ratio between viable cells that were treated with a dilution of the test extract and those not treated. The difference between the positive control and the other treatments was defined as p 0.001

Chromatograms and ^{1}H NMR spectra were observed to determine if there were chemical differences between the ASC and ASL extracts that could explain different biological activities. This preliminary chemical analysis noted that the physical differences between the ASC (brown and grainy) and ASL (fine white powder) and their associated biological activities may have resulted from the absence of polar substances, according to the chromatogram and ^{1}H NMR spectrum data of the ASC (data not shown), which occurred during the removal of the solvent.

DISCUSSION

In an ethnobotanical survey carried out in the community of Arancuã, Belém and Menezes[3] identified 12 plant species used by communities for the treatment of LC and *C. laurifolia*. The popularity of the medicinal properties of *C. laurifolia* and the lack of chemical and biological studies on this plant prompted our selection of *C. laurifolia* for the assessment of anti-Leishmania and immunomodulation activities by a preliminary chemical analysis of bioactive extracts. Extracts of various parts of the plant were obtained in the laboratory and an aqueous extract of seed produced by a shaman in the community (ASC).

With respect to their anti-Leishmania activity, all extracts showed low levels of cytotoxicity for both promastigotes and amastigotes of *L. (L.) amazonensis*. Low levels of inhibition of NO were also noted for all the extracts. The extract of the seeds, however, revealed a high immunosuppressant potential, and the ASC presented the highest potential (0.1 mg/mL) (Figure 4A and 4B).

To assess the biological differences between the two modes of preparation (ASL and ASC), the LC-suppressing powder, which resulted from an aqueous extract of the seed, underwent a preliminary phytochemical study. Our attention, however, was directed to the very obvious physical differences between the extracts, i.e., different colors and textures, which may suggest a possible chemical distinction between them. It was speculated that such changes would result mainly from photochemical reactions (exposure to the sun) that occurred with the ASC extract during the removal of the solvent because some polar substances present in this extract were not highlighted in the ASL when observing the NMR ^{1}H spectrum (data not shown). The production of less polar substances may have significantly reduced the immunosuppressive potential of ASL as compared to ASC (0.1 mg/mL).

In general, the measurement of immunosuppression is based on the detection of cell growth that resulted from activation or culture conditions. The inhibition can occur when cell growth factors are removed or when there is induction of energy of apoptosis[15]. Given that the extracts of *C. laurifolia* have low cytotoxicity, it is likely that it suppresses mediators of growth rather than inducing cell death, like fractions of *Boerhavia diffusa* L. (Nyctaginaceae) alkaloids[17]. In addition, the lymphoproliferation inhibition rate of the aqueous seed extract (86%) was not statistically different from the value found in cells grown in the absence of mitogenic stimulus (98%), the positive control.

The inhibition of lymphoproliferation was also observed in the aqueous extract of *Osbeckia aspera* L. (Melastomaceae), a plant that is traditionally used by indigenous people for the treatment of liver diseases. It

§ Incorporation of ^{3}H-thymidine.

provides protection against hepatotoxicity most likely because the inhibition of cell growth leads to a decrease in inflammation levels[18]. This correlation was also made by Punzon[19], who used hydromethanolic extracts of *Phlebodium decumanum* Willd. (Polypodiaceae) to demonstrate that the inhibition of cellular growth was accompanied by decreased levels of IL-1 and TNF. The reduction of the biological activity of these cytokines may lead to the impairment of the factors that control proinflammatory genes and inducible nitric oxide synthase (iNOS), which generated interest as anti-inflammatory agents, mainly for the treatment of rheumatoid arthritis. Other species, such as *raphe officinalis* (Euphorbiaceae) and *Evolvulus alsinoides* L. (Leguminoseae), have immunosuppressive activities associated with the reduction of follicular aggression of the lymphocytes in adjuvant-induced inflammation of rheumatoid arthritis in murine models[11].

However, regardless of the mode of drug action, inhibition of cell proliferation appears to be associated with anti-inflammatory activity, as the reduction of cell growth implies a decrease in both soluble receptors produced by these cells and proteases that convert inactive precursors into active ones[19].

Since the skin lesions caused by *Leishmania* spp. in the early stages of infection include inflammatory reactions involving activity of lymphocytes, plasma cells, macrophages, and in many cases, granulomatous reactions[16,13], drugs with potential anti-inflammatory properties can help heal these injuries. This drug development supports the use of *C. laurifolia* for the treatment of LCA by the *quilombola* communities because its activity might not be associated with a direct action on the parasite, but rather with important anti-inflammatory activities that reduce the tissue damage caused by the immune system in response to infection.

This in vivo anti-inflammatory action may be enhanced by the fact that the extracts of *C. laurifolia* present a small potential for inhibiting the production of NO in activated macrophages (Figure 3). Higher levels of this metabolite, which should only be toxic to microorganisms, parasites or tumor cells, can also damage healthy cells nearby, given that it is the mechanism responsible for most inflammatory and autoimmune processes[11,8,14,25]. The importance of observing preparation of plant extract is worth noting because the activity described by one ethnic group may be associated with the particular mode of its acquisition, such as the ASC extract, which acquires its immunosuppressant activity by the type of solvent used (river water rich in organic matter and humic acids) and the process by which the solvent is eliminated (exposure to the sun[12]). Other tests are required, especially using fractions isolated from the ASC and ASL extracts, to clarify which substances are allegedly involved in the immunosuppressive activity of this plant.

CONCLUSION

Anti-Leishmania activity was not detected in any of the extracts of *C. laurifolia*. However, the seed extracts, especially those produced by the community studied (ASC), have satisfactory immunosuppressant potential. Purified fractions of these extracts should be evaluated, especially polar fractions, in order to investigate the immunomodulatory and anti-inflammatory potential of the species.

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Potencial anti-Leishmania e imunomodulador dos extratos de *Campsiandra laurifolia* Benth. (Fabaceae)

RESUMO

Infusões das folhas, cascas e sementes de *Campsiandra laurifolia* Benth. (Fabaceae) são utilizadas por comunidade de negros descendentes de escravos (quilombolas) para o tratamento, principalmente, de leishmaniose cutânea (LC), feridas, úlceras e impigens. Extratos hidroalcóolicos e aquosos de *C. laurifolia* foram investigados para a atividade anti-*Leishmania* sobre promastigotas e amastigota de *Leishmania* (*L.*) *amazonensis* e resposta imunomoduladora: proliferação celular de esplenócitos e produção ON por macrófagos peritoniais de camundongos BALB/c. Os extratos hidroalcóolicos da casca e aquosos da folha e semente apresentaram reduzida atividade contra as formas amastigotas e promastigotas (<20%) e o mesmo foi observado para a inibição da produção de ON por macrófagos ativados (<23%). A maioria dos extratos revelou moderado potencial imunossupressor (32,6% a 38,5%), mas os extratos aquosos da semente (AS) inibiram em até 87% o crescimento de esplenócitos de BALB/c estimulados com mitógenos. Tal atividade talvez explique a indicação quilombola de *C. laurifolia* para o tratamento de LC, pois o seu uso pode não estar associado majoritariamente com uma ação direta sobre o parasito, mas sim com uma atividade anti-inflamatória, de vez que, tal atividade diminui os danos teciduais causados pelo sistema imune em resposta à infecção e, consequentemente, ajuda na cicatrização das lesões leishmanióticas.

Palavras-chave: Fitoterapia; Extratos Vegetais; Fabaceae; Leishmaniose; Imunossupressão.

Potencial anti-*Leishmania* y inmunomodulador de extracto de *Campsiandra laurifolia* Benth. (Fabaceae)

RESUMEN

Las infusiones de las hojas, cortezas y semillas de *Campsiandra laurifolia* Benth. (Fabaceae) son utilizadas por las comunidades de descendientes de esclavos negros (denominados *quilombos*) para el tratamiento, principalmente, de la leishmaniasis cutánea (LC), de heridas en la piel, de úlceras e impétigo. Se investigó con extractos hidroalcohólicos y acuosos de *C. laurifolia* la actividad anti-*Leishmania* en promastigotes de *Leishmania* (*L.*) *amazonensis* y la respuesta inmunomoduladora: proliferación celular de esplenocitos y producción de ON por macrófagos peritoneales de ratones BALB/c. Los extractos hidroalcohólicos de la corteza y acuosos de la hoja y de la semilla presentaron una menor actividad frente a las formas de amastigotes y promastigotes (20%) y el mismo se observó para la inhibición de la producción de ON por los macrófagos activados (23%). La mayoría de los extractos presentaron un moderado potencial inmunosupresor (de 32,6% a 38,5%), pero los extractos acuosos de la semilla (AS) inhiben hasta un 87% el crecimiento de esplenocitos BALB/c estimulados con mitógenos. Esa actividad puede explicar la indicación de los descendientes de *quilombos* (*quilombolas*) del uso de *C. laurifolia* para el tratamiento de LC, ya que su uso puede no estar asociado principalmente con una acción directa sobre el parásito, sino con una actividad inflamatoria, pues esa actividad disminuye el daño tisular causado por el sistema inmunológico en respuesta a la infección y, en consecuencia, ayuda en la cicratización de las lesiones ocasionadas por la leishmaniasis.

Palabras clave: Fitoterapia; Extractos Vegetales; Fabaceae; Leishmaniasis; Inmunosupresión.

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