Immunomodulatory activity of Madhuca longifolia

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ABSTRACT

The present study was undertaken to evaluate the effect of Madhuca latifolia on immunomodulatory activity that comprises of screening to identify the activity of ethanolic extract of Madhuca latifolia on humoral and cell mediated immunity (specific immune response). Experiments were conducted in vivo in Swiss albino mice. Madhuca latifolia ethanolic extract was found to enhance humoral immune response on 7th day by 13 % as compared to the standard control cyclophosphamide that exhibited 54 % humoral immune response, whereas cell mediated immune response was observed with an enhancement in the values (20.27%) in comparison with control cyclosporine (37.63%).

Keywords: Madhuca latifolia, Immunomodulation, haemagglutination titre (HT), delayed type of hypersensitivity (DTH) response.

INTRODUCTION

A large number of plants and their isolated constituents have been shown to have potential immunity. Some medicinal plants have been shown to exert immunomodulatory and anti-cancer activity [1,2,3]. Madhuca latifolia commonly known as mahua belongs to the family Sapotaceae. Mahua is a large, shady,deciduous tree dotting much of the central Indian landscape, both wild and cultivated. In the folk medicinal system of India, various parts of the tree are used, namely whole young plants, leaves, stems, barks, roots, fruits, flowers, and seeds. The different ailments treated with these parts include tuberculosis, rheumatoid arthritis, cholera, paralysis, snake-bite, debility, tonsillitis, influenza, piles, arthritic pain, helminthiasis, low semen count, headache, flatulence, and infections, besides being used as a blood purifier and as an antidote to poison.

In the present communication, authors have set forth the objective of screening the immunomodulatory potential of this valuable plant in mice.

MATERIALS AND METHODS

Plant material and preparation of extracts

Madhuca latifolia plant parts (flower, fruit, bark and leaf) were collected from February to March 2009, from Allahabad. The whole plants ethanolic extract was used for studying the immunomodulatory properties. Plant materials were dried at 37°C, powdered and extracted in alcohol. Extract was fine-filtered and freeze dried. For the preparation of the extracts, dried ground plant material was percolated with 95% alcohol and concentrated to dryness.
under reduced pressure. The samples were prepared in double distilled water along with 0.1% acacia gum for immunomodulatory test. Swiss mice were obtained from the Central Drug Research Institute (CDRI), Lucknow (average weigh 25±3 g). The animals were housed in standard environmental conditions.

Preparation of sheep red blood cells (SRBC) antigen
SRBC were collected aseptically from Jugular vein of sheep, stored in cold sterile Alsever’s solution for immunization and challenge, at required time schedule. Stored sheep blood cells were centrifuged and washed three times with pyogen free sterile normal saline (0.85% NaCl w/v) and adjusted to a required concentration for immunization. Humoral antibody response (Hab) was analyzed using standard method. The mice were immunized by injecting 0.2 ml of 5×10⁹ SRBC / ml i.p. and plant extracts were administered orally (100mg/Kg body. wt.) for 5 consequent days after immunization. Two parallel controls were run simultaneously. One of them received only normal saline water, named 'Normal Control', while the other received Levamisole (2.5 mg / Kg body wt.) and Cyclophosphamide (250 mg/Kg body wt. post oral). The mean titre values of the drug treated groups were compared with the normal control.

Delayed type hypersensitivity (DTH-CMI) method was employed to access SRBC induced DTH response in mice. Mice were immunized by injecting 20µl of 5×10⁹ SRBC/ subcutaneously into the right hind footpad. The day of sensitization was designated as day 0. Seven days later the thickness of the left hind footpad was measured using a spheromicrometer (0.01mm pitch) and considered as control. Then the sensitized mice were challenged with the same amount of SRBC i/m into the left hind footpad. The test materials (doses= 100 mg/Kg body weight) were administered orally with a metal feeding cannula for 7 days from the day of immunization. The control animals were given an equal volume of 1% Gum acacia as vehicle. The challenging dose of 20µl of 5×10⁹ SRBC/ml in mice were injected to assess the standard control response for DTH[4,5]. Swiss mice (n=6) were treated daily with Madhuca latifolia extract (100mg/kg) ip for 5 days. Blood samples were collected by puncturing the retro-orbital plexus. Total WBC and RBC count was determined using a hemocytometer. A normal control group received normal saline (5mg/kg/ip) and positive control group treated with 5-Fluorouracil (5-FU), an anticancer drug.

RESULTS AND DISCUSSION

Madhuca latifolia commonly known as mahua is a highly valued medicinal plant with diverse therapeutic uses in the traditional Indian systems of medicines such as Ayurveda, Unani and Siddha. There are several medicinal plants that are considered to possess immunomodulatory properties [6,7]. Madhuca latifolia ethanolic extract was found to enhance humoral immune response on 7th day by 13% as compared to the control cyclophosphamide (54%), where as cell mediated immune response was enhanced to 20.27% in comparison with control cyclosporine (37.63%). The effect of methanolic extract of the plant on the hematological parameters of the tumour bearing mice showed an increase in number of RBCs but a decrease in WBCs compared to the control mice. These data were based on the differential leucocyte count by Leishman staining. A number of plants used in traditional medicines have been shown to stimulate or inhibit immune responses, and several active principles have been isolated and characterized from plants [8].

![Immunomodulatory Activity of Madhuca latifolia](image-url)
Mahua seeds are of economic importance as they are good source of edible fats. The distilled juice of the flower is considered a tonic, both nutritional and cooling and also in treatment of helminthes, acute and chronic tonsillitis, as well as bronchitis [9]. The leaves are applied as a poultice to relieve eczema. The aerial parts are used for treatment of inflammation [10]. The bark is a good remedy for itch, swelling, fractures and snake-bite poisoning, internally employed in diabetes mellitus. Previous phytochemical studies on Madhuca indica included characterization of sapogenins, triterpenoids, steroids, saponins, flavonoids and glycosides [11, 12].

Two protobassic glycosides, namely madhucosides A and B have been isolated from the bark of this tree [13]. The two compounds showed significant inhibitory effects on both superoxide release from polymorphonuclear cells, and hypochlorous acid generation from neutrophils.

Like hepatic disorders, rheumatoid arthritis, constipation, diabetes, coughs, asthma, itches, wounds, stomachache, diarrhea, dysentery, pain, typhoid, pneumonia, toothache, cancer, flatulence, body ache, and bone fractures.

Plant contains saponia barriania. Bark contain cupeol acetate, b-amyrn acetate, a spinasterol, erythrodiamonocaprytase, betulinic and oleunolic acids, caprylaises, xylose, rhamnose, glucose, galactose leaves contains b- esosteroles acid, myricelin. Seeds contain cupeol acetate, b-amyrn acetate, a spinasterol, erythrodidlamonocaprytase, betulinic and oleunolic acids, caprylaises, xylose, rhamnose, glucose, galactose leaves contains b- esosteroles acid, myricelin. Seeds contain cupeol acetate, b-amyrn acetate, a spinasterol, erythrodidlamonocaprytase, betulinic and oleunolic acids, caprylaises, xylose, rhamnose, glucose, galactose leaves contains b- esosteroles acid, myricelin. Seeds contain cupeol acetate, b-amyrn acetate, a spinasterol, erythrodidlamonocaprytase, betulinic and oleunolic acids, caprylaises, xylose, rhamnose, glucose, galactose leaves contains b- esosteroles acid, myricelin. Seeds contain cupeol acetate, b-amyrn acetate, a spinasterol, erythrodidlamonocaprytase, betulinic and oleunolic acids, caprylaises, xylose, rhamnose, glucose, galactose leaves contains b- esosteroles acid, myricelin.

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