INFLUENCE OF GYMNEMA SYLVESTRE ON INFLAMMATION

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ABSTRACT


The aqueous extract of Gymnema sylvestre leaves (GSE) tested on various inflammatory models showed anti-inflammatory activity by significantly inhibiting carrageenan-induced rat paw oedema and peritoneal ascites in mice. GSE elevated liver enzymes (e.g. y-glutamyl transpeptidase (y-GT) and superoxide dismutase (SOD)) showing a protective mechanism against the release of slow-reacting substances and free radicals. GSE did not inhibit granuloma formation and related biochemical indices, such as hydroxyproline and collagen. GSE in high doses did not affect the integrity of the gastric mucosa and appears to be a less gastrotoxic anti-inflammatory agent when compared with other non-steroidal anti-inflammatory agents.

Keywords: Gymnema sylvestre, plant extract, oedema, granuloma, y-glutamyl transpeptidase, superoxide dismutase

INTRODUCTION

Gymnema of the Asclepediaceae family is a widely occurring plant in central and peninsular India [1]. The leaves are known to contain a variety of chemical compounds, including acidic glycosides and anthraquinone derivatives. A variety of biological activity, including antidiabetic, insulinotropic and antiviral, is reported [2–4]. The preliminary study revealed that GSE has moderate anti-inflammatory activity; however, a literature survey provided no reports on this aspect. Hence, the present study was undertaken to explore the anti-inflammatory activity of GSE in animal models with biochemical parameters.

MATERIALS AND METHODS

Extract preparation

The dried leaves (50 g) were suspended in cold distilled water for 48 h. The water-soluble portion was lyophilized and the water-soluble compound obtained (2.4 g) was used, as Gymnema sylvestre extract (GSE).
Rat paw oedema

Wistar rats of either sex weighing 150–180 g were used in the experiment as described by Diwan and Singh [5]. Overnight fasted animals were injected with 0.1 ml of 1% carrageenan into the left paw. Paw volume at 0 h was measured by digital plethysmometer (Ugo Basile, Italy). GSE at 200, 400 and 600 mg/kg po and naproxen 200 mg/kg po were administered 1 h before oedemogen challenge. Three hours later, the volume of the same paw was measured and the difference from the 0 h reading was calculated. Values were expressed as percentage inhibition of rat paw volume [5].

Inhibition of ascites in mice

Albino mice of either sex weighing 20–25 g were used in this experiment. The method described by Diwan and Kulkarni was employed [6]. The animals were fasted overnight. Naproxen, 100 mg/kg, and GSE, 600 mg/kg, were administered in 0.5% gum acacia suspension. An hour later, all animals received ip 0.2 ml of 4% formaldehyde (37% pure). Animals were starved for a further 6 h and later killed by cervical dislocation. The peritoneal fluid was collected by incising the abdomen. Volume of fluid collected was measured and expressed as percentage inhibition with respect to control.

Pith granuloma

The method of Diwan and Kulkarni was employed [7]. Rats weighing 150–200 g were used for the experiment. The cylindrical piths, measuring 1.5 cm x 0.4 mm were sterilized and implanted subcutaneously, one in each groin and axilla region, under light ether anaesthesia. Naproxen, 100 mg/kg, and GSE, 600 mg/kg, were administered for 7 days. On the 8th day, the granulomas with the piths were dissected out, dried overnight at 60°C and weighed. The dry weight was expressed as mg/100 g body weight of rat. Percentage of inhibition was calculated with respect to control values. The granuloma tissues were further used for enzyme assays.

Ulceration studies

The method of Urushidani et al. [8] was used to assess the ulcerogenicity. The Wistar rats, weighing 150–180 g, were fasted for 48 h and kept in wire-mesh-bottom cages with access to water. The drugs, such as indomethacin (30 mg/kg sc), aspirin (600 mg/kg), phenylbutazone (150 mg/kg) and GSE (1000 mg/kg), were administered to the rats which were fasted for a further 7 h. The animals were sacrificed by cervical dislocation and the stomach was cut open from the greater curvature and examined under stereomicroscope to assess ulcerogenicity. The ulcer gradings were carried out as suggested by Robert et al. [9].