

A study on the anti-inflammatory effect of a novel preparation, Sudarshana Syrup (SS) in Wistar rats

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Abstract— This study investigated the anti-inflammatory potential of the Sudarshana syrup (SS) in Wistar rats after oral administration (6.5ml / kg). This was done using the carrageenan-induced paw edema method (acute inflammatory model) Data was analyzed statistically by analysis of variance (ANOVA). Results with $p < 0.05$ were considered as significant. The maximum inhibition, 88.5 % was noted after 5th hour of test drug, whereas the Indomethacin produced 96.2 % inhibition. A statistical significant reduction ($p < 0.05$) of paw oedema was noted at every hour when compared with the negative control group.

Keywords— Sudarshana syrup, Anti-inflammatory, Wistar rats

I. INTRODUCTION

Sudarshana powder (SP) is the most effective anti pyretic Ayurvedic preparation, widely used in Sri Lanka as well as India from the very early beginning of Ayurveda treatment. It is recommended for all types of fever including bone fever and common cold etc (Bhaishajya Ratnavali, 2003) and it is used traditionally as an antimalarial, antipyretic, antihistamine, antiviral and antidiabetic formulation.

Sudarshana Powder contains 53 (Ayurvedic Pharmacopeia, 1976) bitter ingredients which has the capability to treat fever associated symptoms such as dyspepsia, anorexia, fatigue and nausea. Like other medicines it does not constipate the bowels, but tends to produce a mild laxative effect. It promotes the flow of bile. In gastrointestinal disorders it is used as digestive.

During the early beginning of Ayurveda treatment in Sri Lanka, the main ingredient of the SP was *Swertia chirata* which was later replaced by *Andrographis paniculata* (Burm. F.) Nees. Presently the SP contains *Andrographis paniculata* (Burm. F.) Nees (50 %) along with other 52 ingredients (50 %). All other ingredients have different therapeutic uses.

All the 53 ingredients of SP together make it a very bitter preparation. The excellent medicinal properties of this

powder are masked by this bitterness and administration to children is very difficult. Therefore the preparation of a syrup from this formulation would assist in popularizing Ayurvedic medicine among children as well. Syrup forms of drugs are an easy way to administer insoluble or sparingly soluble drugs to the elderly who have difficulty in taking drugs in tablet or capsule forms. Therefore this powder was developed into consumer-friendly standard Ayurveda syrup.

In the present study, the anti-inflammatory effect of the Sudarshana syrup (SS) was studied in Wistar rats.

II. MATERIALS AND METHODS

A. Preparation of drug

Andrographis paniculata (Burm. F.) Nees - Heen bincohomba (50%) along with other 52 ingredients (50%) Sudarshana powder was prepared according to Ayurvedic Pharmacopeia at the Pharmacy of the Institute of Indigenous Medicine, University of Colombo and converted to syrup according to the *Ayurvedic Mana paribasha* (Nagodavthana P., 2001).

B. Animals

Healthy adult albino male Wistar rats (200–250 g) were used in the study. The animals were kept in plastic cages (two per cage) under standardized animal house conditions (temperature, 28–31°C; photoperiod, approximately 12 h natural light “per day”; relative humidity, 50–55%) with continuous access to pelleted feed and tap water.

All experiments in rats were carried out in accordance with the recommendation of the guidelines for care and use of laboratory animals and the project proposal was approved (No.591/11) by the Ethics Review Committee of the Faculty of Medical sciences of the University of Sri Jayewardenepura, Sri Lanka.

A. Anti-inflammatory activity

Thirty two male Wistar rats were selected and randomly divided into four groups; Test-1, Test-2, Positive Control and Negative Control with 8 rats in each. The SP was given to the Test -1 (783mg/ kg), SS for Test-2 (6.5ml/kg)

and compared with Positive Control given indomethacin (10mg/kg) (Vaishali D. et al., 2012; Laurence & Bennett, 1992) and negative control given 1.5ml of distilled water.

One hour after administration of drugs, 1% carrageenan was injected subcutaneously into the plantar surface of the left hind paw (Winter et al., 1962). After the induction of inflammation, oedema was expressed as an increase in paw volume due to carrageenan injection.

The volumes of paws in the test, control, and standard groups were measured plethysmometrically (Scientific Instruments, Barcelona, Spain) at hourly intervals up to 5h.

The degree of swelling was calculated by the paw volume increase ($V_t - V_0$) where V_t and V_0 are the volume of the left hind paw after and before the carrageenan injection, respectively. The percent inhibition of inflammation at each h compared to the controls was calculated for each group (Bhadoriya S S. et al., 2012) as follows:

$$\% \text{ Inhibition} = \frac{(V_t - V_0)_{\text{control rats}} - (V_t - V_0)_{\text{treated rats}}}{(V_t - V_0)_{\text{control rats}}} \times 100$$

B. Statistical analysis

Statistical analysis was performed using Dennett's *t*-test. $p < 0.05$ was considered statistically significant.

III. RESULTS

The results obtained are summarized in Table 1. As shown, SS significantly inhibited carrageenan-induced paw edema which was comparable with known anti-inflammatory drugs. The maximum inhibition, 88.5 % was noted at the 5th hour of test drug administration, whereas Indomethacin produced 96.2 % inhibition at the same hour. A statistically significant reduction ($p < 0.05$) in edema was noted at every hour when compared to negative control group. There was no significant difference between SS and SP.

	H1	H2	H3	H4	H5
Indomethacin	48.64	31.09	40.29	65.78	96.15
S. Powder	37.83	41.17	43.28	60.52	84.61
S. Syrup	39.18	44.17	50.74	71.05	88.46

Table 1. Anti-inflammatory activity: % Inhibition of paw edema at different time interval.

IV. DISCUSSION

Carrageenan-induced edema of rat paw is used widely as a working model of inflammation in the search for new anti-inflammatory agents (Valencia E. et al., 1994) As found in the present study, Sudarshana syrup exerts anti inflammatory effects that are similar to Sudarshana powder as well as indomethacin. These findings warrant further studies on the toxicity of the new preparation as well as studies with human subjects.

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