Anti-Inflammatory and Diuretic Property of Anthum Sowa in Swiss Albino rats

PADMAKSHI SINGH
Department of Chemistry, T.D.P.G. College, Jaunpur U.P. (India).

Abstract

Anthum sowa plant was selected to investigate anti-inflammatory and diuretic property effect in experimental animal models. The dried powder was subjected to successive soxhlet extraction with ethyl alcohol. Ethanolic extract of A. sowa was orally administered to experimental in albino rats at doses of 400 mg/kg & 800 mg/kg. Furosemide (20 mg/kg) was used as positive control drug. Anthum sowa contained essential oils, fatty oil, moisture (8.41%), protein (15.62%), carbohydrate (36%), fiber (13.9%), ash (9.90%), furanocuomarin, polyphenols and minerals. The alcoholic extract of A. sowa was found to be significant inhibitory effect on the carreggenan induced edema in rats of all the doses (100, 200 and 400 mg/kg body weight) tested on rats when compared to the normal saline control and standard indomethaethacin. It is clear that ethanolic extract of A. sowa have significant diuretic activity by increasing urine volume output (60%) and increased extraction of sodium, potassium and chloride levels ($P<0.01$) when compared to control.

Key words : Anthum sowa, Furo Semide, Carrageenan, Inflammation**.**

Introduction

Anthum sowa belonging to the family umbelliferae. It is annual herb growing in control and Southern Asia. It has been used in ayurvedic medicines since ancient times and is popular herb widely used as a spice and also yields essential oil[1,2]. It is mainly used in digestive disorders. Plant recipe is given to lactating mother to improve breast lactation. Moreover, it is used as an anti-convulsion, anti-ematic, anti-cramp, as a wound healer and to increase the appetite and to strength the stomach[3].

A. sowa contained essential oils, fatty oil, moisture (8.41%), protein (15.62%), carbohydrate (36%), fiber (13.9%), ash (9.90%), furanocuomarin, polyphenols and menerals. Phytochemical study indicates that it contains carvone, limonene, phellandrene, pinene, diterpene, dihydrocarvone, cineole, myrecene, paramyrcene, dillapiole, isomyrtisticin, myristcin, myristin, apiol and dillapiol[4,5]. Drugs which are in use presently for the management of pain and inflammatory condition are either narco[6].

Material & Methods

Plant Anthum sowa were collected from the medicinal garden of institute in December 2018 and identified by Dr. A.K. Singh, Department of Botany, Banaras Hindu University, Varanasi (U.P.). The shade dried plant were powdered go get a course grannule. 600gm powder was extracted with ethyl alcohol by continuous hot extraction using soxhlet apparatus. The residual dark greenish extract was concentrated on water bathe having yield 2.17%. The extract was preserved at 10ºC for biological study[7].

The essential oil and different extracts of A. sowa exerted anti-inflammatory activity against wide range & micro-organisms. The crude extract of A. sowa showed strong anti-inflammatory activity. Inflammation induced by carrageen in rat paw edema. Wrinter Abino rats of either sex weighing 140-200gm were divided into 5 groups (N=5). Group 1 received 0.5% CMC suspension (control) Group 2 received indomethacin (reference standard 10 mg/kg P.O.). Group 3, 4 and 5 received extract 100, 200, 400 mg/kg P.O. of A. sowa respectively. Animals were treated with drugs by oral route and subsequently 1h after treatment, 0.1 ml of 1% suspension of carrageen an in normal saline was injected into the sub-planter region of left hind paw to induce edema.

The paw volume was measured initially at 0, 1, 2, 3 and 4 hr after carragenan injection using digital paw edema meter (520-R, IITC Life Science, USA). The difference between the initial and subsequent values gave the actual edema volume which was compared with control. The initial inflammation was calculated using the formula

$$\%\,\text{inhibition} = 100\left(1 - \frac{Vt}{Vc}\right)$$

Where Vc represents edema volume in control and Vt edema volume in group treated with test extract[8]

For diuretic activity Albino rats of either weighing 150-200gm were divided into 5 groups of 5 animal each. The animal was received priming dose of normal saline 25 ml/kg before giving test drugs. The Group-I served as control received the vehicle only (4% gum acasia 1 ml/100g P.O.) Group-II received the standard drug of Furosemide 20 mg/kg body weight in the normal saline. The other two group III, IV & V received ethanolic extract of A. sowa dose of 100mg, 200mg & 400mg respectively suspended in normal saline. All the substances were orally administered. Dose volume was completed with physiological saline solution upto a total constant administration volume of 40 mg/kg. Immediately after the respective treatment of animals placed in fabricated metabolic cages and urine was collected in a measuring cylinder prevents evaporation of urine. The bladder was emptied by pulling base of tail of each rat. During this period no food and water was made available to animals. Then the volume of urine and Na^+, K^+ and Cl^- were estimated for assessing diuretic activity. Na^+ and K^+ Conc. were determined by Flame Photometer and Cl^- Conc. was estimated by $AgNO_3$ Soln. (0.1% N) using 2ml of Ferric alum solution as indicator[9,10].

$$\text{Diuretic uretic index} = \frac{\text{Mean urine volume of test}}{\text{Mean urine volume of control}}$$

$$\text{Lipschitz} = \frac{\text{Mean urine volume of test}}{\text{Mean urine volume of standard}}$$

Result & Discussion

The alcoholic extract of A. sowa was found to be significant inhibitory effect on the carreggenan induced edema in rats of all the doses (100, 200 and 400 mg/kg body weight) tested on rats when compared to the normal saline control and standard indomethaethacin[11,12]. The activity resides more at higher doses of 400 mg/kg with 63% inhibition after 4h of extract administration. Also in regard to the other doses 100 and 200 mg/kg there was also significant decrease with 30 and 54% after 4h of extract administration when compared with standard drug 36%. The effect of ethanolic extract of A. sowa in carrageenan induced paw edema in rats was shown in Table-1.

Table-1: Effect of A. sowa alcoholic extract on inflammation inhibition

Treated Group	Doses mg/kg	Percentage of inhibition				
		0hr	1hr	2hr	3hr	4hr
Control I	0	0	9	12	14	18
Standard II	Indomethacin (10 mg)	0	13	24	32	36
Extract III	100 mg	0	10	15	22	30
Extract IV	200mg	0	18	29	43	54
Extract V	400 mg	0	21	33	48	63

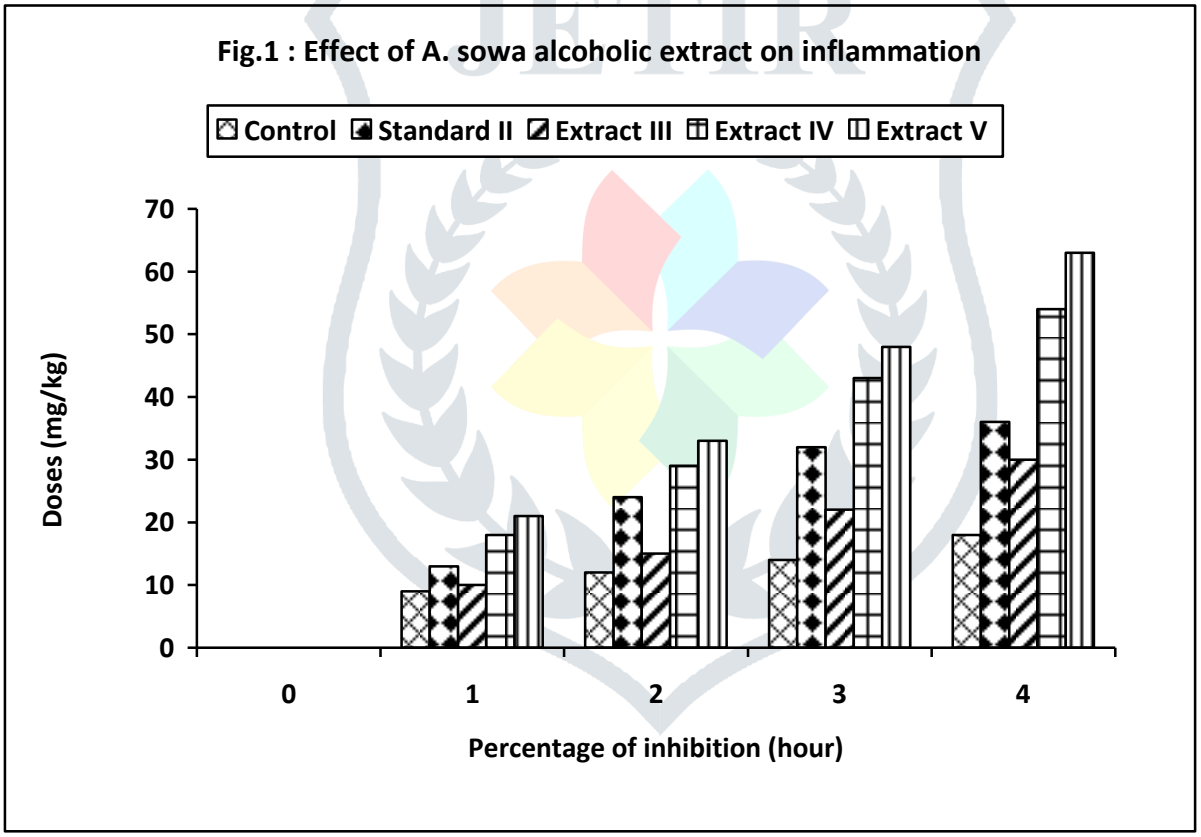
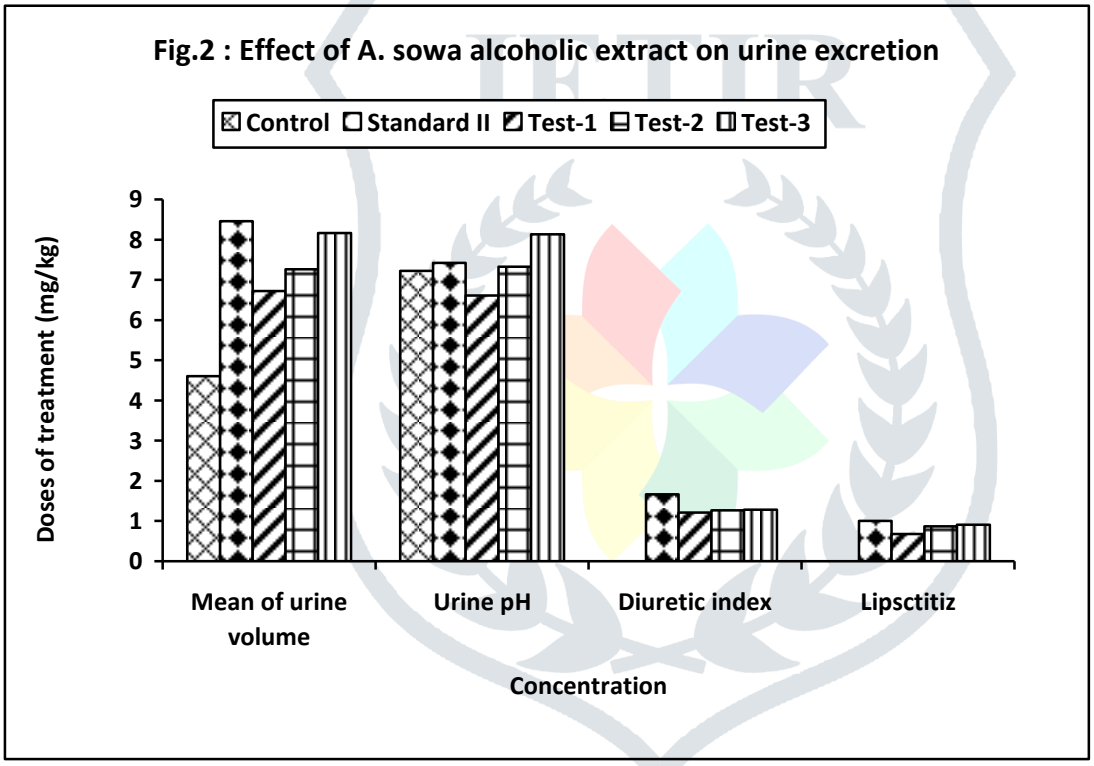


Table-2: Effect of A. sowa extract on urine excretion & concentration

Groups n = 5	Dose of treatment (mg/kg) P.O.	Mean of urine volume (ml)	Urine pH	Diuretic index (t/c)	Lipsctitiz value
Control	4% gum acacia	4.60±0.14	7.22	–	–
Standard	Indomethacin 10mg/kg	8.46±0.13	7.42±0.15	1.661	1.0
Test-1	Alcoholic Extract of A. sowa 100 mg/kg	6.72±0.22	6.61±0.22	1.214	0.68
Test-2	Alcoholic Extract of A. sowa 200 mg/kg	7.26±0.26	7.33±0.19	1.269	0.87
Test-3	Alcoholic Extract of A. sowa 400 mg/kg	8.16±0.32	7.33±0.15	1.287	0.91

Each value is the mean ± S.E.

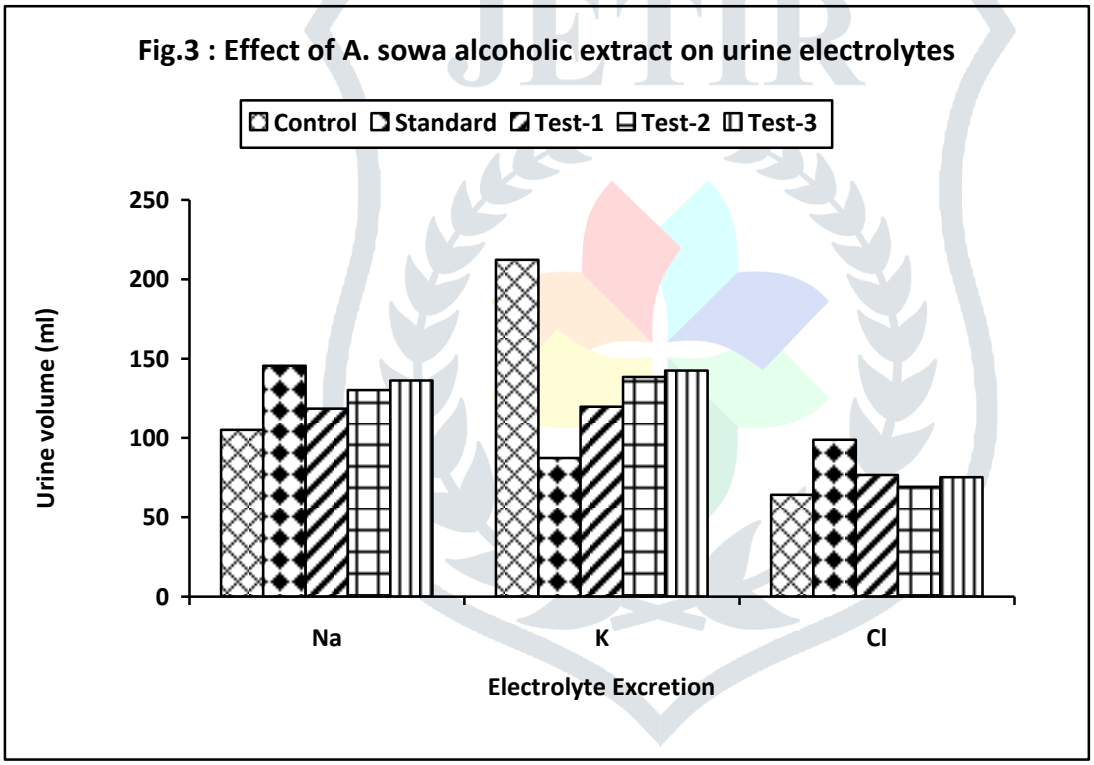


From the above observation it is clear that ethanolic extract of A. sowa have significant diuretic activity by increasing urine volume output (60%) and increased extraction of sodium, potassium and chloride levels ($P<0.01$) when compared to control[13-15]. The effect was dose dependent manner, 100 mg, 30%, 200 mg 54% and 400 mg 63% after 4h of treatment. The phyto constituent steroid, flavonoids and saponins might be responsible for diuretic activity[16]. Several previous studies have revealed that these agents have diuretic

property. The effect may be produced by stimulation of regional blood flow or initial vasodilatation or by inhibiting tubular reabsorption of water and electrolyte[17,18].

Table-3: Effect of A. sowa extract on urine excretion & electrolyte concentration

Treatment Group	Urine Volume (ml)	Electrolyte Excretion			
		Na^+	K^+	Cl^-	Na^+/K^+
Control	4.60 ± 0.14	105.1 ± 3.41	212.2 ± 9.01	64.2 ± 3.10	0.495 ± 0.38
Standrad	8.46 ± 0.13	145.4 ± 4.10	87.4 ± 4.02	98.9 ± 3.06	1.66 ± 1.01
Test-1	6.72 ± 0.22	118.4 ± 4.06	119.6 ± 4.27	76.7 ± 2.92	0.99 ± 0.95
Test-2	7.26 ± 0.26	130.2 ± 5.19	138.5 ± 5.60	69.3 ± 2.05	0.94 ± 0.93
Test-3	8.16 ± 0.36	136.2 ± 5.89	142.5 ± 6.16	67.3 ± 2.16	0.96 ± 0.95



The urine pH is also alter as intake of alcoholic extract increased. Excretion of urine effect diuretic index which higher at 400 mg/kg. Higher excretion of urine indicate that inflammatory debries remove from animal body and help in lowering edema. Na^+ concentration is higher in urine at 400 mg/kg where as Cl^- concentration is 67.3 from 76.7 as compared to 100 mg/kg. The Na^+/K^+ index is higher in test I group animal i.e. 100 mg/kg. From this observation it is clear that anti-inflammatory activity of A. sowa will be due to higher excretion of urine along with excretion of electrolytes.

The short first phases anti-inflammatory activity occurred 1 to 2 hrs after the carrageenan administration before it diminished at the 3rd hours of time intervals[19]. The activity was found to be appear again, in what could be said as second phase of anti-inflammatory activity. The urine excretion increase in experimental animal as compare to control group. The electrolyte concentration of Na^+ & K^+ significantly increases as compare to control but Cl^- concentration increase slightly is experimental group[20,21].

Carrageonan induced edema has been commonly used as an experimental animal model for acute inflammation and is believed to be biphesic. The early phase 1-2hr simple inhibition occurs but significant inhibitory activity shown by 100, 200 and 400 g/kg dose over a period of 4h in carrageenan induced inflammation.

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