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ANTISPASMODIC ACTIVITY OF AQUEOUS LEAF EXTRACT OF *XANTHIUM STRUMARIUM* ON ISOLATED RABBIT JEJUNUM

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ABSTRACT

The present study was conducted to evaluate the antispasmodic activity of aqueous leaf extract of *Xanthium strumarium* on isolated rabbit jejunum. The effect of *Xanthium strumarium* leaf extract on the intestinal smooth muscle in rabbit was studied in the presence muscarnic agonist acetyl choline using Tyrode solution as physiological salt solution maintained at 37ºC and the percentage contractile response was calculated. The results showed that aqueous leaf extract of *Xanthium strumarium* inhibited the smooth muscle contraction produced by acetyl choline in dose dependent manner. From the above it was concluded that, the aqueous leaf extract of *Xanthium strumarium* exhibited antispasmodic activity on isolated rabbit jejunum.

KEY WORDS: *Xanthium strumarium*, Antispasmodic activity, Rabbit jejunum.

INTRODUCTION

Traditional or indigenous drugs have attained a considerable usage for various ailments by the community due to its safety, availability and affordability; moreover it has been trusted and sustained for long years. *Xanthium strumarium* Linn belonging to the family Asteraceae, commonly called as common cocklebur, clot bur, button bur, ditch bur, hedgehog bur weed, sea burdock and sheep bur. *Xanthium strumarium* is distributed all over the world but is most common in the temperate zone. It is a serious weed in Australia, India, South Africa, and the America [1].

The plant contains a mixture of alkaloids [2], sesquiterpene lactones: viz. xanthinin, xanthatin and xanthinosin [3], guaianolides, germacranolides, and elemanolides, sulphated glycoside: xanthostrumarin, atractyloside, carboxyatractyloside [4], phytosterols: xanthanol, isoxanthanol, xanthinosin, 4-oxobedfordia acid [5], phenols like caffeic acid, ferulic acid, chlorogenic acid, cynarin, α and γ-thiazinedione [6]. The fruits are rich in vitamin C. The oil obtained from stem and leaves of *Xanthium strumarium* contains large amounts of monoterpenes and sesquiterpenes [7].

The tender fruit contains glucose, fructose, sucrose, organic acids, phosphatides, potassium nitrate, β-sitosterol, γ-sitosterol, β-d-glucoside of β-sitosterol called strumaroside [8,9]. Fatty acid composition of oil includes unsaturated fattyacids like oleic, linoleic, palmitic, stearic, behenic acid and saturated fatty acids include capric, lauric, myristic and palmitic acid [10].

Xanthium strumarium L plant is found to possess diverse biological activities including antibacterial, antifungal, antimalarial, antirheumatic, antispasmodic, antitussive, cytotoxic, hypoglycemic, stomachic, tonic, diuretic, sedative, allergic rhinitis, sinusitis, urticaria, constipation, diarrhoea, lumbago, leprosy and pruritis [11,12]. *Xanthium strumarium* L is reported to have anti diabetic activity due the presence of phenolic compounds [13].

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The present study is aim to evaluate the antispasmodic activity of the aqueous leaf extract of *Xanthium strumarium* in isolated rabbit jejunum using tyrode solution.

MATERIALS & METHODS

Plant Material

The aerial parts of *Xanthium strumarium* were collected from the out skirts Erode, South India, in the month of February. The plant samples were identified and authenticated by the botanist, Botanical Survey of India, Agricultural University, Coimbatore, India. The voucher specimen (A/6675) has been deposited in Herbarium for further reference.

Extract Preparation

The collected leaves of *Xanthium strumarium* were washed, air dried, powdered and boiled in sufficient quantity of distilled water for 2 hours and the aqueous extract was filtered, concentrated in vacuum and lyophilized to give a dry extract.

Animals

Male healthy rabbits of local breed weighing between 1.0 to 1.5 kg were used for the study. The animals were obtained from animal house of Sri Lakshminarayana Institute of Medical Sciences, Pondicherry, India. On arrival the animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of 24 ± 2^{o}C and relative humidity of 30–70 %. A 12:12 light: dark cycle was followed. All animals were allowed free access to water and fed with standard commercial pelleted chaw (Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by Ethics Committee (932/a/06/CPCSEA) of Sri Lakshminarayanan Institute of Medical Sciences, Pondicherry and were in accordance with the guidelines of the Institutional Animal Ethics Committee.

ANTISPASMODIC ACTIVITY

The rabbit was sacrificed by a blow on the head. Segment of the jejunum, about 3.0 cm long was removed and dissected free of adhering mesentery. The intestinal contents were removed by flushing with Tyrode solution of the following compositions in millimoles (mM): NaCl - 136.8; KCl - 2.7; $CaCl_2$ - 1.3; $NaHCO_3$ - 12.0; $MgCl_2$ - 0.5; $NaPO_4$ - 0.14; glucose - 5.5. The tissue was mounted in a 25ml organ bath containing Tyrode solution maintained at 37ºC and aerated with air. An initial tension of 0.5 g was applied to the segments and 60 minutes equilibration period was allowed with the physiological solution changed every 15 minutes. At the end of equilibration period, the effect of acetylcholine ($2.0 \times 10^{-8} – 1.6 \times 10^{-7}$ gml^{-1}) and the aqueous extract of *Xanthium strumarium* (0.8 – 6.4 mgml^{-1}) were investigated non-cumulatively. The contact time for each concentration was one minute which was followed by washing three times. The effect of the extract on the contractile response induced by acetylcholine (2×10^{-5}gml^{-1}) was determined [14].

Statistical Analysis

Results were expressed as mean ± SEM. The data were analyzed by using one way analysis of variance (ANOVA) followed by Dunnet's ' t' test. P values < 0.05 were considered as significant.

RESULT & DISCUSSION

Table 1 shows the antispasmodic effect of aqueous leaf extract of *Xanthium strumarium* on the contractile responses on isolated rabbit jejunum in the presence of acetyl choline. Various concentrations of aqueous extract of *Xanthium strumarium* were tested on the contractile response of acetylcholine on isolated rabbit jejunum. Acetylcholine is a cholinergic agent which enhances the contraction of rabbit jejunum by binding to muscarnic receptor. The aqueous extract of *Xanthium strumarium* inhibited the contraction induced by acetylcholine in dose dependent manner.

Table 1. Effect of aqueous leaf extract of *Xanthium strumarium* on the contractile responses on isolated rabbit jejunum in the presence of acetyl choline

S.No	Drug Treatment	Response (mm)	% Responses
1	Acetyl Choline (2×10^{-5}gml^{-1}) - Control	24.67±1.23	100
2	Acetyl Choline (2×10^{-5}gml^{-1}) + Extract (0.8×10^{-5}gml^{-1}	18.32±0.79*	74.26
3	Acetyl Choline (2×10^{-5}gml^{-1}) + Extract (1.6×10^{-5}gml^{-1}	14.95±0.65**	60.55
4	Acetyl Choline (2×10^{-5}gml^{-1}) + Extract (3.2×10^{-5}gml^{-1}	09.41±0.47***	38.11
5	Acetyl Choline (2×10^{-5}gml^{-1}) + Extract (6.4×10^{-5}gml^{-1}	06.97±0.15***	28.22

Values are in Mean ±SEM; *P<0.05, ** P<0.01 and ***P<0.001 Vs Control

CONCLUSION

From the above it was concluded that, aqueous leaf extract of *Xanthium strumarium* exhibited antispasmodic activity on isolated rabbit jejunum.

The antispasmodic activity of *Xanthium strumarium* may be due to its anticholinergic activity. Further studies required to establish its actual mechanism of action.

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