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Anti-Muscular Activity of Various Parts of *Martynia annua* Linn

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ABSTRACT

Martynia annua Linn is one of the medicinal herbs used by native people since ancient time for various medicinal purposes. The present study was aimed to evaluate the skeletal muscle relaxant effects of various parts (leaves, stem, seed and root) of *M. annua* acetone extracts using Rota –Rod method. Acetone extracts of leaves, stem, seed and root of *M. annua* up to a dose of 2000 mg/kg body weight, did not show any toxic manifestations or death. The acetone extracts of leaves, stem, seed and root of *M. annua* administrated orally at the dose of 200 and 400 mg/Kg to Wistar albino rats. Diazepam in a dose of 10 mg/Kg was used as a standard. Acetone extract of leaves at the dose level of 400 mg/kg body weight showed significantly reduces the fall off time and significant skeletal muscle relaxant activity.

INTRODUCTION

Majority of the people living in the developing world is struggling to increase the standard of living and to improve the health care delivery in the face of increasing poverty and growing population. It has been estimated that 70% - 80% of population in the developing countries have only their traditional herbal remedies for their ailments as the costly pharmaceuticals are out of their reach.

Martynia annua Linn. (Martyniaceae) is wild, pubescent herb commonly called as Devil's claws. *M. annua* is one of the medicinal herbs used by native people since ancient time for various medicinal purposes. In folk medicine, the fruits are anti-inflammatory, used for the treatment of asthma, the seeds are applied locally for itching and eczema [1]. The leaves are given in epilepsy and its juice is gargled for sore throat [2]. Decoction of whole plant is given in pneumonia and cold fever [3]. The roots made into a poultice and applied in snake bite [4]. In Pateshwar hilly area of Western Maharashtra, the natives use the unripe fruits as antiseptic and for wound healing. Different parts of the plant studied scientifically reveal that the roots are anthelmintic [5], anti-fertile [6], leaves are analgesic [7], CNS depressant [8], antioxidant [9] and antibacterial [10] but no data is available as far the skeletal muscle relaxant effects of leaves, stem, seed and root. The present study was aimed to evaluate the anti-muscular activity of acetone extracts of *M.annua* various parts.

MATERIALS AND METHODS

A. Materials

a) Collection of plant

Martynia annua Linn leaves were collected in Sivanthipuram, Tirunelveli district in Tamil Nadu. The botanical identity was confirmed by Dr. M. Johnson, Assistant professor, Department of Botany, St. Xavier's College (Autonomous), Palayamkottai. Voucher specimens were deposited in St. Xavier's College Herbarium (XCH 26876). It was cleaned with running tap water to remove adhering elements, shadow dried and powdered.

b) Animals used

Wistar Albino rats of either sex (100-200 g) were randomly selected from the central animal facility. The animals kept at ambient temperature of 22 ± 1^{o}C, 12 hr light and dark cycle

allowed. Food, water given *ad-libitum.* Animals were acclimatized to laboratory conditions for 7 days prior to taking them for experimentation. The experimental protocols were duly approved by the Institutional Animal Ethical Committee (IAEC, Approval No: SBCP / 2015-16 / CPCSEA / IAEC- I / 1(k)) of Sankaralingam Bhuvaneswari (SB) College of Pharmaceutical Sciences, Anaikuttam, Sivakasi, Virudhunager District. All experiments and animal care were according to the CPCSEA and Good Laboratory Practice Guidelines. No animals were sacrificed at the end of the study.

Extract Preparation

About 60 g of air-dried and coarsely powdered leaves, stem, seed and root of *M. annua* Linn were extracted using acetone solvent through Soxhlet method. The extraction was carried out about 48 hours. The extracts were concentrated by using vacuum evaporator and analyzed for further analysis.

Acute toxicity study

Acute toxicity study was performed in Albino rats divided into different groups of 6 each. After an overnight starvation, the column fractionated extract in 0.5% (w/v) suspension of sodium hydroxide was administered orally in graded dose (2000 mg/ Kg body weight) to Albino rats. The experimental animals were observed for 30 min after treatment, followed by observation hourly for 8 h and once daily for the next 13 days. Clinical observations were made once a day for mortality, moribund, ill health or reaction to treatment, such as changes in skin and fur, eyes and mucous membranes, salivation, behaviour pattern, lethargy, convulsions, tremors, diarrhoea, Urine, sleep and coma.

Selection of dose for pharmacological screening

The various parts of *M. annua* acetone extract was found to be non-toxic up to the dose of

2000 mg/kg and did not cause any death, therefore it is considered as safe. Hence 1/10 and $1/5^{th}$ of this dose i.e. 200 and 400 mg/Kg body weight was used for the activity.

Determination of anti-muscular activity

The animals were weighed and numbered. The animals were placed one by one on the rotating rod. (If the rod is divided into several compartments, one can place more than one

mouse at a time). A normal untreated mouse generally falls off within 3-5minutes. Diazepam (10 mg/kg) was injected to all the animals. After 30 minutes, the fall off time was noted and compared with that of standard before and after diazepam treatment. Group I served as control (5 mL/Kg). Group II was given diazepam (10 mg/Kg), group III were administered samples of leaves, stem, seed and root of *M. annua* at 200 mg/Kg and group IV were administered samples of leaves, stem, seed and root of *M. annua* at 400 mg/Kg. Animals remaining on Rota-Rod (16 rpm) 2 min or more in low successive trials after the administration of test material or control vehicle the same test of 30 min for 2 hr. The fall off time from the rotating rod was noted. The difference in the fall off time from the rotating rod between the control and the treated rats was taken as an index of muscle relaxation. The anti-muscular activity of various parts of *Martynia annua* acetone extract was recorded.

RESULTS

A preliminary acute toxicity study in rats showed that the acetone extract of *Martynia annua* various parts was found to be non-toxic up to a dose of 2000 mg/Kg (LD_{50}>2000mg/Kg).

The skeletal muscle relaxant effects of various parts of *Martynia annua* Linn acetone extract were tabulated in table 1. Leaves, stem, seed and root of *M. annua* significantly reduced the time spent by the animals on revolving rod when compared to control. The standard drug (diazepam) also showed significant effect when compared to control.

Table: 1 Skeletal muscle relaxant activity of acetone extract of *Martynia annua* Linn various parts

Sr. No.	Group	Dose	Fall of Time		Percentage of Reduction
			Before drug administration	After drug administration	
1.	Control	5 mL/Kg	280.1±1.632	288±1.087	-
2.	diazepam	10 mg/Kg	218.7 ± 0.120	6.5±1.702	97.11
3.	Leaves	200 mg/Kg	245.2±2.362	38.2	84.31
		400 mg/Kg	261.6±0.957	27.5	89.48
4.	Stem	200 mg/Kg	225.7±0.577	66.3	70.62
		400 mg/Kg	264.2±1.087	69.6	73.65
5.	Seed	200 mg/Kg	249.5±0.707	69.3	72.22
		400 mg/Kg	215.6±1.087	51.2	76.25
6.	Root	200 mg/Kg	234.8±0.625	70.3	70.05
		400 mg/Kg	274.3±0.480	76.8	72.00

DISCUSSIONS

Roda rod test is primarily employed in animals for the assessment of muscle relaxant properties [11, 12]. The animals in this model are allowed to spend time on the revolving rod; less time spent on the rod more indicates a muscle relaxant effect of a tested material. The present study reveals that all the parts of acetone extracts of *M. annua* showed more than 70% reduction. Highest percentage of reduction showed in *M. annua* leaves. In addition, our results are similar to those of diazepam, the standard drug used in the study. The percentage of reduction follows the order; Leaves > Seed >Stem > Root of *M. annua.*

Researchers believed that the muscle-relaxant like effects of benzodiazepines such as bromazepam was mostly due to interference with the action of gamma aminobutyric acid (GABA A) [13]. Additionally, studies revealed that benzodiazepines bind to the gamma subunit of the GABA A receptor, implicating structural modification of the receptor and thus causing an increase in GABA A receptor activity. Acetone extracts of *M. annua* parts were similar to that of benzodiazepines, it is also possible that they might interact with benzodiazepine receptor located adjacent to the GABA receptor. The overall effects of acetone extract of *M. annua* were similar to standard drug used (diazepam).

CONCLUSION

Based on the results, the present study concluded that the acetone extract of *Martynia annua* various parts possesses significant skeletal muscle relaxant activity. The acetone extract of leaves showed skeletal muscle relaxant activity (89.48%). Nature has been a good source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources. However, further studies are necessary to find the exact mechanism of skeletal muscle relaxant effect and to isolate the active compounds responsible for this pharmacological activity.

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