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Skeletal muscle relaxant activity of methanolic extract of *Rumex nepalensis* in albino rats

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ABSTRACT

*The objective of the present study was to evaluate the skeletal muscle relaxant activity of methanolic extract of the leaves of *Rumex nepalensis* (MERN) using Rota-Rod method. MERN was administered orally at dose of 400mg/kg to Wistar Albino rats. The methanolic extract significantly reduces the fall off time (motor coordination), and highly significant (** $P < 0.01$) at 30min of duration. Thus, the result suggested that the MERN possess skeletal muscle relaxant activity may be due to presence of different chemical compounds present in the extract.*

Key words: *Rumex nepalensis*, methanolic extract, skeletal muscle relaxant activity.

INTRODUCTION

The genus *Rumex* comprises of about 200 species of herbs. *Rumex nepalensis* Spreng. (Polygonaceae) commonly known as “jungli palak” in Hindi. It grows abundantly in many parts of India. It is widely distributed in the temperate Himalayas, Western Ghats, Nilgiri and Palni Hills at altitudes between 1200-4300m. The use of *Rumex nepalensis* for various therapeutic purposes is well known in Indian traditional medicine. Many of them used for its astringent qualities. Leaf extract is applied to cure skin sores; leaf infusion is given in colic and applied to syphilitic ulcers. The pounded root is given to animals in case of diarrhoea and dysentery. Leaf powder mixed with butter is applied to treat scabies[1]. Aqueous extract used as wash for reducing body pain[2].

According to the research and as other species from genus *Rumex* shows purgative[3], analgesic, antipyretic[4], anti-inflammatory[5], and psychopharmacological activities[6] on the roots of *Rumex nepalensis*. In the present work is to evaluate the skeletal muscle relaxant activity of the methanolic extract of leaves of *Rumex nepalensis*.

EXPERIMENTAL SECTION

Plant material:

The mature green leaves of *Rumex nepalensis* (Polygonaceae) were collected from Summer-Hill, Shimla (H.P.), India, in the month of September 2010. The leaves were identified and authenticated by Dr. R. Raina and voucher specimen number 5583 was deposited in the Herbarium of Forest Products Department, University of Horticulture & Forestry, Nauni, Solan (H.P.), India.

After authentication, the fresh leaves were collected in bulk, dried under shade and pulverized in a grinder. The coarse powder was used for further studies.

Preparation of methanolic extract:

For the preparation of methanolic extract of leaves of *Rumex nepalensis* (MERN), the dried coarse powdered of leaves were extracted with methanol (95%) in a Soxhlet apparatus. The extract was concentrated and dried using Rotary flash evaporator and stored in a refrigerator at 5°C for experimentation.

Animals used:

Adult Albino rats (Wistar strain) of either sex with weighing 100-150 g were used. The animals were maintained on the suitable nutritional and environmental condition throughout the experiment. The animals were housed in polypropylene cages with paddy house bedding under standard laboratory condition for an acclimatization periods of 7 days prior to performing the experiment. The animals were fed with commercially available rat pelleted diet. Water was allowed ad libitum under strict hygienic conditions.

The experimental protocols were duly approved by the Institutional Animal Ethical Committee (IAEC, Approval No: 002/2010/IAEC/SU) of School of Pharmaceutical Sciences, Shoolini University, Solan, Himachal Pradesh.

Determination of acute toxicity (LD₅₀)[7]:

The procedure was divided into two phases, Phase I (observation made on day one), and Phase II (observed the animals for next 14 days). Two set of healthy male rats (each set of 3 rats) were used for the experiment. First set animals were divided and fasted for 18 hrs, deprived from food, water withdrawn before 4 hrs of the dosing, body weights were noted before and after dosing with methanolic extract of *Rumex nepalensis* (4000mg/kg) orally. Individually animals were observed for 4 hrs to see any clinical symptoms, any change in behaviour or mortality. 6 hrs post dosing again body weights recorded. Behavioural change, clinical symptoms or mortality was observed in the same animals for next 14 days and animal body weights were recorded on 8th and 14th day. The same procedure was repeated with another set of animals to nullify the errors[8].

Selection of dose for pharmacological screening:

The methanolic extract of *Rumex nepalensis* (MERN) was found to be non-toxic up to the dose of 4000mg/kg and did not cause any death, therefore it is considered as safe. Hence 1/10th of this dose i.e. 400mg/kg body weight was used for the activity.

Skeletal muscle relaxant activity (motor coordination)[9,10]:

Rats were divided into three groups consisting of four animals each. Group I served as control which received distilled water. Animals of group II received standard drug Diazepam at a dose of (2mg/kg, *i.p.*). Group III received the MERN orally at a dose of 400mg/kg. Animals remaining

on Rota-Rod (16 rpm) 2min or more in low successive trials were selected for testing; 30min after the administration of test material or control vehicle the same test was repeated at intervals of 30min 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.

Statistical analysis:

The data obtained in present investigation was subjected to statistical analysis. All results are expressed as Mean \pm SEM (standard error of mean); 4 animals in each group. All statistical comparisons were made by Bonferroni's test after conducting one-way ANOVA.

RESULTS

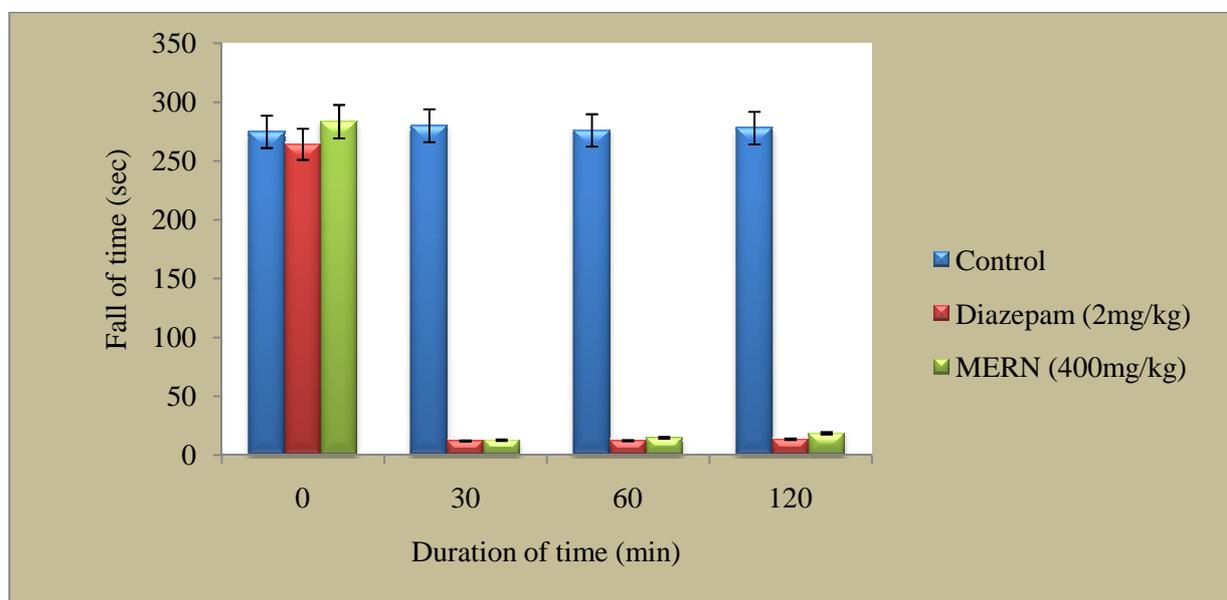
A preliminary acute toxicity study in rats showed that the methanolic extract of *Rumex nepalensis* was found to be non-toxic up to a dose of 4000mg/kg ($LD_{50} > 4000\text{mg/kg}$).

Table 1: Effect of methanolic extract of *Rumex nepalensis* on muscle relaxant activity

Group	Dose	Fall of time(sec)			
		0min(before dosing)	30min	60min	120min
Control	-	274.75 \pm 1.702	280 \pm 1.78	276 \pm 1.632	278 \pm 1.65
Diazepam	2mg/kg, <i>i.p.</i>	264.2 \pm 1.087	12.0 \pm 0.707**	12.25 \pm 0.625*	13.42 \pm 0.711
MERN	400mg/kg, orally	283.5 \pm 0.957	12.75 \pm 0.577**	14.70 \pm 0.520*	18.50 \pm 0.480

One way ANOVA followed by Bonferroni's test. Values are mean \pm S.E.M; n = 4 in each group. *P < 0.05 and **P < 0.01 when compared to control.

Fig 1: Effect of MERN on muscle relaxant activity



Skeletal muscle relaxant activity (motor coordination):

The skeletal muscle relaxant effect of methanolic extract of *Rumex nepalensis* leaves has been shown in Table 1 and Fig. 1. Treatment with extract at dose of 400mg/kg body weight and Diazepam at dose of 2mg/kg decreased fall off time (motor coordination). The results obtained from both standard and extract treated groups were compared with the control group. A highly

significant (**P<0.01) reduction in the motor coordination was observed in the test drug at 30min of duration.

DISCUSSION

The present results showed that the methanolic extract of *Rumex nepalensis* leaves possess a significant skeletal muscle relaxant activity in experimental rats. At dose of 400mg/kg it showed highly significant skeletal muscle relaxant activity at 30min of duration. Preliminary phytochemical screening reveals the presence of anthraquinone, steroids, saponins, reducing sugars and tannins in the plant extract⁶. Therefore, the observed skeletal muscle relaxant activity may be attributed to these compounds. Further studies are in progress to isolate the active constituents responsible for this activity.

Since the pharmacological profile of the present investigation of the methanol extract of *Rumex nepalensis* was similar to that of benzodiazepines, it is also possible that they might interact with benzodiazepine receptor located adjacent to the GABA receptor. Therefore, the use of methanol extract of *Rumex nepalensis* leaves in folkloric medicine may be due to its CNS action.

CONCLUSION

Based on the results of the present study, we conclude that the methanolic extract of *Rumex nepalensis* (MERN) possess significant skeletal muscle relaxant activity. However, further studies are necessary to find the exact mechanism of skeletal muscle relaxant effect and to isolate the active compound(s) responsible for this pharmacological activity.

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