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Original Research Article

Calotropis gigantea Flower Ethanolic Extract's Ability to Relax Skeletal Muscle in Albino Rats is Assessed

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Abstract

Background: Because of its medicinal qualities, *Calotropis gigantea*, a member of the Apocynaceae family, has historically been employed in treating a number of diseases1. Several researchers have thoroughly examined most of the uses, but there have only been a few investigations into the skeletal muscle-relaxing properties of the *Calotropis gigantean* flower. The purpose of this study was to determine whether albino rats' skeletal muscles might be relaxed by an ethanolic extract of *Calotropis gigantean* flowers (EECGF). Materials and Techniques In albino rats weighing 180–220 g, EECGF preparation and skeletal muscle relaxant activity testing were conducted. Four separate groups of creatures were created. Group I (control) received 10 ml/kg of normal saline, Group II (standard) received 10 mg/kg of diazepam, and Groups III and IV received 100 mg/kg and 200 mg/kg of EECGF, respectively. Both locomotor activity on the photoactometer and skeletal muscle relaxant activity (motor coordination) were carried out. Analysis of variance was used in the statistical analysis, which was followed by ANOVA comparison tests.

Results: The actophotometer and rotarod tests revealed that EECGF considerably decreased the tested animal's motor coordination and locomotor activity.

Conclusion: Significant dose-dependent skeletal muscle relaxant action was demonstrated by EECGF.

Keywords: Actophotometer, *Calotropis gigantea*, Rotarod, and Skeletal Muscle Relaxant.

Introduction

Skeletal muscle relaxants are medications that lessen the tone of the muscles. To lessen muscle tone or create paralysis, they act either centrally in the cerebrospinal axis (neuromuscular blockers) or peripherally at the neuromuscular junction (neuromuscular blockers)/muscle fibre itself [1]. Whereas centrally acting drugs are utilised for painful muscle spasms and spastic neurological disorders, neuromuscular blocking drugs are used as adjuncts during general anaesthesia

to relax muscles for surgery [2]. These medications do, however, have a number of side effects. So, in this context, finding a good substitute has always been a top concern. In this nation, arka (*Calotropis gigantea*), a significant Ayurvedic medication, has a long history of use. The oldest Hindu writers made reference to it, and the plant's ancient name, which appears in Vedic literature, was Arka. which alludes to the shape of the leaves that were employed in sacrificalrites.

The Sanskrit authors [1,3]. identified two common species of Calotropis, namely *Calotropis gigantea* (Linn.) R.Br. and *Calotropis procera* (Ait.) R.Br. Common wasteland weed C. gigantea is also referred to as giant milk weed. Bangladesh, Burma, China, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand, and Sri Lanka are the original home countries of this plant. The traditional medical system in India uses C. gigantea for a variety of therapeutic purposes [3]. The blooms of C. gigantea are said to have analgesic, muscle-relaxing, antibacterial, and cytotoxic activity, among other qualities, according to recent scientific reports [4]. The plant's leaves and other parts have been shown to have anti-diarrheal [5], anti-Candida [6], antibacterial [7], and antioxidant [8]. properties. According to reports, roots have cytotoxic [9] and antipyretic properties [10].

Method and Materials

Plant Material Collected *Calotropis gigantean* flowers were found in a herbal plant garden, and a botanist from SRR Degree & PG College in Karimnagar identified them.

Extract preparation [11].

The Flowers were ground into a fine powder and shade dried. Using a Soxhlet device, the powder was progressively extracted with 50% ethanol. The same solvent was used to extract the residue once more. The extract was stored in an airtight container for later examination after being vacuum-dried at 45°C.

The study's animals were adult albino rats of either sex that weighed between 180 and 220 g. The animals came from NIN in Hyderabad, India. The animals were kept stable for a week at a temperature of 25 1 °C, 60 5% relative humidity, and 12-hour cycles of darkness and light. The Vaageswari Faculty of Pharmacy's Department of Pharmacology has separated them into individual cages and provided them with a standard pellet meal and unlimited access to water.

The study was carried out in compliance with the recommendations of CPCSEA and in accordance with the ethical standards recognised by the IAEC. Vageswari/IAEC/2016/CPCSEA is the reference.

Chemicals and Drugs

Diazepam (Lupin Laboratories Ltd., India) (Lupin Laboratories Ltd., India).

Experimental Models [12].

The six rats were divided into four groups at random and given the following treatments:

Group I: Control received vehicle (normal saline, 10 ml/kg) as a control.

Group II: Standard was given 10 mg/kg of benzodiazepine.

Group III: 100 mg/kg of ethanolic *Calotropis gigantean* floral extract (EECGF) was administered to test rats.

Group IV: were given 200 mg/kg of an ethanolic extract of *Calotropis gigantean* flowers (EECGF).

All the drugs were administered orally.

Skeletal Muscle Relaxant Activity (Motor Coordination) [13].

The rotarod was used to measure the muscle relaxant activity. There were four groups of six rats each, totalling 24 rats. The investigation involved the animals kept on rotarods (25 rpm) for 5 minutes. Rats were placed on the rotarod; the falloff time was 30 minutes earlier. The difference between control and treated rats' falloff times from the rotarod was used as an indicator of muscular relaxation.

Movement activities

A photoactometer was used to measure the spontaneous locomotor activity [14]. It has a computerised counter, a picture sensor, and six built-in light sources to detect movement. The device relies on photoelectric cells, which are wired into the circuit with the counter, to function. When an animal blocks the light beam from reaching the photocells, the count is recorded.

Each rat was now separately placed in the cage for 5 minutes while the photoactometer was turned on to monitor locomotor activity. All the animals' basal activity scores were recorded. Upon oral administration of all medications, 5 min of activity score observation followed by 1 hour. Before and after the administration of the medicine, there was a difference in the activity score. There was a noticeable percentage drop in motor activity.

Statistics

The mean and standard deviation were used to express the results. One-way analysis of variance was used for the statistical analysis (ANOVA). Statistics were deemed significant at P 0.001.

Results

Rotarod (Test for Muscular Relaxation)

Motor coordination was significantly reduced at test dosages of EECGF of 100 mg/kg and 200 mg/kg, or by 22.3% and 47.5%, respectively. The common medication reduced motor coordination by 70.40%.

Significant (P 0.001) skeletal muscle relaxant action was seen with EECGF (100 mg/kg and 200 mg/kg) (Table-1).

Actophotometer: (Test for Locomotor Activity)

With dosages of 100 mg/kg and 200 mg/kg EECGF, the percentage of reduction was 59.7% and 66.9% after 1 hour of locomotor activity, respectively, and the standard medication exhibited an 82.17% reduction when compared to control.

A statistically substantial (P 0.001) reduction in locomotor activity was seen with EECGF (100 mg/kg and 200 mg/kg) (Table-2).

Table 1: Rotarod apparatus affected by EECGF (Muscle coordination)

Groups	Fall of Time (Seconds)		% Reduction
	Before	After	
Group I – Control (NS 10ml/kg)	299.59±2.04	302.10±2.96	-
Group II – Standard (Diazepam 10mg/kg)	339.56±2.90	100.5±2.10**	70.402%
Group III – EECGF 100mg/kg	322.45±1.95	250.52±2.29*	22.307%
Group III – EECGF 200mg/kg	352.85±2.60	185.20±1.79*	47.513%

Table 2: Effect of EECGF in the Actophotometer (Locomotor activity)

Groups	Actophotometer score		% Reduction
	Before	1 hr after	
Group I – Control (NS 10ml/kg)	165.80±2.89	161.25±1.02	-
Group II – Standard (Diazepam 10mg/kg)	189.45±2.24	33.77±2.50**	82.174%
Group III – EECGF 100mg/kg	199.60±1.10	80.40±2.92*	59.719%
Group III – EECGF 200mg/kg	180.55±2.36	59.65±1.79*	66.962%

Discussion

Due to their safety profile, herbal medications have been widely employed in recent years to treat a variety of ailments. The purpose of the current investigation was to assess how EECGF affected the activity of muscle relaxants in experimental mice. Rodents' locomotor and anti-anxiety activity is measured using an actophotometer, and muscle relaxants are measured using a rotarod. In experimental rats, EECGF dramatically decreased locomotor activity and motor coordination. Sedative action is indicated by a decrease in locomotor activity. When administered orally at a regular dose of 10 mg/kg, diazepam significantly reduced muscle tension compared to the control and extract. Diazepam has a low ratio of sedative to muscle relaxant effects, which restricts the amount used for muscle relaxation [15].

Calotropis gigantean flower demonstrated a substantial skeletal muscle relaxant and sedative effect in previous neuropharmacological studies [16]. Our research contributes to these conclusions as well. The EECGF, which contains terpenoid components such beta-sitosterol and campesterol [17] as well as flavonoids and phenolic content, is presumably to blame for the effects. The primary flaw in the study is that phytochemical analysis to pinpoint the precise ingredients was not conducted. To pinpoint the precise components and clarify the potential mechanism of EECGF's muscle-relaxing function, thorough phytochemical study and research are required.

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