

Sida cordifolia Linn- An widely used herbs in the village of Falta, west Bengal, India: Pharmacological evaluation of antiepileptic activity of root extract of *Sida cordifolia* Linn.

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Abstract

As per the observation of the social work activist it was found that the raw extract of the root of *Sida cordifolia* Linn. Are been used by some old people in the village of Falta Block of South 24 PGS district of West Bengal, India to treat epileptic attack on some villagers. The identified plant were collected and handed over the research scientists for the further study. The dried coarse powder of the root of *Sida cordifolia* Linn. Were soxheleted successively with petroleum ether (PESC), methanol (MESE), with boiled water (AESC) and the epileptic study was performed on the Albino mice using 100 and 300 mg/kg body weight of PESC, MESE and using clonazepam as standard using Maximum Electroshock induced seizure model and result depicted that PESC exhibited a significant antiepileptic effect at both low and high doses where as MESC exhibited the significant antiepileptic effect only at high dose. Hence, the petroleum ether extract may be chosen to be more effective than that of the methanol extract.

Keywords: *Sida cordifolia* Linn; Soxheleted, Methanol; Antiepileptic; Clonazepam; Petroleum ether extract

1. Introduction

Traditional systems of medicine are popular in developing countries and up to 80% of the population relies on traditional medicines or folk remedies for their primary health care need. Medicinal plants are believed to be an important source of new chemical substances with potential therapeutic effects (Nadkarni, 2007). Several plants used for treatment of epilepsy in different systems of traditional medicine have been shown activity when tested in modern bioassays for the detection of antiepileptic activity (Akerle, 1988)

The plant *Sida cordifolia* Linn. (Family-Malvaceae), in Bengali local people called as Berela, a small, downy, erect shrub, 1.5 m in height with long branches and sometimes rooting at the nodes, is widely distributed in moist places throughout tropical and subtropical India and Nepal, ascending to an attitude of 1050 m. Roots, leaves and seeds are slightly bitter in taste and used in medicines (Agharkar, 1991). The juice of plant is mixed with the juice of *Borassus flabellifer* for local use in elephantiasis. The mucilaginous leaves are used as a demulcent and their infusion is given in fever as a refrigerant. A decoction of the leaves are said to possess emollient and diuretic properties. In nervous disorders such as hemiplegia, sciatica and facial paralysis, the root is administered with milk and sugar to relieve frequent micturition and leucorrhoea (Jain et al., 2011).

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Epilepsy, a heterogeneous symptom complex, is a chronic disorder characterized by recurrent seizures which are finite episodes of brain dysfunction resulting from abnormal discharge of cerebral neurons (Bancaud et al., 1981).

Seizure, the characteristic event in the epilepsy, is associated with the episodic high frequency discharge of impulses by a group of neurons in the brain that starts as a local abnormal discharge may then spread to other areas of brain (Rang et al., 2012). The site of the primary discharge and the extent of its spreading determines the symptoms that are produced, which range from a brief lapse of attention to a full convulsive fit lasting for several minutes as well as odd sensation or behaviors. The particular symptoms produced depend on the function of the region of the brain that is affected (Raza et al., 1999). Thus involvement of the motor cortex causes convulsion, involvement of the hypothalamus causes peripheral autonomic discharge and involvement of the reticular formation in the upper brain stem leads to loss of consciousness (Akilandeswari et al., 2013).

The plant in raw extract form the root of the plant has been found to be used by some old people to treat epileptic attack on some villagers of the Falta Block of South 24 PGS district of West Bengal, India while working in the village for the social work by the social work activist.

Keeping in the view of that social activist the pharmacological evaluation of the root of the herb has taken under the consideration.

2. Materials and methods

2.1. Materials



Figure 1 Photograph of *Sida Cordifolia* Linn.

2.2. Collection of Plant material

Fresh roots of plant *Sida Cordifolia* Linn. was identified and authenticated by a taxonomist and was collected from the local area of Falta Block of South 24 PGS district of West Bengal, India in the month of July 2016. The roots were washed with water properly for removing dust if any. Then all the materials were dried in sunlight separately for 2 hours and subjected to shade dried completely. All the foreign matters like destructed parts were removed precautionary. Then the shade dried roots were milled to coarse powder by a mechanical grinder separately. Then the powdered material was subjected to successive solvent extraction.

2.3. Preparation of extracts

The dried coarse powder of roots (about 100 gm) was passed well in soxhlet apparatus and also subjected to continue hot extraction by using petroleum ether as a solvent for 12-24 hours. During extraction, the temperature was maintained between 35-37 °C to prevent loss of thermosensitive chemical constituents of roots. After completion of the extraction the marc was removed from the soxhlet apparatus, allow for evaporation of remaining solvent under shade and repacked into the soxhlet apparatus after complete drying then the further extraction is followed by using methanol followed by aqueous extraction. The petroleum ether extract (PESC), methanolic extract (MESC) and aqueous extract (AESC) of roots of *Sida Cordifolia* Linn. was taken separately and tested for antiepileptic activity. (Mallikarjuna et al., 2013)

2.4. Drug used

Clonazepam was received as a gift sample from Ranbaxy Laboratories, India. All other chemicals used were of analytical grade. Clonazepam was dissolved in distilled water just before administration to get 1% w/v of pure drug. The extracts were suspended in gum acacia (0.5%) to prepare a solution of 1% w/v containing extract. A gastric catheter was used for oral administration of pure drug solution as well as the extract. (Di Carlo et al., 1999; Katzung et al., 2009)

2.5. Methods

2.5.1. Animals

Albino mice were used to carry out the antiepileptic activity study. Animals were divided into eight groups. One group received vehicle (distilled water) (used as control), two groups received PESC (100 & 300 mg/kg), two groups received MESC (100 & 300 mg/kg), two group received AESC (100 & 300 mg/kg), and the eighth group received the reference standard i.e. Clonazepam (Mazarati et al., 2008).

2.5.2. Maximum Electroshock induced seizure model

Electroconvulsive shock (50 mA for 0.2 sec) was delivered through ear electrodes to induce hind limb tonic extensions (HLTE) in mice. The extracts were administered orally at the doses of 100 and 300mg/kg body weight into different test groups. Gum acacia in water and Clonazepam (0.1 mg/kg) were administered intraperitoneally into two groups of animals as control and standard groups respectively. Electroconvulsive shock was delivered 60 min after the oral administration of drug and extract containing formulations. Occurrence of HLTE and duration of seizures were noted closely for 2 min. The animals that did not exhibit HLTE were considered to be protected. Percentage of inhibition of seizures relative to the control was calculated (Eweka et al., 2008).

3. Results

3.1. Assessment of Antiepileptic Activity of *Sida cordifolia* Linn

3.1.1. Electroshock Induced seizures

Sida cordifolia Linn. root extracts were screened for antiepileptic activity using maximum electroshock induced seizure model in mice. Study was conducted using low, and high doses of PESC, AESC and MESC (100 & 300 mg/kg respectively). The result depicted that PESC exhibited a significant antiepileptic effect at both low and high doses where as MESC exhibited the significant antiepileptic effect only at high dose. Hence, the petroleum ether extract may be chosen to be more effective than that of the methanol extract. The standard drug *Clonazepam* (0.1 mg/kg-i.p.) exhibited a significant antiepileptic activity and offered 100% protection. All the observations are mentioned in Table-1 (Bittigau et al., 2003; Kokate et al., 2002).

Table 1 Antiepileptic activity of PESC, AESC and MESC of *Sida cordifolia* Linn

Treatment	Dose (mg/kg body weight)	Onset of time (Sec)	Percent inhibition of convulsion
Control	0.1	211.14 ± 07.57	
Clonazepam	0.1	0	100%
PESC	100	237.27 ± 04.77	60.13%
PESC	300	273.49 ± 06.27	69.32%
MESC	100	200.46 ± 02.92 NS	50.80%
MESC	300	234.23 ± 05.48	59.36%
AESC	100	200.17 ± 03.67	50.73%
AESC	300	201.39 ± 05.17	51.04%

*Values are mean ± SEM; n=6.

4. Discussion

There are a number of synthetic antiepileptic drugs currently available for use in the management, control and treatment of individuals with epilepsy. However, most of the synthetic drugs are not only inaccessible and unaffordable, but also possess many toxic adverse effects (Heinemann et al., 1994). Therefore, there is a great need for the development of cheap, effective and safe antiepileptic agents from plants and other sources with reduced side effects.

Preliminary phytochemical analysis of petroleum ether extract and aqueous extract of *Sida cordifolia* Linn. showed the presence of sterols, terpenoids, alkaloids, glycosides, flavonoids, proteins, tannins and carbohydrates. However, the similar analysis of methanolic extract of *Sida cordifolia* confirmed the presence of steroids, alkaloids, flavonoids, proteins and carbohydrates. (Ghosal et al., 1975)

The petroleum ether, methanol and aqueous extracts of roots of *Sida cordifolia* Linn. showed the presence of sterols, alkaloids, flavonoids, proteins and carbohydrates. The presence of flavonoids, sterols and terpenoids have been implicated in various pharmacological actions on central nervous system including antiepileptic and anxiolytic activity. Flavonoids and sterols have been involved in central inhibitory and neuromodulatory effects. The antiepileptic activity may be due to the presence of flavonoids and sterols in the petroleum ether and methanol extracts. Therefore, this may be concluded that *Sida cordifolia* Linn. possesses significant antiepileptic activity against Clonazepam.

5. Conclusion

The plant *Sida cordifolia* Linn. is widely used for its medicinal applications and therapeutic properties and it has its importance in Ayurvedic preparations due to its wide variety of pharmacological properties, thus the medicinal plants constitute very important rational resources. The plant *Sida cordifolia* Linn. possess great potential to be developed as the modern Ayurvedic medicament as well as athletic supplement by pharmaceutical industries.

Compliance with ethical standards

Disclosure of conflict of interest

Munmun Mondal, student of Social Work, Rabindra Bharati University Centre for Distance Education and Online Learning while working with the villagers found the folkloric use of the plant and Dr. Partha Niyogi, Associate Professor, School of Pharmacy, Sister Nivedita University performed the animal study.

Statement of ethical approval

The animal study was performed after the approval of AEC of Animal ethical committee of School of Pharmacy, and the study was performed under the guidelines of AEC at School of Pharmaceutical Sciences, SOA Deemed to be University, Bhubaneswar, while working as PhD Scholar.

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