Antiepileptic activities of the extract and fractions of *Mondia whitei* (Hook f.) Skeel leaves

Adediwura A. Fred-Jaiyesimi*, Oluwatosin F. Ogunjobi

Department of Pharmacognosy, Faculty of Pharmacy, Olabisi Onabanjo University, Sagamu Campus, Ogun State, Nigeria

**Abstract**

**Objectives:** To investigate the antiepileptic potentials of *Mondia whitei* (Hook f.) Skeel leaves as identified in the folklore recipes for the management of paralysis, epilepsy. *M. whitei* is also used in antimalarial, antihelminthic recipes as well as in the treatment of impotence and sexual dysfunction.

**Methodology:** The antiepileptic study of the methanol extract, hexane and ethyl acetate fractions were carried out using the pilocarpine induced seizure model while the Phytochemical and fluorescence analysis were carried out using standard procedures.

**Result:** The presence of saponins, flavonoids, tannins and resins were detected in the leaves of *M. whitei*. The extract and fractions exhibited a dose-dependent effect in the delay of the onset of seizures and reduction in the duration of seizure.

**Conclusion:** This study justifies the use of *M. whitei* in folklore medicine as a recipe in the management of epilepsy.

**Keywords:** *Mondia whitei*, Epilepsy, Pilocarpine, Phytochemical and fluorescence analysis

1. Introduction

Epilepsy a neurological condition characterized by recurrent seizures and convulsions is third most common neurological disorder which affects about 50 million people worldwide, most especially in the developing countries. The imbalance between excitatory and inhibitory decrease in GABAergic and glutamatergic transmission is involved in the generation of epilepsy. Several antiepileptic medications are employed in the management of epilepsy however, the side effects exhibited by these medications are of great concern. In addition, the cost of these drugs has made the management of epilepsy a challenging one in developing countries. Epilepsy has been a major cause of mortality hence an increased interest in the use of herbal remedies for its management.

*Mondia whitei* (Hook f.) Skeels (Apocynaceae) a climbing shrub of about 8–20 m, is one of the two species of the genus *Mondia*. It is characterized by latex and woody roots, which are aromatic when old. It is commonly known as white's ginger or tonic root and Isirigun (Yoruba, SW Nigeria).

*M. whitei* is endemic to South, East and West Africa, widely distributed from Guinea to East Africa. In traditional medicine, the various parts of *M. whitei* are used for the management of several diseases and ailments such as impotence and sexual dysfunction, constipation, abdominal pain, appetite stimulant, urinary infections, gonorrhoea as analgesic pains, inducement of labour. In addition, the roots are chewed to treat stress, tension in the management of paralysis, epileptic attacks and fits in children, for milk production in lactating mothers. In Central African Republic, the seeds are used in preparing arrow poisons as antimalarials and anthelminthics.

Previous biological studies have reported the androgenic effect, aphrodisial properties, analgesic, antimicrobial properties, anti-inflammatory, antioxidant effect. From the roots, β-sitosterol and probenecid have been isolated. The aim of this study is to investigate the antiepileptic activities of the extract and fractions of *M. whitei*.

2. Plant collection

The fresh leaves of *M. whitei* were collected in September, 2012 from Ilaro Ogun State and authenticated at Forestry Research Institute of Nigeria and the Department of Pharmacognosy, Olabisi Onabnjo University where voucher specimens with number FHI 109513 have been deposited.

3. Preparation of extract and fractions

The fresh leaves of *M. whitei* were cleaned, air dried and ground into powder. The powdered leaf sample was macerated in 80% methanol.
methanol for 72 h. The filtrate was concentrated under reduced pressure. The dried extract was made aqueous and partitioned successively with hexane and ethyl acetate to obtain the hexane and ethyl acetate fractions.

3.1. Test animals

Wistar albino rats (200–220 g) were used for this study. The rats were obtained from the animal house of the University of Ibadan, Oyo State. The rats were allowed to acclimatize and kept in accordance with the International Guidelines on animal care and kept in cages at 25 ± 2 °C (12/12 h light/dark cycle). They were fed with rat pellets and water ad libitum.

4. Phytochemical and fluorescence screening

The Phytochemical and fluorescence screening were carried out using standard procedures.18–20

5. Evaluation of antiepileptic activity of M. whitei leaves

The antiepileptic activity of M. whitei was investigated by adopting the method of Turski et al., 198321 by using the Pilocarpine induced seizure model (400 mg/kg of Pilocarpine).

Group 1: Rats received 1 ml/kg of normal Saline
Group 2: Rats received 100 mg/kg extract/fraction
Group 3: Rats received 50 mg/kg extract/fraction
Group 4: Rats received 25 mg/kg extract/fraction
Group 5: Rats received 5 mg/kg Diazepam

The rats (n = 5) were administered the test sample/reference drug and thirty (30) min after, they received 400 mg/kg body weight of pilocarpine intraperitoneally.

6. Statistical analysis

The results are presented as mean ± SEM. The results were analysed by the one-way analysis of variance (ANOVA).

7. Result

M. whitei (Apocynaceae) has been reported to possess several biological activities such as antifertility, androgenic activity, anti-inflammatory, antibacterial and antiscickling properties. Previous phytochemical studies reported the presence of reducing sugars and triterpenes22 while Quasie et al.,23 reported presence of alkaloids, flavonoids, saponins and phenolics.24 In this study, the leaves of M. whitei revealed the presence of saponins, flavonoids, tannins, resins and absence of cyanogenic glycosides, Anthraquinone, alkaloids and cardiac glycosides (Table 1). This is similar to the reports of Quasie et al.,25 The variation reported in M. whitei from various areas could be due to certain environmental factors, seasonal variations or differences in varieties of the species.

In the fluorescence analysis, the leaves of M. whitei reacted with various chemical reagents showing various colour reactions in normal daylight and under the UV light at both 254 nm and 366 nm. These reactions exhibited will enable the characterization and identification of the purity of the leaf of M. whitei (Table 2).

The use of pilocarpine in inducing epilepsy in this study activated the muscarinic receptors in the brain of the rats. This led to cholinomimetic syndromes characterized by salivation, oro-facial movement, brightening of the eyes and lacrimation, raised body furs, increased gastric motility and urinary incontinence as well as tonic clonic seizures of the hind limbs which mimicked the features of temporal lobe epilepsy in human beings.23

The methanol extract, ethyl acetate and hexane fractions of M. whitei at 100 mg/kg 50 mg/kg, 25 mg/kg exhibited a dose-dependent effect in delaying the onset and reducing the duration of seizures. The hexane fraction at 100 mg/kg appeared to delay onset of seizures (25.3 min) while the ethyl acetate fraction shortened the duration of seizure at the same dose (27 min). Though the extract and fractions did not prevent seizures, the methanolic extract at all doses tested protected the rats from mortality while the fractions exhibited partial recovery (Fig. 1).

Several studies have attributed the presence of monoterpenes, triterpenoid glycoside,26 alkaloids, flavonoids, saponins28 to antiepileptic activities. This study therefore indicates that the presence of the various constituents (Saponins, tannins, flavonoids)
may be responsible for different mode of actions in the antiepileptic activities of the extract and fractions of *M. whitei* leaves. This study highlights the need for further studies.

**Conflicts of interest**

All authors have none to declare.

**References**