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Sedative and anticonvulsant effects of aqueous extract of *Ficus sycomorus* L. (*Moraceae*) stembark in rats

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ABSTRACT

The aqueous extract of the stembark of *Ficus sycomorus* was prepared and used as 0.2 mg/ml. Seventy white albino rats of both sexes weighing between 101 g and 120 g were used for this study. The sedative effects of the extract were demonstrated by its increase on amylobarbitone sleeping time in a dose-dependent manner and its slight increase in the duration of ketamine anaesthetic time with resultant abolition of palpebral, pedal and inner ear reflexes in rats. The extract conferred 100% protection to rats treated with a convulsive dose of pentylenetetrazol, indicating anticonvulsive effect, but could not protect rats treated with strychnine even though it delayed the time of onset of death.Thus, the results suggested that the aqueous extract of *Ficus sycomorus* stembark possesses a sedative effect and anticonvulsive properties in rats.

Key words*: Ficus sycomorus*, sedative effect, anticonvulsive effect

Introduction

Ficus sycomorus L. (indigeneous Kanuri and Hausa names are tarmu and Baure, respectively) belongs to the class Moraceae which is widely

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distributed in tropical West Africa (GEORGE and LAWRENCE, 1961). It is a tree which grows to about 60 ft in height, with a pale trunk and widespread branchlets (HUTCHINSON and DALZIEL, 1957). The powdered stembark is soaked in water for about 6 hours and the resulting aqueous solution is administered to the patient orally three times a day for several days, for the treatment of a variety of ailments such as mental illness, diarrhoea and pain relief (ABDURRAHMAN, 1992). Reducing sugars, gallic tannins, saponins, alkaloid and flavones have been identified in the plant and studies on its acute toxicity (LD_{50}) showed 720 mg/kg, indicating low toxicity (SANDABE, 2002).

This study was undertaken to investigate the scientific basis for the traditional use of *Ficus sycomorus* by determining its neuropharmacological effects in rats.

Materials and methods

Plant collection, identification and extract preparation. Fresh stembarks of *Ficus sycomorus* were collected in November 1999 from Maiduguri, in Borno State, Nigeria. The plant was identified and authenticated by Dr. S.S. Sanusi, a botanist working in the Department of Biological Sciences, Faculty of Science, University of Maiduguri, and a set of voucher herbarium, specie chem 732A has been deposited at the department of Chemistry, University of Maiduguri. The sun- dried stembark was crushed into fine powder and extraction procedure was carried out according to the methods of MITTAL et al. (1981) and FERNANDO et al. (1989). Two hundred grams of the powdered stembark were mixed with one litre of distilled water in a 5-litre beaker and heated at 65 ^{0}C for 30 minutes. It was allowed to cool and then filtered using Whatman No.1 filter paper. The extract (filtrate) was stored at 4 ^{0}C in a concentration of 0.2 g/ml, until used.

Animals. Seventy white Wistar strain albino rats of both sexes weighing between 101 g. and 120 g. were purchased from the National Veterinary Research Institute (NVRI) Vom, Nigeria. They were kept in clean, plastic rat cages in the Department of Veterinary Physiology and Pharmacology laboratory, where they were given water and commercial feed (Sanders

Feed, Seepc, Nigeria, Ltd) *ad libitum.* They were allowed to adjust for three weeks before commencement of the experiment.

Effects of extracts on amylobarbitone sodium sleeping time. Twenty rats of both sexes weighing between 118 g. and 120 g. were randomly divided into four groups of five (5) rats each and were treated with amylobarbitone sodium 30 minutes after extract of *Ficus sycomorus* of varying doses was administered.

Group A served as control and was given only amylobarbitone sodium at 20 mg/kg body mass.

Group B rats received 50 mg/kg *Ficus sycomorus* extract thirty minutes before the administration of 20 mg/kg amylobarbitone sodium.

Group C rats were administered 100 mg/kg *Ficus sycomorus* extract 30 minutes before 20 mg/kg amylobarbitone sodium administration.

Group D rats were given 200 mg/kg *Ficus sycomorus* extract and 20 mg/kg amylobarbitone sodium 30 minutes later.

All injections were given intraperitoneally (i/p). Duration of sleeping time was then recorded. The duration of sleep was defined as the time between losing and regaining the righting reflex (CARLINI and BURGOS, 1979)

Effect of the extract on ketamine hydrochloride induced anaesthesia. Twenty rats of both sexes weighing between 109 g. and 112 g. were randomly divided into four groups of five rats each and were treated with Ketamine hydrochloride (60 mg/kg) thirty minutes after treatment with various doses of *Ficus sycomorus* extract.

Group A served as control and rats in this group received ketamine hydrochloride (60 mg/kg) only.

Group B rats were treated with 100 mg/kg of with *Ficus sycomorus* extract 30 minutes prior to Ketamine hydrochloride (60 mg/kg) administration.

Group C rats were treated with 200 mg/kg of *Ficus sycomorus* extract 30 minutes before Ketamine hydrochloride (60 mg/kg) was administered.

Group D rats in received 300 mg/kg of *Ficus sycomorus* extract and 60 mg/kg Ketamine hydrochloride, 30 minutes later. Extracts and drug administration were made through the intraperitoneal route. Duration of

sleeping time was recorded. Duration of sleep was defined as the time between losing and regaining the righting reflex (CARLINI and BURGOS, 1979).

Effect of the extract on strychnine and pentylenetetrazol (leptazol) induced convulsions. Thirty rats of both sexes weighing 104 g. and 119 g. were randomly divided into six groups of five (5) rats. They were housed in four clean, plastic rat cages and were given food and water *ad libitum.* Before treatment with strychnine or pentylenetetrazole commenced the rats were treated with a strong analgesic, pentozocine 30 mg/kg intraperitoneally to alleviate pain associated with convulsions.

Group A was given a convulsive dose of 2 mg/kg of strychnine and served as control.

Group B was given a convulsive dose of 2 mg/kg of strychnine 30 minutes after treatment with 400 mg/kg of *Ficus sycomorus* stembark extract.

Group C was given a convulsive dose of 2 mg/kg of strychnine 30 minutes after treatment with 600 mg/kg of *Ficus sycomorus* stembark extract.

Group D received a convulsive dose of 100 mg/kg pentylenetetrazole (leptazol) which served as control.

Group E was also given a convulsive dose of 100 mg/kg of pentylenetetrazole (leptazol) 30 minutes after treatment with 400 mg/kg of *Ficus sycomorus* stembark extract, while

Group F was given a convulsive dose of 100 mg/kg pentylenetetrazole (leptazol) 30 minutes after treatment with 600 mg/kg of *Ficus sycomorus* stembark extract. Strychnine injections were given intraperitoneally (i/p) while pentylenetetrazole was administered subcutaneously. The onset of convulsion, number of convulsions per minute and onset of death were recorded (TAKAGI et al., 1960; MAEDA et al., 1981).

Statistical analysis. Results were expressed as mean and standard deviation and the difference between mean values was analysed using analysis of variance (ANOVA).

Results

Plant extraction. The aqueous extract of *Ficus sycomorus* stembark was reddish-brown in colour and is tasteless.

Effect of extract on amylobarbitone sodium sleeping time. The aqueous extract of *Ficus sycomorus* stembark significantly ($P<0.05$) increased the sleeping time of amylobarbitone dose dependently in rats (Table 1).

Table 1. Effect of aqueous extract of *Ficus sycomorus* stembark on amylobarbitone-induced pattern of sleep in rats

Group	Dose of extract (mg/kg)	Duration of sleep Mean ± SD (min)
A Control (AB)	-	58.5 ± 3.79
B Extract +AB	50	69.0 ± 0.82*
C Extract +AB	100	80.75 ± 3.59*
D Extract +AB	200	93.00 ± 3.16*

* Significant ($P<0.05$)
AB = 20 mg/kg amylobarbitone

Effect of the extract on ketamine hydrochloride induced anaesthesia. The aqueous extract of *Ficus sycomorus* stembark slightly increased the duration of anaesthesia of ketamine hydrochloride (Table 2). The extract caused significant a difference ($P<0.05$) at 300 mg/kg. Administration of the extract to ketamine-treated rats resulted in the abolition of palpebral, pedal and inner ear reflexes. Rats had their eyes closed while anaesthetised and during recovery they demonstrated ataxia.

Table 2. Effect of aqueous extract of *Ficus sycomorus* stembark on ketamine hydrochloride-induced anaesthesia

Group	Dose of extract (mg/kg)	Duration of sleep Mean ± SD (min)
A Control (Ketamine)	-	15.75 ± 0.5
B Extract + Ketamine	100	16.25 ± 0.5
C Extract + Ketamine	200	16.75 ± 0.5
D Extract + Ketamine	300	17.25 ± 0.95*

* Significant compared with control ($P<0.05$)
Ketamine at 60 mg/kg

Table 3. Effect of aqueous extract of *Ficus sycomorus* stembark on convulsions induced by pentylenetetrazole (leptazol) and strychnine

Extract pretreatment (mg/kg)	Convulsant treatment (mg/kg)	Mean onset of convulsions (Min. ± SD)	Mean number of convulsions/min.	Mean onset of death (Min. ± SD)	Quantal death	Survival (%)
Control	PTZ, 100	2.2 ± 0.83	73.0 ± 9.11	25.7 ± 8.96	3	40
400	PTZ, 100	3.6 ± 0.55	59.6 ± 3.58*	-	-	100
600	PTZ, 100	4.25 ± 0.51	49.0 ± 1.83*	-	-	100
Control	Strychnine (2)	2.4 ± 1.40	16.80 ± 4.20	4.0 ± 1.22	5	0
400	Strychnine (2)	2.4 ± 1.52	16.6 ± 4.30	4.2 ± 0.84	5	0
600	Strychnine	2.5 ± 0.58	13.2 ± 0.96*	4.75 ± 1.5	5	0

PTZ = pentylenetetrazole
* P< 0.05 compared with controls

Effect of extract on strychnine and pentylenetetrazole (leptazol) induced convulsions. Table 3 shows the effect of aqueous extract of *Ficus sycomorus* stembark on seizures induced by pentylenetetrazole and strychnine in rats. The extract protected rats from death due to pentylenetetrazole seizures but could not do so for strychnine seizures, even though it significantly reduced ($P<0.05$) the number of convulsions.

Discussion

The aqueous extract of *Ficus sycomorus* stembark showed a depressant effect on the central nervous system. This action was demonstrated by its effects on amylobarbitone sleeping time, ketamine-induced anaesthesia and pentylenetetrazole- and strychnine-induced convulsions.

The extract appeared to potentiate amylobarbitone-induced sleeping time in a dose-dependent manner. Amylobarbitone is an intermediate acting barbiturate and is known to produce sleep in rats for up to 50 minutes (HARVEY, 1991). The extract may have acted synergistically with amylobarbitone to increase the duration of sleep. In addition to increasing

the sleeping time of ketamine it also abolished palpebral, pedal and inner ear reflexes, thereby increasing the potency of ketamine, which alone has an uncertain effect in inducing unconsciousness and is characterised by only superficial sleep with those reflexes present (FLECKNELL, 1988). The extract completely prevented the death of rats resulting from pentylenetetrazole convulsion, which contradicts the assertion that most drugs with an anticonvulsant activity do not counteract pentylenetetrazole seizures, but only retard them (LOSCHER et al., 1991). However, the extract could not protect rats from strychnine convulsions and since it acted synergetically with amylobarbitone, its mechanism of action is therefore different from amylobarbitone sodium, which is used to save animals poisoned with strychnine.

In conclusion, the extract of *Ficus sycomorus* stembark has shown some neuropharmacological effects in rats and more work needs to be done to ascertain its mechanism of action.

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SAŽETAK

Vodeni iscrpak kore stabljike sikomore *Ficus sycomorus* bio je pripremljen i upotrijebljen u koncentraciji 0,2 mg/ml. U istraživanju je korišteno 70 bijelih albino štakora oba spola teških između 101 i 120 g. Sedacijski učinak iscrpka očitovao se produženim vremenom spavanja potaknutog amilobarbitonom te blagim povećanjem vremena anestezije potaknute ketaminom s posljedičnom odsutnošću palpebralnog i nožnog refleksa te refleksa na podraživanje unutarnjeg uha. Primjena iscrpka očitovala se i 100%-tnom zaštitom štakora od konvulzija uzrokovanih pentilentetrazolom, naznačujući njegov antikonvulzijski učinak. Ipak, njegova primjena nije zaštitila štakore od djelovanja strihnina, iako je produžila vrijeme njihova preživljavanja. Polučeni rezultati upućuju na zaključak da vodeni iscrpak kore stabljike sikomore *Ficus sycomorus* ima sedacijski i antikonvulzijski učinak u štakora.

Ključne riječi: *Fycus sycomorus*, sedacijski učinak, antikonvulzijski učinak