



Phytochemical and Acute Toxicity Study of *Trichilia Emetica* (Meliaceae) bark of trunk Extract in Albinos Rats

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ABSTRACT

The barks of *Trichilia emetica* (Meliaceae) are used in traditional medicine to treat diseases like malaria, cough, gastric ulcer, intestinal dysmenorrhea, asthma, cirrhosis, worms. The present study was carried out to screen aqueous and ethanol extract of this plant for its phytochemical constituents and acute toxicity profile. Acute toxicity study was evaluated in rodent by OECD guideline 423 and phytochemical analysis was performed according standard methods. Rats were orally treated by 50, 300, 500, 2000 and 5000 mg/kg body weight (bw) with both extracts only once. They were observed for 24 h, with special attention given to the first 4 h and once daily further for a period of 14 days. Phytochemical components were identified in the plants extracts by using standard laboratory grade reagents. The results revealed the presence of polyphenols, leucoanthocyanins, catechic tannins, sterols, terpenes, quinones, cardiac glycosides, alkaloids and flavonoids in the ethanol extract. The aqueous one contains the same compounds and saponins. The results of acute toxicity study classified *Trichilia emetica* above the hazard category 2000 < LD50 < 5000 mg/kg according to globally harmonized classification system. The results obtained suggest that the plant extract is considered as slightly toxic. The diversity of phytochemicals found suggests that *Trichilia emetica* stem bark could serve as a source of useful drugs.

KEYWORDS: Phytochemical; acute toxicity, *Trichilia emetica*.

INTRODUCTION

Various plants are reputed for their medicinal values because they contain structurally diverse biological substances with varying properties. Especially in Africa, herbs are widely used in traditional medicine within *trichilia emetica*, a plant of Meliaceae family.

Trichilia emetica is essentially tropical in origin and is native to sub-saharan Africa [1]. This plant is used to treat various diseases such as abdominal pains, dermatitis and chest pain in traditional medicine [2]. It is also used in the treatment of hemorrhoids, mental illness, epilepsy, abscess, typhoid fever, malaria, hypertension, witchcraft, and sight trouble. The main used parts are the leaves and the roots in powder form decoction and maceration. Concoction administration is by oral route, body bath or direct application on the skin [3]. External application of the pounded bark is used to treat parasitic skin, infections and inflammation in West Africa [4]. In Eastern Africa, the root bark decoction is better for emetic, purgative, fever, epilepsy, leprosy and makes women fecund [5]. In this same African region, *Trichilia emetica* is used against poisoning, hepatitis, ulcer, dysmenorrhea, asthma, cirrhosis and internal worms. Its fruits are used as diuretic [6]. Decoction of fresh leaf twigs is drunk in colic, in case of convulsions and fever. A decoction of the roots is used against jaundice and is better against intestinal worms [7]. In Senegal, the leaf decoction of *Trichilia emetica* is used against skin diseases,

malaria, scabies and insomnia; and for its stimulatory properties in bronchial secretions [8]. The plant is used as general tonic and for bronchial inflammation [9]. Leaf and roots decoctions are used for bathing against insomnia [10].

Concerning its biological properties, *Trichilia emetica* has drawn extensive attention and has been largely investigated. Methanol extract of leaves has anti-plasmodia activity [11]. The ethanol extract is prostaglandins inhibitor demonstrating *Trichilia's* anti-inflammatory activity [12]. The complement activating effect was investigated [13], and the antipyretic activity, by Sanogo *et al.* [14]. Studies of Spargand *et al.* also demonstrated antischistosomiasis activities of this plant [15]. Hepatoprotective effect on the rats and antioxidant activity *in vitro* were investigated [16, 17, 18]. Methylene chloride extract of *Trichilia emetica* leaf presented a good antitrypanosomal activity *in vitro* on *Trypanosoma brucei* [19]. Analgesic activity with pain inhibition was demonstrated with aqueous leaves extracts of *T. emetica* [20].

All these biological properties show *Trichilia's* importance. However, its leaves and roots are the only ones which are much more used. The aim of this study is to evaluate the phytochemical profile and the acute toxicity of aqueous and ethanol extracts of *Trichilia emetica* bark on the rat.

MATERIALS AND METHODS

Plant materials: The fresh barks of *Trichilia emetica* were collected in February 2014 in the region of Mankono, Northern of Côte d'Ivoire. The



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plant was identified at the National Floristic Centre of Felix Houphouet-Boigny University of Cocody (Abidjan).

Animals: Albinos Wistar healthy rats of the same sex, weighing 150 to 200 g were procured from Animal House. The entire process was approved by OECD Guidelines [21]. The animals were kept in clean and dry cages and they were fed with standard pellet diet and water was given as libitum. For experimental purpose, the animals were kept fasting overnight but allowed for access to water.

Preparation of extract: Barks of the plant were dried at room temperature during 14 days, ground coarsely in a grinder (IKAMAG RCT®) and then stored for further use. The extracts were prepared according to the method described by Zihiri et Kra [22]. For the preparation of total aqueous and ethanol extracts 70%, 100 g of plant powder were extracted in one liter of distilled water or ethanol-water (70/30, v/v) by maceration using a magnetic agitator (the process is repeated 3 times). The homogenate obtained was first spun in a square of fabric, and then filtered twice successively on cotton wool and once on Whatman filter paper (3 mm). The filtrate was concentrated using a drying oven at 70 °C. The concentrate was evaporated at 50 °C in an oven for 48 hours giving a dry ethanol and aqueous extract.

Phytochemical screening: Different families of secondary metabolites such as alkaloids, polyphenols, tannins, flavonoids, saponins, quinones, cardiac glycosides, Leucoanthocyanins,

sterols and terpenes were screened according to the method described by Bidié *et al.*, [23], Békro *et al.*, [24] and Bagré *et al.* [25].

Acute toxicity study: The experimentation was carried out sequentially according to OECD guidelines 423 [21]. Healthy Wistar rats (150-200 g) were divided into 5 groups of 3 animals each and allowed to access water and food throughout the experiment, except for the fasting period before the oral administration of the single dose of extracts. The five groups of rats received respectively doses of the 50,300, 500, 2000 and 5000 mg/kg bw of *Trichilia emetica* extracts. The general behavior and mortality of the rats was continuously monitored for 1 h after dosing periodically during first 24 h (with special attention given during the first 4h) and then daily for 14 days. Changes in the normal activity of rats, sign and symptoms of toxicity study were also recorded.

RESULTS AND DISCUSSION

Phytochemical screening: The results revealed the presence of polyphenols, leucoanthocyanins, catechic tannins, sterols, terpenes, quinones, glycosides, alkaloids and flavonoids in the ethanol extract. The aqueous one contains saponosides and all the components identified in the ethanol extract, except quinones (Table1).

Acute toxicity study: Observing animals during the experiment, no mortality was noticed until amount 5000 mg/kg body weight. During 14 days period of



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acute toxicity evaluation, some signs of toxicity have been observed, but they were all quickly reversible. The clinical signs are presented in table 2.

| Identified Chemicals Groups | | Bark Powder Extracts | |
|-----------------------------|-----------------|----------------------|-----------------|
| | | Aqueous extract | Ethanol Extract |
| Polyphenols | | + | + |
| Flavonoids | | + | + |
| Saponins | | + | - |
| Tannins | Tannin catechin | + | + |
| | Tannin gallic | - | - |
| Leucoanthocyanins | | + | + |
| Alkaloids | Dragendorff | + | + |
| | Bouchardat | + | + |
| Cardiac Glycosides | | + | + |
| Sterols and Terpenes | | + | + |
| Quinones | | - | + |

Table 1: Preliminary phytochemical screening of the bark extracts
{ +: present, - : absent }

The results of the phytochemical screening showed that the aqueous and ethanol extracts of *Trichilia emetica* contains various components. The presence of polyphenols in the aqueous extract is confirmed by studies of Germano *et al.* [17]. According to some studies, the methanol extract of *Trichilia emetica* contains alkaloids, cardiac glycosides, saponins, flavonoids and tannins [26]. In the present study, the aqueous extract revealed also the presence of these components. Besides, flavonoids are presents

in the aqueous acetone extract of leaves [1]. Coumarins are absent in the stem bark extract of *Trichilia emetica*. However, they are presents in the leaves extracts and roots bark according to studies of Timbo Binta [27]. The presence of alkaloids in the stem bark and their absence in the leaves as well as in the root bark has been also revealed by Timbo Binta.

In acute toxicity study, there was no mortality observed up the maximum dose level 5000 mg/kg



| 36 FEMALS RATS EXPLOITED | | | | | | | |
|---------------------------|------------------------|-------------------------|------------|------|----------------|------------------------|----|
| Number of treated animals | Number of dead animals | CLINICAL SIGNS | | | | | |
| | | Abdominal constrictions | Immobility | Food | Fast breathing | Difficult displacement | |
| AQUEOUS EXTRACT | | | | | | | |
| Control (NaCl) | 3 | 0 | † | † | † | † | † |
| Group 1 (50mg/kg) | 3 | 0 | † | † | † | † | † |
| Group 2 (300mg/kg) | 3 | 0 | † | † | † | † | † |
| Group 3 (500mg/kg) | 3 | 0 | † | † | † | † | † |
| Group 4 (2000mg/kg) | 3 | 0 | † | † | ## | † | † |
| Group 4 (5000mg/kg) | 3 | 0 | † | † | ## | † | † |
| ETHANOL EXTRACT | | | | | | | |
| Control (NaCl) | 3 | 0 | † | † | † | † | † |
| Group1 (50mg/kg) | 3 | 0 | † | † | † | † | † |
| Group2 (300mg/kg) | 3 | 0 | † | † | † | † | † |
| Group3 500mg/kg) | 3 | 0 | † | † | † | † | † |
| Group 4 (2000mg/kg) | 3 | 0 | † | † | † | † | † |
| Group 5 (5000mg/kg) | 3 | 0 | † | † | ## | ## | ## |

Table 2: General appearance and behavioral observations for control and treated groups of *trichilia emetica*
 ## : presence of sign not leading to animal dying , † : Absence of signs



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body weight (bw) of the aqueous and ethanol extracts administrated orally. During 14 days period of acute toxicity evaluation, some signs of toxicity have been observed, but they were all quickly reversible. The absence of death observed allows classifying our extracts in category 5 of the Globally Harmonized System (SGH). That means what follows:

2000 < LD50 Aqueous extract < 5000 mg/kg bw

2000 < LD50 Ethanol extract < 5000 mg/kg bw.

According to the scale of toxicity of Hodge and Sterner in this rat experiment, the aqueous and ethanol extracts of *Trichilia emetica* are slightly toxic [28].

CONCLUSION

In the present study, it was proved that the aqueous and ethanolic extract of *Trichilia emetica* was found

to be non-toxic to rats up to the dose of 5000 mg/kg body weight. This study concludes that the presence of various phytochemical constituents in the plant (*Trichilia emetica*) may be responsible for its various pharmacological actions documented in traditional medicine.

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