Preliminary Study on the Contractile Effects of the Aqueous Extract of *Leptadenia Hastata* Leaf (Pers Decne) on Rat Uterus


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Abstract

The effect of the aqueous leaf extract of *Leptadenia hastata* on the contractile activity of the female uterus in rats was studied. The aqueous leaf extract was extracted with distilled water using a Soxhlet extractor and this yielded 24.1% w/w of the extract. The phytochemical study of *Leptadenia hastata* leaf was also determined and this revealed the presence of alkaloids, tannins, anthraquinones, phlobatannins, saponins, cardiac glycosides, flavonoids, carbohydrates and terpenoids. The uterus of seven adult intact/non-pregnant virgin female rats were isolated and the effect of the extract on rat uterus was studied and measured on a kymograph. Uterine contractile activity was demonstrated by different doses of the extract. The results also show that the extract increases the length of uterine segments. It was thus concluded that the aqueous leaf extract of *Leptadenia hastata* has uterotonic principles which could be responsible for the oxytocic effects on the uterus and could therefore be used as an ecbolic. The identification of this phytochemical constituent would certainly be the focus of future studies.

Keywords: Contraction, ecbolic, kymograph, *Leptadenia hastata*, uterus.
PRELIMINARY STUDY ON THE CONTRACTILE EFFECTS OF ...

Introduction

Several medicinal plants have been studied and more are being studied with a view of determining the safety margin and efficacy of these plants. *Leptadenia hastata* (Pers) Decne (also known as *Yadiya* in Hausa and *Hagalhadjar* in Arabic) belongs to the family *Asclepiadaceae* (Thomas, 2012). It is an edible non domesticated vegetable and it is collected in the wild throughout Africa (Bayala et al., 2011; Bello et al., 2011; Thomas, 2012). It is a voluble plant with creeping latex stems, gloabescent leaves, glomerulus flowers as well as follice fruits (Garba et al., 2013). Traditional use of the plant in Nigeria shows that the plant is used as a spice (Ibrahim et al., 2012) as well as in the treatment of hypertension and skin diseases (Dambatta and Aliyu, 2011). The plant has also been reported to be used in the treatment of patients with prostate cancer and rheumatism complaints (Mathieu and Meissa, 2007). Furthermore, the plant has been known to have antibacterial, anti-diabetic, anti-inflammatory and trypanocidal properties (Nikiema et al., 2001; Magasouba et al., 2007; Aberbauer et al., 2008; Bello et al., 2011). In most parts of West Africa, the leaf of *L. hastata* is an important staple when cereal harvest becomes inadequate to support populations (Bayala et al., 2011). Earlier studies on the effects of *L. hastata* leaf extract on the reproductive system in rats has shown that the leaf extract has anti-androgenic (Bayala et al., 2011) as well as abortifacient effects (Garba et al., 2013). In view of the fore going, this study was designed to determine the effects of the aqueous leaf extract of *L. hastata* on the contractile activity of rat uterus.

Materials and Methods

Plant Collection, Identification and Extraction Procedure

Fresh leaves of *L. hastata* were collected from Maiduguri, Borno State, Nigeria. Collected leaves were identified and authenticated by a botanist in the Department of Biological Sciences, University of Maiduguri. An Herbaria was made and a voucher specimen was deposited in the Department of Veterinary Physiology, Pharmacology and Biochemistry Laboratory, University of Maiduguri, Nigeria for future references. The air dried leaves of *L. hastata* was crushed into fine powder using pestle and mortar. Two (2.0) Kg of the powdered leaves was subjected to exhaustive Soxhlet extraction in one liter of distilled water at 60°C for 72 hours. The crude aqueous extract was then concentrated in a water bath at 50°C. This gave a total mean extract weight yield of (24.1 % w/w) of extract which was further oven dried at 40°C and maintained in a desiccator until a constant weight was obtained.

Phytochemical Screening

The presence of tannins, anthraquinones, phlobatannins, saponins, cardiac glycosides, flavonoids, alkaloids and terpenoids in extract were tested using simple and standard qualitative methods earlier described by Trease and Evans (1989) and El Olemy et al., (1994). Lethal dose of *L. hastata* has earlier been reported to be at 1440mg/kg (Sanda et al., 2013).

Experimental Animals and Ethical Consideration

Seven (7) adult non pregnant virgin female albino rats in estrus stage and weighing between 95g to 120g were used for this study. The rats were maintained in plastic rat cages in the Veterinary Physiology Laboratory, University of Maiduguri and were allowed one week to acclimatize to the laboratory environment before the commencement of the study. Pelleted commercial feed (ECWA Nig. PLC, Jos, Nigeria) and water were provided ad libitum. This research (FVM699/05/10/01/105) was approved by the Animal Welfare Committee of the Faculty of Veterinary Medicine, University of Maiduguri, Nigeria and the experimental animals were handled in accordance with the internationally acceptable principles for laboratory animal use and care (Brooman and Legge, 2000).

Extract-Induced Stimulation

The rats were humanely sacrificed by cervical dislocation so as to isolate the uterus. The abdomen was opened and the female reproductive tract was isolated. The uterine horns were severed at the junctions with the fallopian tubes and cleared of...
adhering mesentery and placed in a petri dish containing Tyrode solution maintained at 37°C. The Tyrode solution used had the following composition in gramme/Litre (gm/L) NaCl; 8.0, KCl; 0.2, CaCl₂, MgCl₂; 0.2 each, NaHCO₃; 1.0, NaH₂PO₄; 0.05 and glucose; 1.0. Approximately 2-3 cm segment of the uterine tissue was used for each experiment. A thread was attached to each end of the segment without occluding the lumen. One end of the tissue segment was mounted on the organ bath (Grant instrument 51963, Cambridge) containing Tyrode solution. The other end was attached in a similar manner to a frontal writing lever through which tissue response will be recorded on a kymograph paper isometrically using Ugo Basile Strain Guage Transducer® connected to a micro dynamometer recorder. The tissue was gassed with ordinary air and it was allowed to equilibrate for at least 30 minutes before adding the extract. Graded doses of the extract (0.2, 0.4, 0.6, 0.8 and 1 ml) were prepared and variously tested. The contact time for each dose was 30 secs, after which the tissue was washed with Tyrode solution by draining through the draining tube. The organ bath was quickly replaced with fresh Tyrodes solution and 3 to 5 min was allowed for the tissue to regain their strength.

**Results**

**Phytochemical Analysis**

The results of the phytochemical analysis of the aqueous extract of *Leptadenia hastata* leaf showed that it contains flavonoids, carbohydrates, alkaloids, tannins, phlobatannins, saponins, cardiac glycosides and anthraquinones (Table 1).

<table>
<thead>
<tr>
<th>S/No</th>
<th>Phytochemical</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carbohydrate</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Tannins</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Anthraquinones</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Phlobatannins</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Saponins</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Cardiac glycosides</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Flavonoids</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>9</td>
<td>Terpenoids</td>
<td>+</td>
</tr>
</tbody>
</table>

Key: + Present.

**Table 2:** Mean values of length of uterine segment before and after treatment with aqueous leaf extract (80mg/ml).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose</th>
<th>Length of Uterine segment before administration</th>
<th>Length of Uterine segment after administration</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract (80mg/ml)</td>
<td>0.2</td>
<td>15</td>
<td>27.50</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>15</td>
<td>32.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>15</td>
<td>34.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>15</td>
<td>39.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>15</td>
<td>41.75</td>
<td></td>
</tr>
</tbody>
</table>

**Effect of the Aqueous Leaf Extract of Leptadenia Hastata on Isolated non Pregnant Uterus**

The effect of the aqueous extract of *Leptadenia hastata* leaf on isolated non pregnant uterus is shown in Fig. 1. The extract showed an increase in length of the non-gravid uterus. This increase was dose dependent following the administration of the extract at (80mg/ml) at graded doses.
Fig. 1: Increase in length of uterine segment before and after treatment with aqueous leaf extract (80mg/ml) at different doses.

Discussion

The phytochemical screening of the aqueous extract of *Leptadenia hastata* leaf indicated the presence of chemical constituents of known pharmacological actions such as alkaloids, flavonoids, carbohydrates, saponins, cardiac glycosides, tannins, phlobatannins and anthraquinones. These chemical constituents found in the aqueous leaf extract of *L. hastata* could be products of secondary metabolism in plants and have been reported to possess some medicinal uses earlier mentioned (Ogundipe *et al.*, 1998; Abdulrahman and Onyeyili, 2001).

The study also showed that the aqueous leaf extract of *L. hastata* exhibited dose dependent contractile activity on the uterus just as is reported using other plants (Sandabe *et al.*, 2008). The effect of different ecbolic agents varies with the species, studies, the dosage used and the hormonal regime of the subject under study. This study has found positive ecbolic effects of *L. hastata* extract with rat uterus. *L. hastata* extract has a stimulatory effect on spontaneous rhythmic contractions of the rat uterine muscle. Saponins have been reported to have ecbolic properties (Sandabe *et al.*, 2008). This agrees with the present findings since the plant *L. hastata* contain saponins capable of exhibiting this ecbolic activity (Doughari and Obidah, 2008). Other studies have shown other plants with its ecbolic property. For example, Oboh *et al.*, (2005) showed that the aqueous and methanolic extracts of *Sidaacuta* exhibited a dose dependent contractile effect on the uterus, and attributed this effect to the saponin component of the extract. Cherian (2000), concluded that the crude papaya latex contains an uterotonic principle which might be a combination of enzymes, alkaloids and other substances. Some of these constituents have been identified in *L. hastata* and might act on the alpha adrenergic receptor population of the uterus thereby causing contractions (Cherian, 2000). The extracts of Chinese motherwort plant (*Leonurus cardiac*) have also been used as an oxytocic agent and is shown to facilitate difficult labour, and or to expel dead fetuses or placenta and stop postpartum hemorrhage (Chahoud *et al.*, 1999). *L.hastata* in its crude form is used by the natives to facilitate difficult labour thereby further buttressing its potential or oxytocic activity. It is also used to prevent or to arrest uterine haemorrhage, painful uterus and administered postnatal to stimulate uterine contractions.

Conclusion

The results obtained from this study have shown that the aqueous leaf extract of *Leptadenia hastata* has an ecbolic effect on the uterine smooth muscles. This may be due to one or more of its phytochemical constituents. The active component
(s) responsible for this ecbolic effect is not investigated in this study. It is therefore recommended that this aspect be investigated.

Acknowledgements

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References


