Full Length Research Paper

Effect of aqueous ethanolic extract of *Hymenocardia acida* stem bark on oestrous cycle of albino rats

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It is well known that some plant preparations play important role in fertility regulation. Oestrous cycles of albino rats showing regular cycles were monitored daily by vaginal lavage. The length of oestrus cycles and duration of each phase of the cycle were recorded. We observed that the aqueous ethanolic extract of *Hymenocardia acida* stem bark caused an irregular oestrous cycle characterised by prolonged diestrus phase. It is concluded that the extract caused a loss of cyclicity in female albino rats.

Key words: *Hymenocardia acida*, albino rats, oestrous cycle.

INTRODUCTION

*Hymenocardia acida* (Tul.) is a small browse tree or shrub with palatable foliage, widely distributed within the savannah region of Nigeria. The plant is also commonly found in scrub and open woodland of Angola, Cameroon, Chad, Congo, Cote d'Ivoire, Gambia, Ghana, Guinea-Bissau, Kenya, Mali, Mozambique, Niger, Senegal, Tanzania, Togo, Uganda, Zambia and Zimbabwe (Burkill, 1994). It is called “Enache” by Idoma people of North Central Nigeria while the local or vernacular name among the Hausas in Nigeria is “Janyaro”. All parts of the plant are useful as remedies for many ailments. The powdered root decoction is used for fever, diarrhoea and dysentery. The root ash is used to treat mouth infections. The powdered roots are also used as depurative and for treating colds, muscular pains, headaches, jaundice, hypotension, enteralgia, chest pains and nephritis (Irvine, 1961). Experimental studies have confirmed antifungal and antimycobacterial (Muanza et al., 1995), antimicrobial (Mann et al., 2008), anti-sickling (Mpiana et al., 2007), anti-ulcer (Ukwe, 2004), anti-diarrhoeal (Tona et al., 1999), antiplasmodial (Vonthron-senecheau et al., 2003) and *in vitro* tyrpanocidal activities of *H. acida* (Hoet et al., 2004; Abu et al., 2009). Muanza et al. (1995) have also reported anti-HIV and anti-inflammatory activity of this plant. Among the Idoma and Igede people of North Central Nigeria, the decoction of root and stem bark is used in the treatment of diabetes (Igoli et al., 2005). In folkloric medicine of Idoma people, *H. acida* is used as douche for female personal hygiene (Ada and Claffey, 2003). Despite the popular and numerous therapeutic benefits of *H. acida*, little is known about its effects on reproduction.

The aim of the present study was to determine the effect of aqueous ethanolic extract of *H. acida* stem bark on oestrus cycle of albino rats.

MATERIALS AND METHODS

The stem bark of *H. acida* was collected within the premises of University of Agriculture, Makurdi and authenticated. Voucher specimen (No. 209) was deposited at the College herbarium. The stem bark was washed, air dried at room temperature for one week, pulverized and stored in air-tight container until required. 100 g of powdered material was soaked in 500 ml of 70% ethanol and stirred intermittently for 48 h at room temperature. The material was filtered using sterile cotton wool and Whatman (No. 1) filter paper: the residue was resuspended in the same amount of solvent and then filtered three more times. The pooled filtrates obtained were

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Table 1. Effect of *H. acida* stem bark extract (400 mg/kg body weight) on oestrous cycle of Wistar rats. Values are expressed as mean ± S.E.M. (N = 5).

<table>
<thead>
<tr>
<th>Phases (days)</th>
<th>Control</th>
<th>Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oestrus cycle</td>
<td>4.40 ± 0.24</td>
<td>6.40 ± 0.55*</td>
</tr>
<tr>
<td>Proestrus</td>
<td>0.86 ± 0.06</td>
<td>0.60 ± 0.10</td>
</tr>
<tr>
<td>Oestrus</td>
<td>0.94 ± 0.05</td>
<td>1.20 ± 0.14</td>
</tr>
<tr>
<td>Metestrus</td>
<td>0.82 ± 0.08</td>
<td>0.98 ± 0.11</td>
</tr>
<tr>
<td>Diestrus</td>
<td>1.76 ± 0.46</td>
<td>3.62 ± 0.52</td>
</tr>
</tbody>
</table>

*N* represents number of animals used for each group.

*Significantly different at P < 0.05*

The control rats exhibited regular 4 to 5 day cycle. The length of the oestrous cycle in treatment group was significantly (P < 0.05) longer compared with the control. The oestrus and metestrus phases of the cycle were increased in the extracted treated rats. However, prooestrus phase was decreased in the treatment group. At a dose of 400 mg/kg body weight, an irregular oestrous cycle characterized by a prolonged diestrus phase was observed.

**DISCUSSION**

The rat has a characteristic short oestrous cycle of 4 to 5 days in phases (Mandl, 1951) which make them ideal for reproductive studies (Marcondes et al., 2002). The results of our study (Table 1) confirm the reports of the ability of some plant extracts to prolong the oestrous cycle and diestrus phase of the cycle (Shibeshi et al., 2006; Kage et al., 2009). However, Shukla et al. (1987) reported complete abolition of proestrus, prolonged oestrus and shortened diestrus phases of the cycle following administration of butanolic extract of *Pueraria tuberosa* in rats. Similar observations on prolonged oestrous cycle were made on ethanolic extract of *Rivea hypocrateriformis* (Shivalingappa et al., 2001) and extract of *Anethum graveolens* (Monsefi et al., 2006). Uchendu et al. (2000) also reported that ethanolic extract of *Dalbergia saxatilis* prolonged the diestrus phase of the cycle and thus reduced fertilization in the affected experimental animals. An oestrous cycle is a rhythmic reproductive cycle in sexually matured female mammals (Hafez and Hafez, 2000) and is influenced by the release of gonadotropin releasing hormone from the hypothalamus, gonadotropins from the pituitary gland and sex hormones from the gonads. While female cyclicity characterized by vaginal changes as observed in oestrous cycle is an index of good functioning of the neuroendocrine – reproductive system and ovarian activity, loss of normal oestrous cycle indicates the disruption of ovarian progesterone and estrogen balance (Romero et al., 2008). The presence of particular cell types indicates the follicular and luteal phases of the reproductive cycle. Although we did not evaluate hormonal milieu in the present study, other researchers using vaginal smear to monitor the oestrous cycle of albino rats given methanolic extract of *Polygonum hydropiper* at a dose of 1 g/kg body weight daily for three consecutive cycles indicated an alteration of oestrous cycle and disruption of ovarian endocrine function (Hazarka and Sarma, 2007).

Similar reports indicate that plant extracts adversely affected oestrous cycle in rats during diestrus phase by blocking the release of both follicle stimulating hormone (FSH) and luteinising hormone (LH) (Benie et al., 2003). Ganguly et al. (2007) also observed a prolongation of oestrous cycle and concomitant suppression of LH
following the administration of *Mimosa pudica* root extract. Irregularity of oestrous cycle may cause distortion of endometrial function which may in turn lead to a failure of implantation and pregnancy. An irregular pattern of oestrous with a prolonged diestrus and consequently a reduced number of ova in the ovary was attributed to administration of *Garcinia kola* seed extract (Akpana et al., 2005). Interestingly, we observed in another study strong antiimplantation and antifertility activities when ethanolic extracts of *H. acida* stem bark were administered from days 1 to 19 of pregnancy (Abu and Uchendu 2010). The present observation of irregular oestrous cycle which correlates well with antifertility effect of *H. acida* is inconsistent with the finding on neem flower extract (Gbotolorun et al., 2008). The authors reported that neem flower extract altered the oestrous cycle due to prolonged diestrus phase, but that the extract neither caused antimplantation nor abortifacient effects.

Estrogenic substances which are known to cause antifertility effects also disrupt oestrous cycle, cause imbalance in estrogen and progesterone levels, expel ova from the oviduct or block ovulation and inhibit uterine development (US EPA, 1996). In our study, ethanol extract of *H. acida* adversely affected oestrous cycle at the diestrus phase. Studies suggestive of alterations in normal cyclicity, reduction in the number of litters and implantation sites have been attributed to the presence of high amounts of saponins and other phytoestrogens in plants with known antifertility effects (Tamura et al., 1997; Shibeshi et al., 2006). *H. acida* was earlier reported to contain saponins, cardiac glycosides, tannins and alkaloids (Abu et al., 2010). Besides, Igoli and Gray (2008) had isolated steroidal compounds in *H. acida* stem bark. It is obvious that different plants have different mechanisms by which they alter the reproductive cycle. We conclude that ethanolic extract of *H. acida* stem bark caused cessation of oestrous cycle at the diestrus phase in albino rats.

REFERENCES


