



Effects of Ethanol extract of *Ricinus Communis* seed on some Hormonal profile in Bromocriptine induced Hypoprolactinemia in Female Albino rats.

Agbai Emmanuel Onuka¹, Professor Nwafor Arthur²

1. Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medicine, Madonna University, PMB 48 Elele; Rivers State Nigeria

2. Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Nigeria

3. Sciences, University of Port Harcourt, PMB 5323, Choba, Port Harcourt, Rivers State, Nigeria

ABSTRACT

This present study was undertaken to investigate the effects of *Ricinus communis* ethanol extract on serum prolactin, LH and FSH levels in bromocriptine-induced hypoprolactinemia in female albino rats. A total of thirty female albino rats divided into 5 groups (Groups I, II, III, IV and V) consisting of 6 rats in each group were used for the study. Group I served as Control, while II, III, IV and V served as experimental groups. The experimental groups received 10mg/kg of bromocriptine orally at interval of 6 hours daily for 4 weeks. Groups III, IV and V were given respectively 200mg/kg/day, 500mg/kg/day and 900mg/kg/day of *ricinus communis* orally for 4 weeks. Group I received distilled water and normal rat chow. Results showed statistically significant decrease in prolactin level ($P < 0.05$) in rats treated with *ricinus communis* extract. There was statistically significant increase in serum LH and FSH levels ($P < 0.05$) in rats treated with *ricinus communis* extract. The present study suggested that *ricinus communis* extract in a dose related pattern significantly lowered serum prolactin level but caused a significant increase serum LH and FSH levels respectively in bromocriptine induced hypoprolactinemia in female rats.

Keywords: *Ricinus Communis*, Hypoprolactinemia

*Corresponding Author Email: emmanuelagbai207@yahoo.com

Received 18 April 2014, Accepted 5 May 2014

Please cite this article in press as: Agbai E *et. al.*, Effects of Ethanol extract of *Ricinus Communis* seed on some Hormonal profile in Bromocriptine induced Hypoprolactinemia in Female Albino rats. American Journal of Pharmacy & Health Research 2014.

INTRODUCTION

Ricinus communis (Euphorbiaceae family) is a soft wooden small tree found in both the tropical and temperate climates of the world ^{1,2}. Different parts of the plant have been reported to have several medicinal values. Its leaf, root, and seed oil represent a therapeutic potential including inflammation treatment, liver disorders, hypoglycemic, and laxative ^{3,4,5}. The methanol extract of *ricinus communis* seed was found to prevent implantation and when implantation occurred, it induced abortion in female guinea pigs and also prolongs the estrous cycle with a marked effect on the diestrous phase ⁶.

Bromocriptine, a lysergic acid derivative with a bromine atom at position 2 has been found to have unique effects on the dopamine receptors in the pituitary and central nervous system and peripherally. It is rapidly and completely absorbed from the gut and is mainly excreted in the bile and feces. It seems to have a particular specificity for the pituitary lactotrophs ⁷. It functions therefore like the prolactin inhibitory factor in the hypothalamus to stimulate inhibitory hormone receptors which results in prolactin release being inhibited and growth hormone release stimulated. In this present study, hypoprolactinemia was induced using bromocriptine⁸. Therefore, we investigated the effect of *ricinus communis* L. on prolactin, LH and FSH levels in bromocriptine-induced hypoprolactinemia in female rats.

MATERIALS AND METHODS

Thirty female albino wistar rats (180 - 210 g) were obtained from the animal house of the Department of Veterinary Medicine, University of Nigeria, Nsukka. They were assigned into 5 groups (n=6) and housed in a wire mesh cage (under temperature of 25°C - 30°C, 14 hours light and 10 hours dark cycle). They were acclimatized for two weeks. The rats were fed with normal rat chow and had access to tap water *ad libitum*. The Animal Ethical Committee of the University approved all the protocols of the study.

Experimental grouping of animals

Hypoprolactinemia was induced by intravenous (i. v.) injection of bromocriptine 10mg/kg [9] body weight 4 times daily for four weeks. During the experiment the animals were weighed and randomly selected into four experimental groups. The administration of extract followed our previous protocol by Agbai and Nwafor ¹⁰.

Table 1: Experimental groupings and treatment protocols for experimental and control cases

Rat Group	Treatment Protocol
Control group (Group 1)	Distilled water and normal rat chow
Group II	10 mg/kg of bromocriptine only
Group III	10 mg/kg of bromocriptine plus 200 mg/kg of <i>ricinus communis</i> extract
Group IV	10 mg/kg of bromocriptine plus 500 mg/kg of <i>ricinus communis</i> extract
Group V	10 mg/kg of bromocriptine plus 900 mg/kg of <i>ricinus communis</i> extract

Extract preparation

The seeds of *ricinus communis* were purchased from Relief market, Owerri L.G.A. of Imo State. The plant materials were identified and authenticated in Pharmacognosy Department, Madonna University, Elele. The outer coating (husks) of the seeds were manually removed and the residual flesh. The residual flesh was sundried for one week and ground in a grinder into pulp. The wet ground pulp (736 g) was extracted by maceration with ethanol to afford pale yellow oils (274 g) and whitish scum. The pale yellow oily form was suspended for 48 hours in 90 % ethanol to remove excess oil and extracted using a mechanical stirrer after which it was filtered with Whatman filter paper (No 1). The filtrate was then concentrated to dryness at 35°C in an electric oven (gallenkamp) for 24 hours. It produced a semi-solid mass when dried and stored in an air tight container in the refrigerator below 10°C. 70.1 g of the extract is then measured using an electric weighing balance and then dissolved into 350.5 ml of distilled water (1 g of extract is dissolved in 5 ml of distilled water). The extract was administered orally using a 2 ml syringe without needle. This was done carefully to prevent damage of the alimentary canal of the rats.

Sample collection

At the end of four weeks experiment, the animals were sacrificed under anesthesia with the use of chloroform. Blood was obtained via cardiac puncture and was put in a labeled EDTA anticoagulant bottle for Enzyme-linked Immunosorbent Assay. Serum prolactin, FSH and LH were estimated by Uotila ¹¹.

Statistical Analysis

Results are expressed as mean \pm SEM. Statistical significance of the differences observed between control and experimental groups (ANOVA) was evaluated by Turkey's multiple comparison at $P < 0.05$.

RESULTS AND DISCUSSION

Group I showed statistically significant difference in prolactin (13.38 ± 0.92 ng/ml) compared to Group II (11.70 ± 2.77 ng/ml), Group III (9.73 ± 4.78 ng/ml), Group IV (9.23 ± 3.33 ng/ml) and

Group V (8.25 ± 1.20 ng/ml) at $P < 0.05$. There was also statistically significant difference in serum prolactin level ($P < 0.05$) between Group II compared to Groups III, IV, and V. There was statistically significant difference in serum LH level ($P < 0.05$) between Group I (8.07 ± 0.71 mIU/mL) compared to Group II (10.41 ± 1.14 mIU/mL), Group III (10.82 ± 0.88 mIU/mL), Group IV (11.44 ± 0.53 mIU/mL) and Group V (12.88 ± 0.72 mIU/ml). Although there was no statistically significant difference in serum LH level ($P > 0.05$) between Group II compared with Group III and IV, statistically significant difference occurred between Group II compared to Group V at $P < 0.05$. There was statistically significant difference in serum FSH level ($P < 0.05$) between Group I (5.20 ± 0.97 mIU/ml) compared to Group II (8.71 ± 0.70 mIU/ml), Group III (8.95 ± 1.46 mIU/ml), Group IV (9.74 ± 0.59 mIU/ml) and Group V (9.87 ± 0.41 mIU/ml).

Table 1: Effect of *ricinus communis* extract (RCE) on serum prolactin, LH and FSH in female rats administered with 10 mg/kg of bromocriptine

Treatment groups	Prolactin level (ng/ml)	LH level (mIU/mL)	FSH level (mIU/mL)
I Control	13.38 ± 0.92	8.07 ± 0.71	5.20 ± 0.97
II Bromocriptine only	11.70 ± 2.77^a	10.41 ± 1.14^a	8.71 ± 0.70^a
III Bromocriptine + 200mg/kg RCE	9.73 ± 4.78^{ab}	10.82 ± 0.88^a	8.95 ± 1.46^a
IV Bromocriptine + 500mg/kg RCE	9.23 ± 3.33^{ab}	11.44 ± 0.53^a	9.74 ± 0.59^a
V Bromocriptine + 900mg/kg RCE	8.25 ± 1.20^{ab}	12.88 ± 0.72^{ab}	9.87 ± 0.41^a

Data represented as mean + SEM; (^a) $P < 0.05$ significant difference between control (^b) $P < 0.05$ significant difference between bromocriptine control

The result in figure 1 showed statistically significant decrease in serum levels of prolactin after administration of bromocriptine and which was further decreased by the ethanol extract of *ricinus communis* in a dose-dependent pattern demonstrating that extract may have significant effect on the pituitary gonadotropins. Our recent findings ¹⁰ on the effect of *ricinus communis* extract on prolactin after administration of metoclopramide showed that the extract significantly reduced prolactin levels in a dose-dependent pattern with a concomitant increase in FSH and LH. Several studies ^{13, 15} have showed a strong association exists between elevated prolactin and decreased FSH and LH, therefore, it is credible to suggest that bromocriptine induced hypoprolactinemia could have effect on prolactin level. In contrast, studies have showed that plasma concentrations of gonadotropin were not affected after a 4-week treatment with bromocriptine ¹⁴, and that gonadotropin was unaltered by bromocriptine therapy in women with polycystic ovarian disease ^{12,15}. Oseko et al. ¹³ have also showed that low dose of bromocriptine administered to normal men for 8 weeks does not significantly influence pituitary secretion of LH.

Our findings showed that *ricinus communis* extract increased the FSH and LH after administration of 10mg/kg of bromocriptine suggesting that the extract increased pituitary gonadotropins with a decrease in prolactin level. Recently we reported that *ricinus communis* extract increased levels of estrogen and LH in a dose-dependent pattern ¹⁶. This implies that the increase in LH observed in the present study could possibly be due to the direct action of *ricinus communis* extract on gonadotrophic cells of the pituitary gland.

Studies have showed that dopamine agonist caused an increase in FSH without a concurrent increase in LH ¹⁴, whereas strong associations exist between elevated prolactin and decreased FSH and LH ¹⁵. We have reported that *ricinus communis* extract caused a significant increase in FSH and LH levels with decreased prolactin level in metoclopramide treated rats ¹⁰. Therefore, we can suggest that the extract possessed anti-prolactin property that can possibly elevate FSH and LH levels.

CONCLUSION

Therefore, it can be established that *ricinus communis* extract significantly reduced serum prolactin level, and the increase in serum LH and FSH observed in the study could result from the reduced prolactin and/or a direct action of *ricinus communis* extract on the anterior pituitary cells.

REFERENCES

1. Lakshamma P, Prayaga L. Identifying the sources of tolerance for drought in castor, *ricinus communis* L. J Oilseeds Res 2006; 33(3):348-352
2. Raoof MA, Yasmeen M. Aetiology, epidemiology and management of Botrytis grey mold of castor, *ricinus communis* L. (A review). J Oilseeds Res 2006; 23(2):144-150
3. Kirtikar KR, and Basu BA. *Indian Medicinal Plants*. 3rd edition 1991; 2274-2277
4. Capasso F, Mascolo N, Izzo AA, Gaginella TS. Dissociation of castor oil induced diarrhea and intestinal mucosal injury in rat: effect of NG-nitro-L-arginine methyl ester. B J Pharmacol 1994; 113:1127-1130
5. Dhar ML, Dhar MM, Dhawan BN, Mehrotra BN, and Ray C. Screening of Indian plants for biological activity. Part I. Indian J Exp Biol 1998; 6:232-247
6. Makonnen E, Zerihun L, Assefa G Rostom AA. Antifertility of *ricinus communis* seed in female guinea pigs. East Afr Med J 1999; 76:335-337
7. Mehta AE, Tolis G. Pharmacology of bromocriptine in health and disease. Drugs 1979; 17(5):313-325

8. Kauppila A, Martikainen H, Puistola U, Reinila M, Ronnberg L. Hypoprolactinemia and ovarian function. *Fertil Steril* 1988; 49(3):437-441
9. Arita J, Kimura F. Characterization of in vitro dopamine synthesis in the median eminence in rats with haloperidol induced hyperprolactinemia and bromocriptine induced hypoprolactinemia. *Endocrinology* 1986;119:1666-1672
10. Agbai EO, Nwafor A. Effects of ethanol extract of *ricinus communis* seed on serum prolactin, LH and FSH levels in metoclopramide induced hyperprolactinemic female albino rats. *American Journal of Pharmacy & Health Research* 2014; 2 (3)
11. Uotila M, Ruoslath E, Envall E. Two-site sandwich enzyme immunoassay with monoclonal antibodies to human alpha teloprotein. *J Immunological Methods* 1981; 42:11-15
12. Steingold KA, Lobo RA, Judd HL, Lu JK, Chang RJ. The effect of bromocriptine on gonadotropin and steroid secretion in polycystic ovarian disease. *J Clin Endocrinol Metab* 1986; 62(5):1048-1051
13. Oseko F, Morikawa K, Nakano A, Taniguchi A. Bromocriptine effects on plasma LH responses to gonadotropin-releasing hormone in normal men. *Life Sciences* 1993; 52(22):1805-1807
14. Beijerink NJ, Kooistra HS, Dieleman SJ, Okkens AC. Serotonin antagonist-induced lowering of prolactin secretion does not affect the pattern of pulsatile secretion of FSH and LH in the bitch. *Reproduction* 2004; 128(2):181-188
15. Mohan K, Sultana M. Follicle stimulating hormone, luteinizing hormone and prolactin levels in infertile women in North Chennai, Tamilnadu. *J Biosci Res* 2010; 1(4):279-284
16. Agbai EO, Nwafor A. Ethanol extract of *ricinus communis* increased reproductive hormones in female albino rats. *American Journal of Pharmacy and Health Research* 2014;2(4)



AJPHR is
Peer-reviewed
monthly
Rapid publication
Submit your next manuscript at
editor@ajphr.com / editor.ajphr@gmail.com