



Effect of Hydroalcohol Extract of *Englerina drummondii* Balle ex Polhill & Wiens (Mistletoe) Leaves on Prolactin and Thyroid Stimulating Hormone (TSH) in Female Wistar Rats.

¹*Gbaranor K. B., ²Ovili-Odili B. Z., ¹Okpara E. P. ¹Tamuno-Opubo A., ³Victor P. D., ³Orupabo C. D., ¹Tee P. G., ⁴Alasia O. M., ⁵Sapira-Ordu L ¹Nonju I. I., ⁶Nwosu G. N.

¹Department of Human Physiology, College of Medical Sciences, Rivers State University, Port Harcourt, Nigeria.

²Department of Human Physiology, College of Health Sciences, University of Port Harcourt, Nigeria.

³Department of Human Anatomy, College of Medical Sciences, Rivers State University, Port Harcourt, Nigeria.

⁴Department of Pharmacology, College of Medical Sciences, Niger Delta University, Bayelsa State, Nigeria.

⁵Department of Obstetrics and Gynaecology, Rivers State University Teaching Hospital, Port Harcourt, Nigeria

⁶Department of Paediatrics, Rivers State University Teaching Hospital, Port Harcourt, Nigeria

ARTICLE INFO

Article No.: 080821076

Type: Research

Accepted: 16/08/2021

Published: 31/08/2021

*Corresponding Author

Gbaranor Kekii Barinua

E-mail: barinua.gbaranor@ust.edu.ng

ust.edu.ng

Phone: +2348037414186

Keywords: Effect; Hydroalcohol;

Avocado trees; Prolactin; Thyroid

Stimulating Hormone.

ABSTRACT

Phytomedicine is a branch of medicine that is practice across the globe and can not be underrate. It is a branch of medicine that specialize in treating patients with plant materials such as the roots, leaves, fruits, flowers and bark. The aim of this study is to investigate effects of hydroalcohol extract of *Englerina drummondii* Balle ex Polhill & Wiens (mistletoe) leaves from avocado trees on prolactin and thyroid stimulating hormone (TSH) in female wistar rats. Twenty female wistar rats weighing between 160g to 180g were used for this study. The animals were divided into 4 groups, with five (5) rats per group. Group 1 (control) were administered 5ml/kg of distil water, group 2 received extract 100mg/kg, group 3 extract 200mg/kg, and group 4 extract 400mg/kg. The distil water and extract were administered through gavage at 08.00 hour once daily for 28 days. Our study revealed significant increase in prolactin ($0.69 \pm 0.01^*$) when extract of 100mg/kg was administered and significantly decreased in prolactin (0.23 ± 0.01) when extract of 400mg/kg was administered to the animals. Thyroid stimulating hormone (TSH) significantly decreased when 100mg/kg of extract (0.24 ± 0.01) was given and significantly increased when extract doses of 200mg/kg (0.78 ± 0.05) and 400mg/kg (0.80 ± 0.03) was administered respectively. Statistical analysis was done using SPSS version 24 and ANOVA, $p < 0.05$ was significant.

INTRODUCTION

Englerina drummondii Balle ex Polhill & Wiens is a semi-parasitic plant that grows on tree like Avocado tree and other hardwood trees. It has green broad leaves and it bears a round red fruits. It is locally called atabe in OgoniLand, Niger Delta, Nigeria. *Englerina drummondii* Balle ex Polhill & Wiens belong to the family Loranthaceae and is commonly called mistletoe. *Englerina drummondii* Balle ex Polhill & Wiens has the same botanical family name known as loranthaceae and same common name mistletoe with *Viscum album*. *Viscum album* (mistletoe) is found growing on host plants such as avocado pear, cocoa trees, abbies alba and citrus plants (Obatomi et al, 1994; Lyu et al, 2000). Extract preparation from *viscum album* (mistletoe) has been found to be antidiabetic (Obatomi et al, 1994), anticancerous (Kuttan et al, 1990; Hajto et al, 1999; Stein et al, 2000 and antihypertensive (Lyu et al, 2000).

The phytochemical constituents of mistletoe have been revealed and vary according to the host plant and it include: glycoprotein, polypeptides (Viscotoxin), flavonoids, flavonol agylcones, lectins, triterpenes, saponins, caffeic acid, lignans, cholines derivatives related to acetylcholine, vitamin C, histamine, resins, thionins, cardionolids and phenolic compounds (. Edlund et al, 2000; Wollenweber et al, 2000; Lyu et al, 2000). The extract of mistletoe has been found to exhibit oxytocic activity (Frohne D, and Pfander HJ, 1984) on the uterine smooth muscle (Le O and Zam N., 2008).

Englerina drummondii Balle ex Polhill & Wiens (mistletoe) is use by the traditionalist to supress or stop bleeding and it is combined with *African cucumba* for the treatment of fibroid, but no scientific documentation. Study by Ofem et al, (2014) revealed that leaves extract of *Viscum album* contain potent agents with potentials to increase serum FSH, LH and testosterone concentrations and at the same time decrease serum prolactin concentrations. Rats fed with 450 mg/kg body weight caused significant decrease in concentrations of testosterone, FSH and LH but increased prolactin levels (Ofem et al, 2014).

MATERIALS AND METHODS

Experimental plant

Fresh leaves of *Englerina drummondii* Balle ex Polhill & Wiens (mistletoe) were obtained during the raining season in the month of August, 2019 from a forest in Khana Local Government Area, Rivers State. The plant was introduced to me (researcher) by Prof. B. A. Ekeke (Prof of silviculture and Forestry) of the Forestry Department, Faculty of Agriculture, Rivers State University, Port Harcourt, Nigeria, and identified and authenticated in the Department of Plant Science and Biotechnology, Faculty of Science, University of Port Harcourt, Rivers State, Nigeria.

Preparation of plant extract

The *Englerina drummondii* Balle ex Polhill & Wiens leaves were washed and thereafter completely air dried under normal room temperature. The dried leaves were grounded into powder. 3kg of the grounded powder was placed in a maceration jar and 6.00mils of 70% methanol (hydro methanol) was added. The content was then emptied through the filter paper. The filtrate containing the extract was dried in a water bath at a temperature of 45^oc and was dried into a paste form. Extract doses of 100, 200 and 400mg/kg body weight was administered to the sub-groups.

The LD₅₀ of the *Viscum album* is 0.4g/kg(400mg) of body weight as determined by Mathew et al, (2016) was used.

Experimental animals and Management

The experimental animals were obtained from the animal house, Faculty of Basic Medical Sciences, University of Port Harcourt. Twenty (20) of the female wistar rats were used. The animals were housed in cages and maintained under natural environmental condition. The animals were weighed before the commencement and after the 28 days of administration. Wistar rats weighing between 160-180g were used for the study. The animals were allowed free access to clean drinking water and standard feed (rat chow). The research was carried out in accordance with the principles for laboratory animal use and care as found in the European Community guidelines (European Community Guidelines, 1986).

Study design

Twenty (20) animals were selected and randomly grouped into nine (4) groups, and each group has five (5) rats per group. Group 1, normal control received feed + 5ml/kg of distil water, group 2 received feed + extract 100mg/kg, group 3 received feed + extract 200mg/kg and group 4 received feed + extract 400mg/kg, all for 28 days. All the extracts received by the animals were *Englerina drummondii* Balle ex Polhill & Wiens.

Blood Collection

Chloroform soaked in cotton wool and placed in a desiccator was used to anaesthetized the female wistar rats and 5ml of blood samples were collected through cardiac puncture with syringe and shared into the plane bottles. The blood was allowed to stand for 15 minutes and then centrifuged for 15 minutes. Thereafter, the serum was collected and transferred into another bottle and stored in a freezer for biochemical analysis.

Determination of serum levels of prolactin and thyroid stimulating hormone

Estimation of the concentrations of prolactin and thyroid stimulating hormone were done using the SM-300A Microplate Reader Surgiffeld Medical England.

Statistical analysis

Data are presented as mean \pm SEM and data were analysed using a one-way Analysis of Variance (ANOVA) then followed with post hoc test. $P < 0.05$ was significant.

RESULT

Table 1: Effect of *Enlerina drummondii* Balle ex Polhill & Wiens on prolactin and Thyroid Stimulating Hormone (TSH) in Female Wistar Rats

Groups	Prolactin(ng/ml) Mean \pm Std	TSH (u/u/ml) Mean \pm Std
Control	0.46 \pm 0.01	0.42 \pm 0.51
Extract 100mg/kg	0.69 \pm 0.01*	0.24 \pm 0.01*
Extract 200mg/kg	0.46 \pm 0.01	0.78 \pm 0.05*
Extract 400mg/kg	0.23 \pm 0.01*	0.80 \pm 0.03*

The serum concentration of prolactin was significantly ($p < 0.05$) increased in group 2 (0.69 \pm 0.01ng/ml) when compare to control and significantly decreased in group 4 (0.23 \pm 0.01ng/ml).

Serum concentration of thyroid stimulating hormone was significantly decreased in group 2 (0.24 \pm 0.01u/u/ml) and significantly increased in group 3 (0.78 \pm 0.05u/u/ml) and group 4 (0.80 \pm 0.03u/u/ml) when compare to group 1 (control).

Table 2: Effect of *Englerina drummondii* Balle ex Polhill & Wiens leaves on rat organs weights

Groups	Thyroid gland(g) Mean \pm Std	Right Kidney(g) Mean \pm Std	Left Kidney(g) Mean \pm Std	Left Ovary(g) Mean \pm Std	Right Fallopian tube(g) Mean \pm Std	Left Fallopian tube(g) Mean \pm Std
Control	0.84 \pm 0.02	0.69 \pm 0.04	1.00 \pm 0.38	0.29 \pm 0.09	0.22 \pm 0.11	0.21 \pm 0.12
Extract 100mg/kg	0.77 \pm 0.03	0.77 \pm 0.19	0.49 \pm 0.01	0.17 \pm 0.11	0.15 \pm 0.03	0.13 \pm 0.02
Extract 200mg/kg	0.76 \pm 0.07	0.56 \pm 0.02	0.52 \pm 0.01	^a 0.05 \pm 0.00	0.05 \pm 0.01	0.06 \pm 0.01
Extract 400mg/kg	0.82 \pm 0.02	0.57 \pm 0.11	0.51 \pm 0.02	^a 0.08 \pm 0.01	0.13 \pm 0.03	0.14 \pm 0.02

a = $p < 0.05$

The weight of the left ovary organ significantly decreased when mistletoe extract of 200mg/kg and 400mg/kg was administered to groups 3 and 4 respectively.

DISCUSSION

Hormones are one of the determining factors for reproduction to occur and this must be in the right proportion. Most people in the rural areas and some in the urban areas depends on herbal medicine each time they have medical issues. The hypothalamus which is located below the corpus callosum and the thalamus is responsible for secretion and regulation of prolactin and thyroid stimulating through thyrotropin releasing hormone (TRH) and prolactin releasing factor (PRF) and prolactin inhibiting hormone (PIH).

The research revealed that the serum concentration of prolactin is significantly increased in

the group treated with mistletoe extract of 100mg/kg when compared to the control group (Table 1). The hormone prolactin is produced by the anterior pituitary gland seated at the base of the brain. This increased in serum concentration of prolactin could be due to obstruction of the hypothalamic-hypophysial portal system or destruction of the hypothalamus. The prolactin is a hormone that induced lactation and from the study, there is significant increase in the serum levels of prolactin when the extract was administered at a lower dose of 100mg/kg and significant decreased when the extract was administered at a high dose of 400mg/kg. This plant (mistletoe) if given to non-pregnant women at low dosage of 100mg/kg may

cause delay in conception owing to the fact that increase levels of prolactin interfere or suppresses the secretion of gonadotropin releasing hormone by the hypothalamus and subsequently suppresses the secretion of gonadotropin hormones (Follicle Stimulating Hormone and Luteinizing hormone) by the anterior pituitary gland and also induce galactorrhoea due to its significant increase in the serum levels of concentration. However, the extract at a dose of 100mg/kg may enhance lactation in nursing mother who find it difficult to produce milk for her baby. This study differs from study by Ofem et al, (2014), which revealed that mistletoe extract when given at a control and moderate dose decreases serum levels of prolactin whereas our study revealed that low dosage of mistletoe extract increases the serum levels of prolactin (Table 1).

Also, when 400mg/kg of mistletoe extract was administered to the animals, it significantly decreases serum levels of prolactin when compared to the control (Table 1) and this decrease may enhance reproductive process mostly in people with hyperprolactinaemia.

Thyroid stimulating hormone (TSH) is a hormone produced by the anterior pituitary gland. The study shows that 100mg/kg of mistletoe extract when administered to the animals significantly decrease the serum levels of TSH (Table 1) and may lead to hypothyroidism caused by decrease thyroid hormones. Since 100mg/kg of mistletoe extract decreases serum levels of TSH, this could be useful in persons with enlargement of thyroid gland (Goitre). However, when the animals were treated with mistletoe extract of 200mg/kg and 400mg/kg, it significantly increases serum levels of TSH (Table 1) when compared to the control and this may lead to hypertrophy of the thyroid gland, commonly called goitre.

When compared to the control, the weight of the left ovary significantly decreases when mistletoe extract of 200mg/kg and 400mg/kg were administered to the animals (Table 2).

CONCLUSION

Englerina drummondii Balle ex Polhill & Wiens (mistletoe) extract when administered in low dose increases the serum levels of prolactin and this may delay conception or reproductive process and when administered in high dose it decreases serum levels of prolactin and this could enhance reproductive process. Also, when extract of mistletoe was administered to the animals at low dose, it decreases serum levels of

TSH and this could be useful to persons with goitre and when administered at high dose, it increases serum levels of TSH.

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Cite this Article: Gbaranor KB; Ovili-Odili BZ; Okpara EP; Tamuno-Opubo A; Victor PD; Orupabo CD; Tee PG; Alasia OM; Sapira-Ordu L; Nonju II; Nwosu GN (2021). Effect of Hydroalcohol Extract of *Englerina drummondii* Balle ex Polhill & Wiens (Mistletoe) Leaves on Prolactin and Thyroid Stimulating Hormone (TSH) in Female Wistar Rats.: A Case Report. *Greener Journal of Medical Sciences*, 11(2): 109-112.