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ALBINO RATS FED WITH *MUCUNA PRURIENS* LINN SEED MEAL DIET
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Abstract

Women around the world have been preventing unintended pregnancy through various forms of birth control practices in which most Nigerian women cannot be excluded. This study investigated the claim of using Mucuna pruriens seed as a birth control for women in Nigeria. The study adopted experimental research. The effect of M. pruriens seed was experimented on the reproductive hormone of 16 adult female albino rats randomized into 2 experimental groups consisting of 8 rats per group for 16 days. Group 1 (control) group was fed with normal feed while group 2 was fed with diets containing Mp seed powder at 0.75g corresponding to one M. pruriens seed. The levels of estradiol, luteinizing hormone and follicle stimulating hormone were monitored using standard methods. Significant improvements in the serum level of all the hormones ($p < 0.05$) were observed in group 2. In conclusion, this study has revealed that Mucuna pruriens seed meal at 0.75g (1 seed) increased the level of estradiol, FSH in female. It has also indicated the potential of M. pruriens to enhance fertility and established the efficacy of M. pruriens seed powder as fertility enhancer in female rather than as a birth control. This provides some justification to the use of M. pruriens seed powder as fertility enhancer in women at a dosage of 1 seed and should be encouraged as it will reduce the dependence on synthetic drugs as fertility enhancing agents.

Keywords: Birth control, Mucuna pruriens, Women, Fertility, Reproductive hormones

Introduction

The use of natural products for birth control has been a subject of interest and speculation for centuries. *Mucuna pruriens*, commonly known as velvet bean or

cowhage, has been traditionally associated with contraceptive properties in various cultures. Birth control also known as contraception, anti-conception and fertility control, is the use of methods or devices to prevent unintended pregnancy (Medicine Net, 2012). It involves various strategies that aim to regulate or prevent the fertilization of an egg by sperm, thus preventing conception. Birth control has been used since ancient times, but effective and safe methods of birth control only became available in the 20th century (Hansen & Burke, 2010). Medicinal plants regarded as contraceptives are those capable of preventing pregnancy by interfering the normal process of ovulation, fertilization and implantation of eggs. About 222 million women who want to avoid pregnancy in developing countries are not using a modern birth control method (Singh & Darroch, 2012). That is because most women are skeptical about the side effects of that modern birth control method while some cannot afford it. Medicinal plants are the most easily accessible health resource available to many rural communities as they possess low toxicity (Dar, Shahnawaz, Rasool & Qazi, 2017). The use of herbal remedies in Nigeria is on the increase and several indigenous plants have been used in herbal formulations to cure diseases, sicknesses and heal injuries (Sofowora, 1993). One major medicinal plant commonly used to cure various ailments in Nigeria is the velvet plant (*Mucuna pruriens*) and commonly referred to as 'werepe' among the Yoruba tribe in Nigeria. All parts of the plant of the *Mucuna* plant possess medicinal properties (Sathiyanarayanan & Arulmozhi, 2007).

In Nigeria, the herbal practitioners and non - practitioners are claiming that the consumption of the seed of *M. pruriens* works as a contraceptive in female subject. Although there's no scientific evidence to support this claim in Nigeria, but the increasing rate at which the seed is being ingested by female subjects without measure require the need to scientifically prove its validity. All the studies conducted on the fertility potential of *M. pruriens* mainly focused on male subject but little is known about its effect on the female subject.

The plant has been screened for its phytochemical constituents and reported to be rich alkaloids, tannins, anthraquinones, saponins,, flavonoids and cardiac glycosides (Vadivel & Janardhanan, 2000; Nebedum, Udeafor & Okeke, 2010; Agbafor & Nwachukwu, 2011; Nwaoguikpe, Braide & Ujowundu, 2011) making the various parts of the plant , including the leaves, roots and seeds, to possess some medicinal properties (Agbafor, et al., 2011).

This plant is one of the most important medicinal plants in Nigeria and is used to treat a wide variety of conditions. The presence of 3,4-dihydroxy-L-phenylalanine (L-DOPA), which is known to provide symptomatic relief in the treatment of Parkinson's disease (Lekhraj & D'Souza, 2012). In addition, the plant has been shown to possess properties such as those of an antioxidant, an anti-inflammatory, a neuroprotective, an anti-epileptic, an antibacterial, and a cardiovascular protective agent (Misra & Wagner, 2004). *M. pruriens* seed exhibits anti-depressant-like activity (Hritcu, Noumedem, Cioanca, Hancianu, Postu,

Mihasan & Stefan, 2017). The powder of the seed has been credited with aphrodisiac or fertility in men (Ahmad, Mahdi, Shukla, Islam & Jaiswar, 2008). It has the capacity to enhance reproductive function in male albino rat due to its higher phenolic content (Ashidi, Owagboriaye, Yaya, Payne, Lawal & Owa, 2019). Its demand even in the international market has increased considerably (Vadivel, Janardhanan, 2000). Therefore, it is on this note that it is necessary to investigate the efficacy of *M. pruriens* seed as a birth control method in women in Nigeria.



Fig.1. Source: Funmilola Yaya. Photograph of dehulled seeds of *Mucuna pruriens* 28th May, 2018.

Statement of the problem

In Nigeria, anecdotal evidence and traditional beliefs suggest that *Mucuna pruriens* seeds possess contraceptive effects, leading to its use as a birth control method by women. *Mucuna pruriens* a tropical legume commonly known as velvet bean has gained attention for its potential therapeutic effects, including its role in fertility and reproductive health. However, there is a lack of scientific evidence to support or refute these claims regarding the specific effects of *Mucuna pruriens* seed meal on the reproductive hormone levels in female albino rats. Hence, this study investigated the effects of *Mucuna pruriens* seed meal on the reproductive hormones profile in female albino rats.

Purpose of the Study

The general objective of this study is to investigate the claim that *M. pruriens* seed serves as a birth control in women while the specific objectives are to:

- i. determine the outcome of *Mucuna pruriens* usage on women reproductive system; and
- ii. examine the difference between the reproductive system of women who use *M. pruriens* and those who do not.

Research Questions

- i. What could be the outcome of *M. pruriens* usage on women reproductive system?
- ii. Is there a difference between the reproductive system of women who uses MP seed and those who do not use MP seed?

Methodology

Mucuna pruriens seeds were collected from a botanical garden for this study. The seeds (Fig. 1) of the plant were dried at room temperature of 27°C for 7 days after which it was milled into fine powder with a grinding machine. Sixteen (16) Albino rats (average weight 110g) were used in this study. The rats were allocated into individual wooden cages and were randomized into 2 experimental groups (group 1, 2) consisting of 8 rats per group. Each rat in group 1 (control) were fed with standard laboratory rat chow while rat in group 2, were fed with the rat chow containing seed meal of *M. pruriens* at 0.75g corresponding to 1g of *M. pruriens* seed for a period of 16 days. The seed of *M. pruriens* seed was mixed with their food and given to the rats once per day at 12% of their body weight. Clean drinking water was supplied to all the rat ad libitum and the whole feeding regime lasted for 16 days. At the end of the feeding regime blood samples were collected from the rats in each group for the laboratory analysis.

The blood samples were centrifuged at 2500rpm for 10 min to obtain serum samples within an hour after blood collection. The sera obtained were later stored at -20°C and then used for hormonal assay. All the data were presented as the mean + Standard Deviation (SD). Statistical analyses for all measurements were performed using Statistical Package for Social Sciences (SPSS) version 20.0. The mean, standard error of the mean, analysis of variance were conducted. Post hoc test was performed using the student-Newman-Keuls. $P < 0.05$ was considered to be statistically significant.

Results

Serum level of reproductive hormones in experimental rat

The level of estradiol was significantly higher ($p < 0.05$) in the female experimental rats daily fed with one seed (group 2) of *M. pruriens* daily than those in the control group (group 1). There was no significant difference ($p > 0.05$) in the level of luteinizing hormone recorded in the control rats (group 1) and those fed with one seed (group 2) of *M. pruriens* daily. Rats fed with one seed (group 2) of *M. pruriens* daily had a significantly higher level of follicle stimulating hormone than rats in the control group (group 1).

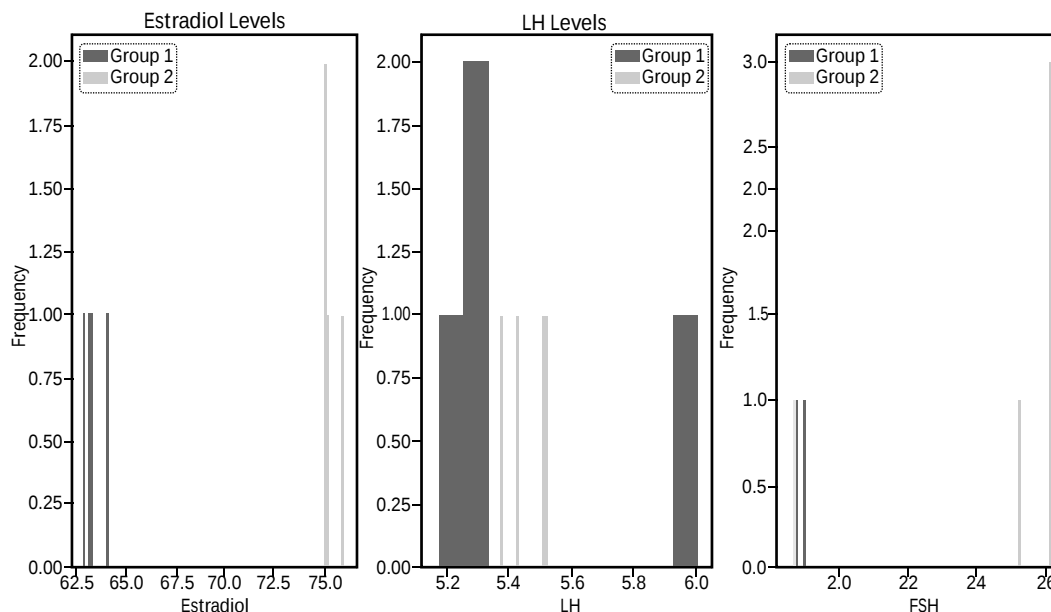


Figure 2: Levels estradiol, luteinizing hormone and follicle stimulating hormone of female rats fed with 1 *Mucuna pruriens* seed daily for 16 days.

Estradiol paired t-test:

T-statistic: -25.892650969736227

P-value: 0.00012636129607772223

There is a statistically significant difference in Estradiol levels between GROUP 1 and GROUP 2.

LH paired t-test:

T-statistic: -0.06702063187796467

P-value: 0.9507818962918108

There is no statistically significant difference in LH levels between GROUP 1 and GROUP 2.

FSH paired t-test:

T-statistic: -35.556950527278275

P-value: 4.89172439483033e-05

There is a statistically significant difference in FSH levels between GROUP 1 and GROUP 2.

Discussion of Findings

The serum concentration of estradiol, FSH in experimental rats in group 2 was observed to increase when compared to the rats in group 1. Estradiol is important in the normal functioning of the reproductive system. The improvement in the reproductive enhancement obtained in this study could be ascribed to the presence of levodopa (L-dopa) in the plant, which improves reproductive function in male

animals (Misra & Wagner, 2007). This L-dopa contains natural secretagogues which support the body's ability to stimulate the natural release of growth hormone (Ahmad *et al.*, 2008). The outcome of this study showed that *M. pruriens* seed usage improved the women reproductive system. Therefore, higher level of estradiol observed in female rats fed with 1 seed of *Mucuna pruriens* could potentially be attributed to the stimulation of follicle stimulating hormone (FSH). FSH is a hormone released by the pituitary gland that plays a crucial role in the regulation of reproductive processes. It is reasonable to suggest that the concentration of the secondary metabolites present in 1 seed of *M. pruriens* is enough to boost the reproductive hormones. L- Dopa and its metabolite dopamine have been reported to stimulate the hypothalamus and forebrain to secrete gonadotropin-releasing hormone (GnRH) (Shukla, Mahdi, Ahmad, Shankhwar, Rajender & Jaiswar, 2009; Singh, Sarkar, Tripathi & Rajender, 2013). The blood carries the dopamine into the brain where it naturally increases the reproductive hormones from the anterior pituitary gland. This study also revealed the difference between the reproductive hormones of women who uses *M. pruriens* seed and those who do not. There is a significant difference on serum level of Estradiol, FSH of female Albino rats that received a dosage of 1 seed of MP and those in the control group. *Mucuna pruriens* seed meal had effect in female albino rats fed with 0.75g seed powder by increasing the level of Estradiol and FSH in female albino rats.

Conclusion

This study has concluded that *Mucuna pruriens* seed meal at 0.75g increased the level of estradiol, FSH in female. It has also indicated the potential of *M. pruriens* to enhance fertility and established the efficacy of *M. pruriens* seed powder as fertility enhancer in female rather than as birth control which was often claimed to be the function of *M. pruriens* seed in women. In conclusion, this study has revealed that *M. pruriens* originally believed to be a birth control method actually possesses fertility-enhancing properties.

Recommendations

Considering the findings of this study, it is recommended that:

Traditional practitioner should work with researchers before prescribing medications to people to avoid misusing various medicinal plants. A dosage of 1 seed and should be encouraged as it will reduce the dependence on synthetic drugs as fertility enhancing agents. There should be awareness on the positive effect of Mp usage on female reproductive hormones. There should be awareness and orientation for couples facing fertility challenges about the potential benefits of *M. pruriens* seed as well as its limitations. There is need to provide an appropriate awareness and disseminate accurate information about Mp as a fertility enhancing plant to herbal practitioners and women in rural communities who are consuming the seeds as birth control. A further study can be conducted to evaluate the potential long term effects and safety of using *Mucuna pruriens* seed for fertility enhancement.

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The study is sponsored by TETFUND Institution Based Research Grant (IBR)