EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES

http://www.ejbps.com

ISSN 2349-8870
Volume: 2
Issue: 6
01-04
Year: 2015

EVALUATION OF APHRODISIAC POTENTIALS OF *IPOMEA BATATAS* IN MALE WISTAR RATS

***Ologhaguo Macstephen Adienbo and Joyce Oluwadare Olorunfemi**

Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Port Harcourt, Nigeria.

***Author for Correspondence: Dr. Ologhaguo Macstephen Adienbo**
Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Port Harcourt, Nigeria.

Article Received on 20/07/2015 **Article Revised on 12/08/2015** **Article Accepted on 05/09/2015**

ABSTRACT

Background: There is an increasing global concern about decline in various male reproductive function parameters in humans. Also, studies have documented the aphrodisiac potentials of various plant products. *Ipomea batatas*, the world's sixth largest food crop, is widely cultivated and consumed throughout the world. Yet, its effects on male sexual behavior has not been evaluated, which is the aim of this study. **Study design**: Fourteen adult male Wister albino rats were used for the study. They were divided into two groups of 7 animals each: Group A (control) was daily fed with 200g of animal feed while Group B (Test) daily fed with 120g of the animal feed thoroughly mixed with 80g of sweet potato particles, for a period of 60 days. The male rats were evaluated for sexual behavior on day 60; while on day 61 six animals from each group were sacrificed, blood collected from each animal and serum testosterone evaluated. **Results**: The results show significant increase in Mounting Frequency ($P<0.01$), Intromission Frequency ($P<0.01$), Ejaculatory Frequency ($P<0.01$), and in serum testosterone ($p<0.05$) in the test animals; with a decrease in the Mounting Latency ($P>0.05$), Intromission Latency ($P<0.05$), Ejaculation Latency ($p<0.01$) and Post Ejaculatory Interval ($p<0.01$), when compared to the control group animals. **Conclusion:** This study has revealed the aphrodisiac potentials of *ipomea batatas* as evidenced by its enhancement of sexual motivation, libido and potency in male wistar rats through stimulation of testosterone secretion.

KEYWORDS: Aphrodisiac, Sexual behavior, *Ipomea batatas*, Testosterone.

INTRODUCTION

In recent years, there has been an increasing global concern about decline in various male reproductive function parameters in humans, including their sexual behaviour. This has stimulated more research interests in reproductive studies using human and animal models.[1,2] Because of the long standing history on the use of plant preparations and extracts as medicinal additives and food supplements, and their increasing global acceptance and use, increasingly more studies[3-5] have documented the aphrodisiac (food or drug agents that arouse sexual desire) potentials of some of these plant products. Amongst these plants with reported medicinal and therapeutic effects is *Ipomoea batatas* (sweet potato).

Ipomoea batatas L. (Lam.) from the family Convolvulaceae, is world's sixth largest food crop which is widely grown in tropical, subtropical and warm temperate regions.[6] It is widely cultivated and consumed throughout the world. The root (tuber) is edible while the leaves and shoots are eaten as vegetables. Reports suggest that regular consumption of sweet potatoes enhance the haematological and immune systems[7,8],while studies from our laboratory show that *Ipomoea batatas* enhance sperm quality and fertility parameters in male rats.[9] Therefore, this study is aimed at evaluating its effects on sexual behavior in males using wistar rats as animal models.

MATERIALS AND METHODS

Animal Models: Fourteen adult male Wister albino rats weighing 180g-200g were bred in the Animal House unit of the Department of Human Physiology, Faculty of Basic Medical Sciences, University of Port Harcourt. The rats were maintained in a well-ventilated animal house under optimum condition of humidity, temperature and a natural light-dark cycle. The animals were housed in clean cages lined with wood chip beddings. Experimental procedures in this study involving the animals and their care were conducted in conformity with International guidelines for the care and use of laboratory animals in Biomedical Research.[10] They were allowed to acclimatize to laboratory environment for 14 days period during which they were fed with

animal finisher feed (Livestock feeds, Sapele, Nigeria) and water *ad. libitum*.

Collection and preparation of Plant Materials: Purple sweet potatoes, purchased at a local market (Choba Market) in Port Harcourt were identified and authenticated by agronomist in the Department of crop and soil science, faculty of Agriculture, University of Port Harcourt. The sweet potatoes were washed clean, air dried, skin peeled off, and washed after peeling. They were sliced into chips and sun dried for 7 days. The dried chips were grounded into fine particles with an electric mill.

Experimental Design: The male animals were divided into two groups of 7 animals each: Group A (control) and Group B (Test). After the acclimatization period, Group A animals were daily fed with 200g of the animal feed, while Group B animals were daily fed with 120g of the animal feed thoroughly mixed with 80g of the sweet potato particles, for a period of 60 days. On the 60th day of the study the male rats were evaluated for sexual behavior; while on day 61 six animals from each group were sacrificed under chloroform anaesthesia and 3ml of blood collected from each animal by cardiac puncture for hormone analysis.

Evaluation of Male Sexual Behaviour: The test was carried out by the methods of Dewsbury and Davis[11] (1970) and as reported in previous studies.[12,13] The test was carried out between 19:00 and 22:00 h under a dim light. Female rats of the same strain used in this study were artificially brought into oestrus[14] by sequential subcutaneous administration with ethinyl oestradiol (Lynoral tablets, Organon Pharma) 125 mg / kg b.w. / animal 54 h before testing; and progesterone (Dubaget tablets, Glenmark Pharma) 5 mg / kg b.w. / animal 6 h before testing, in order The hormones were dissolved in olive oil in a total volume of 0.2 ml / animal. Six male rats each from both the control and test groups were individually monitored for sexual behavior on the 60th day of the study. Sexual behavioral experiments began with the introduction of a male rat in an observation cage (56×35×31cm).The stimulus female was introduced to the male after a 10 minute adaptation period by the male in the cage. The receptive female and male rats were observed from the cage side for a period of 30 minues. The following parameters of sexual behavior were measured as previously described[15,16,2]: (a)Mount latency (ML): time from the introduction of the female until the first mount, (b)Intromission latency (IL): time from introduction of the female to the first intromission (vaginal penetration), (c) Ejaculation latency (EL): time from the first intromission to ejaculation, (d)Post-ejaculatory interval (PEI): time from ejaculation to the first intromission of the second copulatory series, (e) Mount frequency (MF): number of mounts preceding ejaculation, (f) Intromission frequency (IF): number of intromissions preceding ejaculation, and (g) Ejaculation frequency (EF): number of ejaculations in a copulatory series.

Evaluation of Serum Testosterone: The blood samples collected were carefully introduced into anticoagulant-free lithium containers, allowed to clot, retract and then centrifuged for 5 minutes at a speed of 5000 revolutions per minute. The serum was then collected, and assayed for testosterone using the Enzyme Linked Immunoassay (EIA) technique.

RESULTS

Effect of *ipomea batas* on mating behavior. The results of the study show that *ipomea batatas* significantly increased the Mounting Frequency (P<0.01), Intromission Frequency (P<0.01) and Ejaculatory Frequency (P<0.01) in the test animals (figure 1), when compared with animals in the control group. Similarly, a reduction was observed in the Mounting Latency (P>0.05), Intromission Latency (P<0.05), Ejaculation Latency (p<0.01) and Post Ejaculatory Interval (p<0.01) in the *ipomea batatas* treated animals (figure 2), when compared to the control group animals.

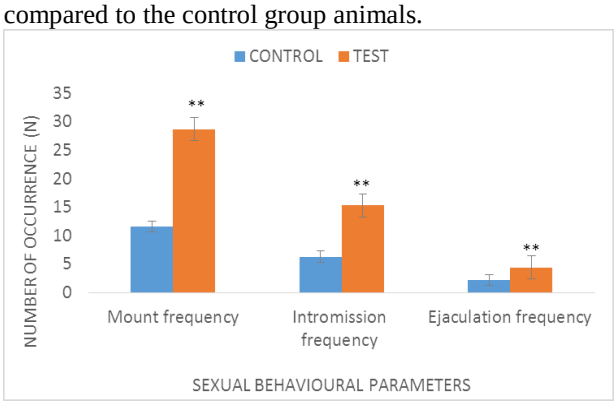

Figure 1: effect of *ipomea batatas* on the frequencies of mounting, intromission and ejaculation. *(p<0.01)***

Effect of *ipomea batas* on serum testosterone: The result on the effect of *ipomea batatas* on serum testosterone concentration (figure 3) shows that there was a significant (p<0.01) increase in testosterone level in animals in the test group, when compared with that in the control group animals.

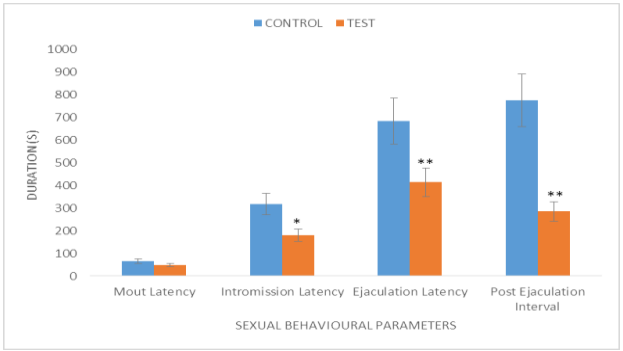

Figure 2; Effect of *ipomea batatas* on the Latencies to mount, intromission and ejaculation. *(*p<0.05; **p<0.01).*

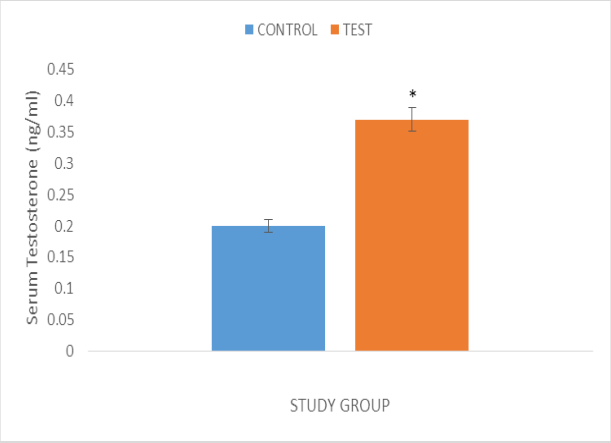

Figure 3: Effect of *ipomea batatas* on serum concentration of testosterone. (*p<0.05).

DISCUSSION

The results from this study revealed that consumption of ipomea batatas roots increased the Mounting Frequency (MF), Intromission Frequency (IF) and ejaculation frequency (EF), while the Mounting Latency (ML), Intromission Latency (IL) and post ejaculatory interval (PEI) were significantly decreased in male rats. Also, the serum testosterone concentration was significantly increased.

In male rats, mount latency (ML) and intromission latency (IL) are considered as indicators of sexual motivation. They are inversely proportional to sexual motivation. Mount frequency (MF) and Intromission Frequency (IF), on the other hand, are indices of both libido and potency; while Intromission frequency (IF) and ejaculation frequency (EF) are considered as behavioural indication of sexual performance and facilitation.[2,17] Therefore, the observed increase in MF and IF, with decrease in ML and IL suggest that *ipomea batatas* enhances sexual motivation, libido and potency; while the increase in IF with a reduction in IL and Ejaculation Latency indicate that *ipomea batatas* enhances and sustains penile erection necessary for intromission, resulting to an improvement in sexual performance. Post Ejaculatory Interval (PEI), a parameter of the rate of recovery from exhaustion after first series of mating, is also considered as an index of potency and libido.[18] Therefore, the significant decrease in this parameter observed in the test group animals indicates that *ipomea batatas* causes lesser exhaustion and faster recovery after ejaculation; a sign of increased frequency of sex drive (libido and potency) in these animals.

There are numerous data on animal studies documenting hormonal regulation of male sexual behavior and the neural site of action of these hormones.[19] Reports show that sexual behaviour and penile erection are androgen dependent (acting both centrally and peripherally), and administration of testosterone to castrated rats results in restoration of both sexual behaviour and penile erectile capacity.[20,21] Also, that androgens regulate corporal nitric oxide synthase (NOS) activity[22,23], which contributes to penile errection. In this study, a significant increase in the serum level of testosterone was observed in the *ipomea batatas* treated animals. Studies show that the roots and skin of *ipomea batatas* contain high levels of polyphenols such as anthocyanins and phenolic acids[24], and that Phenols stimulate the secretion of FSH and Testosterone.[25] This suggests that the improvement in the sexual behaviour parameters demonstrated in this study could be attributed to the observed increase in serum testosterone concentration.

In conclusion, this study has demonstrated that prolong consumption of *ipomea batatas* enhances sexual motivation, libido and potency in male wistar rats by stimulating the secretion of testosterone.

REFERENCES

1. Yakubu MT. Aphrodisiac potentials and toxicological evaluation of aqueous extract of Fadogia agrestis (Schweinf. Ex Hiern) stem in male rats. Ph.D. Thesis, University of Ilorin, Ilorin, Nigeria; 2006.
2. Adienbo, O.M. Effects of *Xylopia aethiopica* (Dunal) A. Rich on Fertility and Sexual Behaviour in male albino wistar rats. Ph.D. Thesis submitted to the College of Graduate Studies, University of Port Harcourt, Port Harcourt, Nigeria. 2014.
3. Thakur M, Dixit VK. Aphrodisiac activity of Dactylorhiza hatagirea (D. Don) Soo in male albino rats. Evid Based Compl Alternate Med. 2007; 4: 29-31. 24
4. Singh S, Gupta YK. Aphrodisiac activity of Tribulus terrestris Linn. in experimental models in rats. J. Men's Health. 2011; 8(1): 575-577
5. Tajuddin, Ahmad S, Latif A. Ahmad IQ. Aphrodisiac activity of 50% ethanolic extracts of Myristica fragrans Houtt. (nutmeg) and Syzygium aromaticum (L) Merr. and Perry. (clove) in male mice: a comparative study. BMC Complementary and Alternative Medicine. 2003; 3: 6- 12.
6. Scott GJ, Transforming traditional food crops. Product development for roots and tubers. In: Scott GJ, Wier-sema S, Ferguson PI. (Eds.),Product Development for Roots and Tuber Crops, vol. 1. Asia International Potato Center (CIP) Lima, Peru, 1992; 3–20.
7. Osime E.O, Ediale G.E., Omoti C.E., Farnodu A.A. Effect of Sweet Potato Leaf (Ipomea Batatas) Extract on Some Haematological Parameters Using Rabbits. A Peer-review Journal of Biomedical Sciences, 2008; 7(I &2): 12-15.
8. Zuraida N. Sweet potato as an Alternative food supplement during rice shortage. Journal lit bang pertanian, 2003; 22(4): 150-155.
9. Adienbo and Wodu. Fertility-Enhancing Potentials of *Ipomoea batatas* (sweet potato) in male albino wistar rats. European Journal of Biomedical and Pharmaceutical Sciences., 2015; 2(3): 1197-1202.

10. American Physiological Society. (2002). Guiding principles for research involving animals and human beings. *American Journal of Physiology (Regulatory, Integrative and Comparative Physiology).*, 2002; 283: 281-283.
11. Dewsbury DA, Davis HN Jr. Effect of Reserpine on the copulatory behaviour of male rats. Physiol Behav., 1970; 5: 1331-1333.
12. Yakubu MT, Akanji MA, Oladiji AT. Sexual dysfunction and methods used in assessing medicinal plants with aphrodisiac potentials. *Pharmocognosy Reviews*., 2007; 1: 49-56.
13. Adienbo O M; Nwafor A and Ogbomade R S. Effect of hydro-methanolic extract of xylopia aethiopica on sexual behaviour in male wister rats. Int J Adv Biol Biom Res., 2013; 1(9): 1078-1085
14. Sooriya RWD, Dharmasiri MG. Effect of *Terminalia catappa* seeds on sexual behaviour and fertility of male rats. *Asian Journal of Andrology*., 2000; 2: 213-219.
15. Gauthaman K., Adaikan P. G., and Prasad R. N. V. "Aphrodisiac properties of *Tribulus terrestris* extract (Protodioscin) in normal and castrated rats," *Life Sciences*., 2002; 71(12): 1385–1396.
16. Zanoli P, Benelli A, Rivasi M, Baraldi C, Vezzalini F, Baraldi M. Opposite effect of acute and subchronic treatments with *Ferula hermonis* on copulatory behavior of male rats. Int J Impot Res., 2003; 15: 450–5.
17. Neill D, Vogel G, Hagler M, Kors D, Hennesey A. Diminished sexual activity in a new animal model of depression. Neurosci. Biobehav. Rev, 1990; 14: 73–76.
18. Tajuddin, A; Ahmad, S; Latif, A and Qasmi, I. A. "Effect of 50% ethanolic extract of Syzygium aromaticum (L.) Merr. & Perry. (clove) on sexual behaviour of normal male rats," BMC Complementary and Alternative Medicine., 2004; 4: 17–24.
19. Robbins A. Androgens and male sexual behavior from mice to men. TEM., 1996, 7: 345-50.
20. Mills TM, Reilly CM, Lewis RW. Androgens and penile erection: A review. Journal of Andrology., 1996; 17: 633–8.
21. Heaton JPW, Varrin SJ. Effects of castration and exogenous testosterone supplementation in an animal model of penile erection. The Journal of Urology., 1994; 151: 797–800
22. Lugg J, Rajfer J, Gonzalez-Cadavid NF. Dihydrotestosterone is the active androgen in the maintenance of nitric oxide – mediated penile erection in the rat. Endocrinology., 1995; 136: 1495–501.
23. Zvara P, Sioufi R, Schipper H, Begin L, Brock G. Nitric oxide mediated erectile activity is a testosterone dependent event: a rat erection model. International Journal of Impotence Research., 1995; 7: 209–19.
24. Konczak I, Yoshimoto M, Hou D, Terahara N, Yamakawa O. Potential chemopreventive properties of antho-cyanin-rich aqueous extracts from in vitro produced tissue of sweet potato (Ipomoea batatasL.). J Agricultural Food and Chemisty., 2003; 51: 5916-5922.
25. Al – Dejyli A N. Study on the effect of Alkaloid and phenolic extract of the red onion *Allium csepa* L. on white male and female mice. PhD Thesis, Collage of Science, Babil University – Iraq., 2001.