

Effect of *Musa Paradisiaca* (BANANA) Flour Supplement on the Reproductive System of Male Wistar Rats

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ABSTRACT

Background: Infertility is a worldwide health concern in the developing world, affecting 8-15% of couples in their reproductive age. *Musa paradisiaca* (BANANA) is a crop in the genus *Musa* and all members of the genus are indigenous to tropical and subtropical countries. Banana is widely consumed by Africans especially by Nigerians. The study was aimed at determining the effect of *Musa paradisiaca* (BANANA) flour supplement on the reproductive system of male wistar rats. **Methodology:** Twenty (20) male wistar rats weighing between 85-170g were used for this study and were randomly divided into four (4) groups. Group one served as the control, group 2 and 3 were treated with commercial feed supplemented with banana flour in the ratio 20:80 ratio and 5ml/kg of body weight of lime juice orally for four weeks. Group 4 (Positive control) was given 5ml/kg body weight of lime juice orally for four weeks. The animals were sacrificed by cervical dislocation and semen samples were collected. Sperm motility, sperm morphology, sperm count and testosterone levels were investigated. **Results:** The result shows that there was increase in sperm motility in treated groups 2 (65.00 ± 13.23) and 3 (68.33 ± 7.64) compared to group 4 and the control group (60.0 ± 20.0), significant increase ($P \leq 0.05$) in sperm count in treated groups 2 (2100.00 ± 208.44) and 3 (2700.00 ± 754.44) compared to group 4 and the control group (1933.33 ± 120.43), There was a significant increase ($P \leq 0.05$) in sperm mortality in treated groups 2 and 3 compared to group 4 and the control group. There was a significant increase ($P \leq 0.05$) in testosterone level in treated groups 2 (5.73 ± 4.38) and 3 (7.56 ± 5.07) compared to control the group (1.23 ± 0.32). There was a significant increase in sperm abnormalities in group 4 (11.67 ± 7.63) when compared to group 2, 3 and the control ($P \leq 0.05$). **Conclusion:** The effect of banana flour supplement on the reproductive system of male wistar rats was investigated and it was shown to increase sperm motility, sperm count, testosterone levels in all treated groups, while decreasing sperm mortality and sperm abnormalities.

Keywords:

INTRODUCTION

Infertility is a couple's inability to have a child after one year of unprotected sexual intercourse (WHO, 2016). Infertility is a worldwide health concern in the developing world, affecting 8-15% of couples in their reproductive age (Otubu, 2006). The prevalence of infertility in a rural Nigerian community is determined by a systematic random sampling of the population. The overall prevalent rate was 30.3%, giving indices of 9.2% for primary infertility and 21.1% for secondary infertility (Adebayo et al, 2021). Infertility leads to stigmatization, marital instability, and enormous psychological stress (Adebayo et al, 2021). Infertility is a public health concern in many developing nations of the world due to its high prevalence and especially because of its serious social implications. Infertility has social, economic and personal effects, which go beyond childlessness, and women bear the major brunt of the burden. It is a major cause of marital disharmony and separation, and personal misery in some other population groups (Ola, 2009). The highest prevalence is in low resource countries, particularly in sub-Saharan Africa (Sharma et al 2008). Male infertility can be caused by poor penile erection, abnormal sperm quality and volume, abnormal ejaculation, other causes such as plants like lime, which has been described as a natural spermicide; a contraceptive substance that reduces sperm concentration to prevent pregnancy.

Banana is an elongated, edible fruit botanically a berry (Armstrong et al., 2013) produced by several kinds of large herbaceous flowering plants in the genus *Musa* (Armstrong et al., 2013). Researches into natural diets like banana (plantain) showed that its consumption by men could enhance some reproductive functions, and also alleviate certain reproductive dysfunctions (Yakubu et al., 2007)

(Ojewole et al., 2003). Bananas are considered nutritive with high content of vitamins A, B1 and C (Margard and Briav, 1979). Generally, bananas contain a considerable amount of mineral elements and could therefore serve as a good source of mineral supplement in human/animal diets. It had a medicinal use in people with high blood pressure and stroke and also reported to help to stimulate the production of hemoglobin and also have hypolipidemic effects

Musa paradisiaca promotes healthy digestion, improves affective state, helps in the retention of and serves as good sources of calcium, phosphorus and nitrogen, which build and regenerate tissues in the body, and is also a rich source of iron and vitamins, especially Vitamins C and E. The fruit is also rich in potassium which are essential for production of sex hormones and enhancing the male libido and improve fertility by enhancing semen quality (Hossain et al., 2015). Enzyme bromelain in banana increases sex drive and reverses impotence in men (also found in pineapple). These phytochemicals also have stimulatory effects on sex hormone and semen production (Hossain et al., 2015), as well as sperm motility. Hence the aim of this research was to ascertain the effect of banana flour supplements on the reproductive system of male wistar rats using lime juice to induce sperm mortality.

MATERIALS AND METHODS

Preparation of the banana flour

Green plantain fruits (ripe); were obtained from a farm. The fruits were cut longitudinally into chips of about 5 mm thickness and air dried for 4 days after which they will be grinded and made into flour. Commercial feed supplemented with banana flour in the ratio 20:80 (Manuela et al., 2018).

ANIMAL GROUPING

Twenty (20) male wistar rats weighing between 85-170g were used for this study were divided randomly into four groups:

Group 1: Served as Control group.

Group 2: Commercial feed supplemented with banana flour in the ratio 20:80 ratio and 5ml/kg lime juice orally.

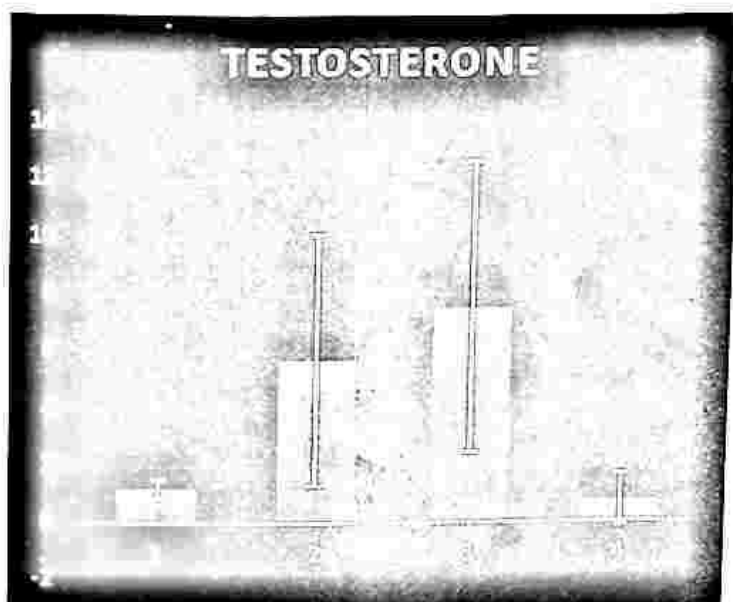
Group 3: Commercial feed supplemented with banana flour in the ratio 20:80

Group 4: Given 5ml/kg body weight of lime juice orally (Ojewole et al., 2009)

The treatment lasted for a period of 14 days.

Twenty four (24) hours after the 14th day of treatment, the rats were euthanized by cervical dislocation and the testes and epididymis excised using a midline abdominal incision. The left caudal epididymis was immediately transferred into sterile bottles containing 2 ml of normal saline for semen analysis. Semen analysis was carried out on sperm motility, sperm morphology and sperm count according to the method of Dolt and Foster, 1972. Blood sample was collected by cardiac puncture and Serum Testosterone level was determined using ELISA technique.

RESULTS

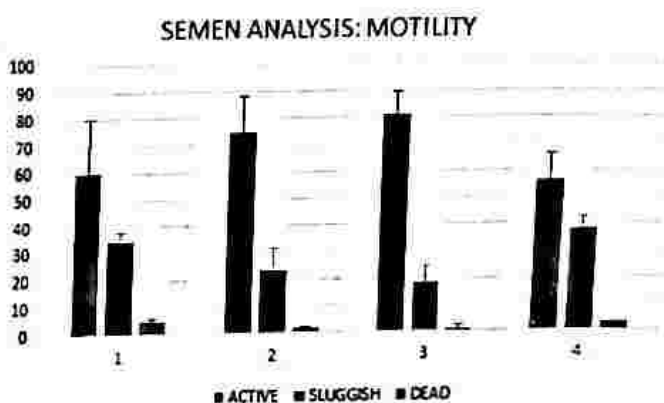
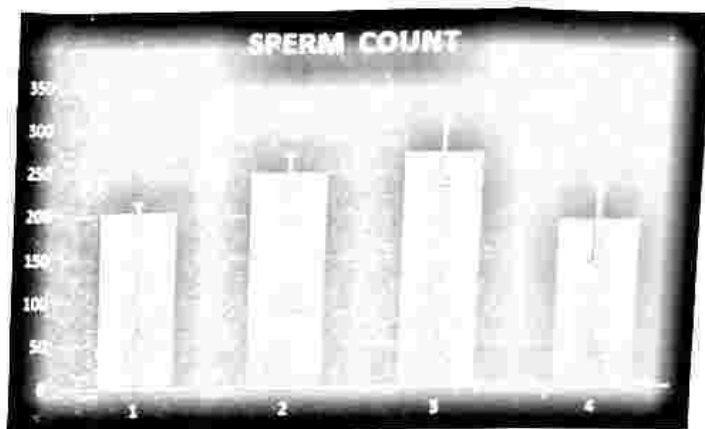


The results indicate significant increase in testosterone level in treated groups 2 and 3 compared to control the group ($P \leq 0.05$). There was a decrease in testosterone level in lime juice treated group 4 compared to the control group.

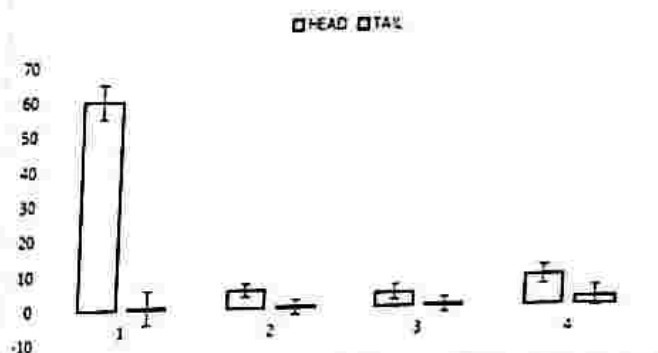
Semen Analysis

There was significant increase in sperm motility and sperm count in treated groups 2 and 3 compared to the control group ($P \leq 0.05$). There was significant decrease in sperm motility and sperm count in lime juice treated group 4 compared to the control group. The result indicates no difference in abnormalities in treated groups 2 and 3 when compared to the control group. However there was an increase sperm abnormality in lime juice treated group 4 when compared to the control group ($P \leq 0.05$).

Semen Analysis



SEMEN ANALYSIS: MORPHOLOGY



The results indicate significant increase ($P \leq 0.05$) in sperm motility in treated groups 2 (65.00 ± 13.23) and 3 (68.33 ± 7.64) compared to the control group (60.0 ± 20.0) due to the banana flour supplement treatment. There was significant decrease in sperm motility in lime juice treated group 4 (60.0 ± 10.00) compared to the control group (60.0 ± 20.0). The results indicate no difference in sperm abnormalities in treated groups 2 (5.00 ± 5.00) and 3 (5.00 ± 5.00) compared to the control group (5.00 ± 5.00). However there was a significant increase ($P \leq 0.05$) in sperm abnormalities in lime juice treated group 4 (11.67 ± 7.63) when compared to control group (5.00 ± 5.00). There was significant increase ($P \leq 0.05$) in sperm count in treated groups 2 (2100.00 ± 208.44) and 3 (2700.00 ± 754.44) compared to the control group (1933.33 ± 120.43) due to the banana flour supplement treatment. However there was a significant decrease ($P \leq 0.05$) in sperm count in lime juice treated group 4 (316.7 ± 497.17) compared to the control group (1933.33 ± 120.43). The results indicate significant increase ($P \leq 0.05$) in testosterone level in treated groups 2 (5.73 ± 4.38) and 3 (7.56 ± 5.07) compared to control the group (1.23 ± 0.32) due to the banana flour supplement treatment. There was a

decrease in testosterone level in lime juice treated group 4 (0.77 ± 0.90) compared to the control group (1.23 ± 0.32).

Musa paradisiaca (Banana) contains the enzyme bromelain and other chemicals such as calcium, potassium, alkaloids, flavonoids, vitamins A, B1 and C. Bromelain, potassium and vitamins B are essential for the production of sex hormone (testosterone), enhancing the male libido and improving fertility by enhancing semen quality (Hossain *et al.*, 2015). They also have stimulatory effects on sex hormone (testosterone) and semen production (Aiddiq *et al.*, 2012), as well as sperm motility.

These results are in line with work done by Yakubu (2007) on the effects of banana fruits in the management of sexual dysfunction in male wistar rats. Although the exact mechanism of action of antioxidants was not stated, the banana fruit was reported to be efficient in the management of sperm concentration (Yakubu *et al.*, 2007). Vitamin A has been studied in combination with other antioxidants including zinc, N-acetylcysteine (NAC), selenium, and vitamins C and E. Scott *et al.* 1998, reported a 30% increase in motility after a 3-month regimen of vitamin A supplementation combined with vitamins C and E and selenium.

For men hoping to increase fertility, the goal is to make sure sperm are healthy. Antioxidant supplements, vitamin A, B1 and C contain in banana can help.

RECOMMENDATION

Infertility is on the increase, eating banana flour as a supplement has proven to affect the male reproductive system positively. Thus medical practitioners should look outside traditional methods for treating infertility in men. Further study should be done on the possible mechanism of action of banana flour supplement on the hypothalamic-pituitary-gonadal axis.

CONCLUSION

The effect of banana flour supplement on the reproductive system of male wistar rats was investigated and it was shown to increase sperm motility, sperm count, testosterone levels in all treated groups. Banana flour supplement should be considered for treatment of infertility in men.

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