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STUDY EFFECT OF DIFFERENT DOSES OF MUSA PARIADISIACA FRUIT ON THE SEMEN QUALITY OF MICE MALE AS MODEL FOR HUMAN BEING

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ABSTRACT

This study designed to estimate the effects of oral administration of mature fruits of Musa paradisiacal on enhancing the semen quality of adult mice male. The study was carried out in department of pathological analyses/ Institute of technical /AL kut city from July - 2015 until December 2016. The 30 mice used for the study were grouped into three group as: the control group, group of a low dose group given 250 mg/kg/day and a high dose group given 500 mg/kg/day of the plantain fruits for one month; which was made into flour, for easy oral administration. **Results**: Significant increment in the semen parameters was noticed in group that received a lower dose of the plantain flour, but those animals who received the high dose had marked and very significant increase in sperm cell concentration and percentage of morphologically and histological normal spermatozoa.

KEYWORDS: Musa paradisiaca, semen parameters.

INTRODUCTION

Musa paradisiaca; is a croup in the genus Musa and all members of the genus are indigenous to the tropical and subtropical countries.[1,2] Musa paradisiacal; is one of the Latin binomial names that was applied to edible bananas, but whose usage has been discouraged since the development, in 1955, of an alternative nomenclature system to classify banana cultivars.

The name was given by Carl Linnaeus, the father of modern taxonomy. Linnaeus was familiar with only one type of banana: the first banana to flower in Europe, a specimen cultivated in George Clifford's glasshouse near Haarlem in the Netherlands. In 1736i he

named it Musa Cliffortiana, which is technically a 'pre-Linnean' Linnean name. In Species Plantarum, which was published n 1753, he renamed it Musa paradisiaca, in reference to the forbidden fruit of paradise.[3] What Linnaeus did not know is that *Musa paradisiaca* is not a specie but a complex and sterile, hybrid. As the first banana to be described, *Musa paradisiacal* has long been considered the 'type species' for the genus *Musa*. The name has also been applied to many different cultivars. The commonest usage has been to designate Plantains.[4]

Its different varieties are staple food in the tropical regions of the world.[5] Musa paradisiacal(plantain); motivate healthy digestion improves affective state; and promote in the retention of and serves as good sources of potassium, calcium, phosphorus and nitrogen, which build and regenerate tissues in the body, and is a rich source of iron and vitamins, especially Vitamins C and E.[1,3] Plantain, is also high in total dietary fibre content, especially hemicelluloses, which is higher than in most fruits and vegetables.[6] The fibre contents,; particularly insoluble fibre can lower glycaemic response by forming a physical barrier to enzymatic hydrolysis of starch. The; (leaves, roots and fruits of plantain have been a scientific breakthrough in the management of male sexual dysfunction.[7,8]

Infertility; is a concern of public health in many counties of the world due to its high prevalence and because of its serious social implications.[9] Infertility; has personal effects, social, economic, which go beyond childlessness, as well as, women bear much of these are lothirat.[10]

Male infertility;, may be caused by, abnormal sperm quality and volume, abnormal ejaculation, poor penile erection , among other causes.[11,12] The aims of the current study; is to determine the effects of oral dosage of mature green plantain fruits on semen quality in normal adult male mice.

MATERIALS AND METHODS

The study was carried out in department of pathological analyses/ Institute of technical /AL kut city from July -2015 until December 2016. The 30 mice used for the study were grouped into three group as: the control group, group of a low dose group given 250 mg/kg/day and a high dose group given 500ii mg/kg/day of the plantain fruits for one month; which was made into flour.

Preparation of the plantain flour

Green plantain fruits; were obtained from a market. The fruits were cut longitudinally into chips of abouti5 mm thickness and air dried for 4 days after which they were grinded and made into flour. Two doses of the plantain flour were prepared: 250 mg/kg/day and 500 mg/kg/day. The flour was dissolved in2ml of double distilled water, for easy administration.[13]

Animal grouping

The 30 animals were divided into three groups:

Group A: Control (2 ml double distilled water)

Group B: Given low dose Musa paradisiaca (250 mg/kg/day)

Group C: Given high dose Musa paradisiaca (500 mg/kg/day).

The treatment lasted for a period of 30 days.[10,12]

Animal sacrifice

Twenty four[24] hours after the 30th day of treatment, the mice were sacrificed by cervical dislocation and the testes and epididymis excised using a midline abdominal incision. The testes were immediately weighed and the left caudal epididymis transferred into sterile bottles containing 2 ml of normal saline for semen analysis.

Semen analysis: Sperm concentration

A modified method;(of Yokoi and Mayi12 was adopted in counting the spermatozoa), with the aid of the new improved Neuber's Counting Chamber (haemocytometer). About 10 µl of the diluted sperm suspension was transferred to each counting chamber of the haemocytometer and was allowed to stand for 5min, and thereafter observed under a binocular light microscope.[14,15]

Sperm motility

The fluid from the caudal epididymis was diluted with Tries buffer solution14 to 0.5 ml. An aliquot of this solution was observed under the light microscope. The mean motilityi estimation was reported as the final motility score for each sample and presented in percentages.[16]

Sperm morphology

The morphology of the spermatozoa was determined using the original dilution for motility, diluted 1:20 with 10% neutral buffered formalin. The sperm cells were categorized based on the presence of one or more abnormal features, such as tail defects (short, irregular coiled or multiple tails); neck and middle piece defects (distended, irregular, bent middle piece, abnormally thin middle piece); and head defects (round head, small or large size, double or detached head). Findings were expressed as percentage of morphologically normal sperm.[17]

Life and death ratio

Life–Death ratio; was taken as, number of spermatozoa alive divided by total number of spermatozoa multiplied by 100. (No. of spermatozoa alive ÷ Total No. of spermatozoa) × 100.

Statistical analysis

Data were; analysed statistically by application of Student's *t*-test, using the SPSS version 15.0 software and presented as mean and standard error mean (SEM). Values of $P < 0.05$ were considered to be statistically significant.

RESULTS

The Plantain flour; was well tolerated with no signs suggestive of regurgitations after oral administration. There was a relative increase in weight in the treated groups and the weight increased more in the group given the high dose Musa paradisiaca Group (C) with statistically significant difference ($P < 0.05$), while the weight, elevation recorded in the high dose group Group(C) was lower than in Group (B), also with statistically significant difference ($P < 0.05$) [Table 1].

Table 1: Weights of mice following administration of Musa paradisiacal

Treatment Groups	Initial body weight (g)	Final body weight (g)
A: Control	22.33±1.02	22.07±1.08
B:250mg/kg/day	20.00±1.38	27.50±2.14*
C: 500 mg/kg/day	22.02±1.32	28.00±2.32*

***Mean (SEM), Statistically significant difference (*P*<0.05).**

The semen parameters, obtained in the treated groups showed statistically significant differences for the two groups given Musa paradisiacal compare to control ($P < 0.05$) [Table 2]. The animals administered with low and high doses of *Musa paradisiaca* had a statistically

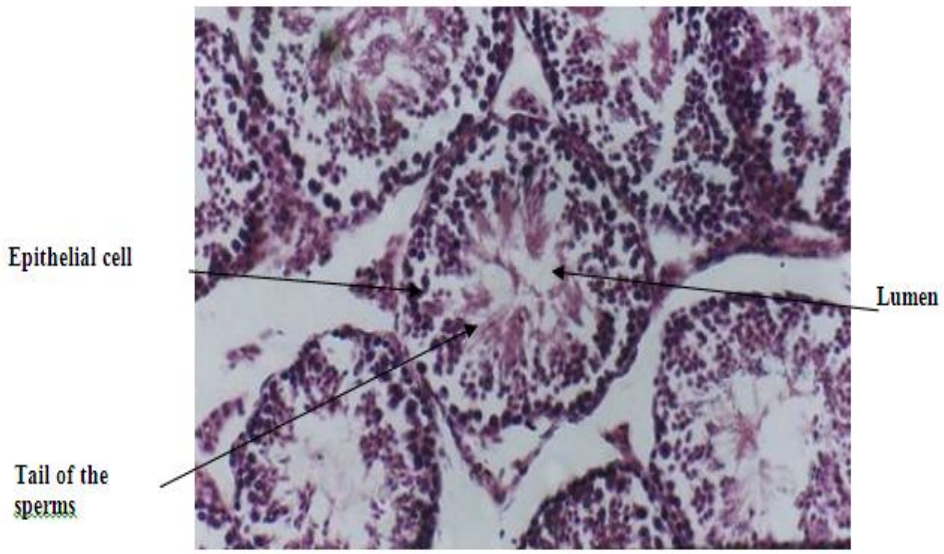
increase in sperm a count($P < 0.05$). The percentage motility highly increased in mice given low dose of *Musa paradisiaca*, also in the high dose group ($P < 0.05$) compared with the control [Table 2. Figure2, picture1,2]. Administration of *Musa paradisiacal* caused enhanced in the number of morphologically normal sperm, with all doses agenised control group ($P < 0.05$) [Table 2]. There was a significant difference in the Life–Death ratio between the control animals and the giving groups ($P < 0.05$) [Table 2. Figure2, picture1,2,3]. Sperm progressivity was elevation in the low & high dose group, wear had forward directional movement almost. [Table 2, picture1,2,3].

Table 2: Results of semen analysis of male mice

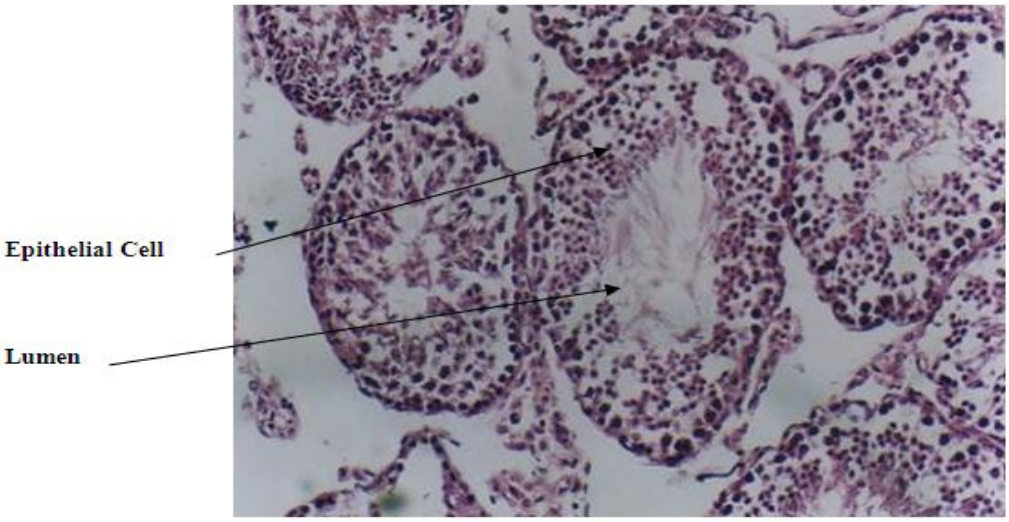
Parameters	A: Control	B: 250 mg/kg/day	C: 500 mg/kg/day
Sperm count (×106)	40.15±1.73	43.30±2.27*	51.30±0.58*
Motility (%)	85.88±1.80	90.53±0.49*	94.58±0.95*
Morphology(×106)	70.25±2.78	73.00±3.39*	73.30±2.48*
Life/death ratio(%)	88.48±1.69	95.68±0.94*	98.28±0.92*
Progressivity	A/B	A*	A*

***mean (SEM), Significant statistical difference with the control group (P<0.05),**

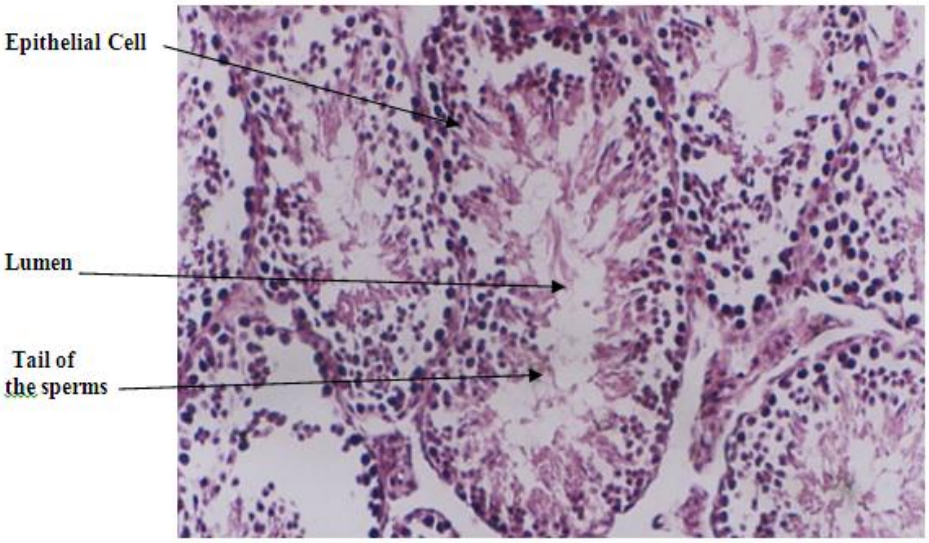
A – Excellent forward directional movement; B – Good forward directional movement



picture1: Histological preparation for the somniferous tubules for control group of male mice.



Picture 2: Histological preparation for the somniferous tubules for group giving 250mg/kg of Musa paradisiacal of male mice.



Picture 3: Histological preparation for the somniferous tubules for group giving 500mg/kg of Musa paradisiacal of male mice.

DISCUSSION

Many studied documented that, Musa paradisiacal; has been many beneficial effects in the several diseased conditions, including, diabetes mellitus, hypertension, hyperlipidaemia, thyroid dysfunctions and body weight, (table1).[18,21] Plantain fruits can be used as a treatment of sexual dysfunctions,; though the exact mechanism of action.[6] Likely,; studies conducted on metabolic extract of *Musa paradisiaca* (MEMP), fruit revealed that animal models with

diabetic induced testicular disorders can have the testicular damage reversed, when given MEMP.[10,19]

The precises mechanism of action by which (MEMP) does this is still unclear. *Musa paradisiacal,* has hypoglycaemic effects in both normal and diabetic animal models, and this might be a reason for its ability to facilitate improvement in male sexual functions in diabetic animals.[10,20,22,23] This is confirmed, when the mature green fruit of plantain is consumed at a moderate dose,. As revealed in the current study, where consumption of *Musa paradisiaca* at a low dose led to improvement in the quantity and quality of spermatozoa in adult male mice and rate. Specifically, sperm motility; was improved, with a very significant increase in life/death ratio of spermatozoa and a progressivity also, (table2).[24,25]

In table (2), animals given a higher (double) dose (500mg/kg) of *Musa paradisiaca,* all the semen parameters investigated were positive effected. Both the sperm count and percentage of morphologically normal sperm cells were significantly increased ($P < 0.05$) compared with the control animals.

A good results, of spermatozoa observed; had some of the abnormal morphological features listed below: Tail defects (short, irregular coiled or multiple tails); neck and middle piece defects (distended, irregular, bent middle piece, abnormally thin middle piece); and head defects (round head, small or large size, double or detached head). These findings would definitely negatively impart the normal sexual functions of the animals, thereby reducing their ability to fertilise an ovum successfully.[26,27] At a higher dose of plantain fruit, the percentage motility and Life/Death ratio did significantly alter, the forward directional movement was elevated when compared with the control.

Conclusively, the mature green fruit of (*Musa paradisiacal)* improves semen parameters of male mice at a moderate dose, making it a possible remedy for male reproductive dysfunctions in which sperm cells have been adversely impaired.

CONCLUSION

Musa paradisiaca fruit should be consumed in moderate quantities in order to derive its beneficial effects of enhancing male reproductive functions.

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