

Assessment of Sexual Behaviour Effects of Seed Coat of *Garcinia Kola* on Male Wistar Rats

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Abstract

Original Research Article

As a result of the rise in the incidence of male sexual dysfunctions, several treatment options including medicinal plants are being evaluated to determine their aphrodisiac potentials. In the present study, extracts of the seed coat of *Garcinia kola* were assessed for their aphrodisiac properties. The *Garcinia kola* seeds were first dried to enhance the removal of the coat. The coat was blended to fine powder and extracted using hydromethanol (1:4) as solvent. Six (6) male rats were randomly placed into three (3) groups. Group 1 which served as control received distilled water. Group 2 received 100mg/kg body weight and group 3 received 200mg/kg of body weight of the seed coat extracts. The extracts were orally administered daily for 30 and 60 days. The sexual behavior tests done are: mounting latency (ML), mounting frequency (MF), intromission latency (IL), intromission frequency (IF), ejaculation latency (EL), ejaculation frequency (EF) and post ejaculatory interval (PEI). Results obtained showed that precopulatory behaviors such as chasing, sniffing and nosing were not affected in the test males. The ML, IL, MF and IF were not significantly ($P < 0.05$) altered. The EL, EF and PEI were not also significantly affected when test groups were compared with control. It was concluded that seed coat extract of *Garcinia kola* did not influence sexual activity either by improving sexual arousability (libido), vigour or potency. The consumption of seed coat of *Garcinia kola* together with the pulp for the purpose of promoting sexual vigour in males does not have any physiological value.

Keywords: Sexual behaviour, *Garcinia kola*, hydromethanol, aphrodisiac, wistar rats.

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INTRODUCTION

Reproductive processes in humans begins with the union of the male and female gametes in fertilization [1]. In most of the cases, mating occurs prior to fertilization. The effectiveness of this process depends on the normal functioning of the penis, the copulatory organ of the male, and other factors relating to erection. The failure in the performance of this function is regarded as sexual dysfunction. Sexual dysfunction has a higher prevalence in males, therefore, eliciting increased research interest into male sexual disorders [2]. Male sexual dysfunction may present in various forms such as erectile dysfunction, arousal difficulty (poor libido), premature ejaculation, retarded or inhibited ejaculation and orgasmic disorders, etc. In addition, the incidence of male sexual dysfunction is on the increase worldwide [3]. This condition may cause psychological disturbances, depression, anxiety and poor self esteem [4]. Several substances that cause enhancement of sexual activity in the males by increasing sexual drive and sexual pleasure has been used in the treatment of male

sexual dysfunction [3]. These substances usually referred to as aphrodisiacs enhances sexual behaviour leading to improved self esteem, increased relationship satisfaction [5], and the overall quality of an individual's life [6]. Some medicinal plant extracts including *Curculigo orchioides Gaertn* Rhizome [7], *Boesenbergia rotunda* (L.) Mansf. Rhizome [8] and *Catha edulis Forsk* [9] were investigated and reported to possess aphrodisiac properties. *Garcinia kola* is a medicinal plant whose seed is reportedly consumed by some males to increase sexual desire or sexual performance [10, 11]. The aphrodisiac potential of the Pulp of *Garcinia kola* seed has been investigated [12, 13], but there is no scientific report on the aphrodisiac potentials of the Seed coat of *Garcinia kola*. In a report [13], it was indicated that some consumers of *Garcinia kola* seed claimed that the coated seed was more effective in traditional remedies than the uncoated seed (Pulp). Interestingly, the difference between the coated seed and the pulp is the seed coat in the coated seed.

The objective of this study is to investigate the aphrodisiac potential of the hydromethanolic extract of the seed coat of *Garcinia kola*.

MATERIALS AND METHODS

Animal Models

This experiment carried out in conformity with standard institutional guidelines [14], involved the use of adult male rats bred in the animal house of the Department of Human Physiology, Faculty of Basic Medical Sciences, University of Port Harcourt. They were randomly selected, placed in neat cages and acclimatized in two weeks. They were exposed to standard conditions including exposure to 12 hour light and 12 hour dark schedules, and surrounding temperature of $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and relative humidity of 55 – 65%. They had free access to water and feeds (commercially available rat chows produced by Top feeds Nigeria Limited). The rats were handled with optimum care, their cages cleaned and beddings changed daily.

This study was approved by the ethical committee of the College of Health Sciences, University of Port Harcourt.

Preparation of Plant Extract

Garcinia kola seeds were purchased from a local market in Rivers state, Nigeria and authenticated at the herbarium, department of Plant Science and Biotechnology, University of Port Harcourt, Nigeria. The outer coat of the seeds were removed, dried and later blended to fine powder. Hydromethanol (20%: 80%) was used as solvent in the extraction using the soxhlet apparatus at 60°C - 70°C giving rise to a solution containing the extracts. After filtration, the filtrate was concentrated to a semi solid form under reduced pressures of 60°C using the rotary evaporator. The extract yield was weighed and stored in the refrigerator at 4°C .

Measured quantity of the extracts were dissolved in distilled water to obtain 100mg/ml and 200mg/ml of the extract for animal treatments.

Experimental Design

The rats were randomly placed in three (3) groups. Each group contained 6 rats. Group I served as control and received distilled water. Group 2 received 100mg/kg body weight (bw), while group 3 received 200mg/kg bw of the hydromethanolic extract of the seed coat.

Extracts were administered orally as single daily dose for 30 days and 60 days duration. The sexual behavior test was done on day 30 and on day 60.

Sexual Behavior Test

The methods adopted in sexual behavior test of male rats in this study has been described in previous studies [3, 15].

Only Estrus female rats were allowed to mate with the males. The estrus (heat) of test females was achieved by artificial induction by administration of oral estradiol benzoate ($10\mu\text{g}/100\text{g}$ bw) and progesterone ($0.5\text{mg}/100\text{g}$ bw) given subcutaneously, 48 hours and 4 hours respectively before experiment [3].

Six (6) male rats from each group were monitored for sexual behavior for a period of 30 minutes on day 30 and also on day 60. Sexual behavior experiments were carried out during the first 4 hours of the 12 hours dark cycle and 3 hours after extract administration.

First, the test male rat was introduced into the observation cage with dimension (56 x 35 x 31cm) [16] and allowed a period of 10 minutes for adaptation before introducing the stimulus female. Only active females were used in the experiment in order to sustain the high sexual stimulation of the male.

The male rats and their receptive female partner were observed for precopulatory and copulatory behaviours from a corner. The parameters used in measurement of sexual behavior includes:

- Mount latency (ML): time from introduction of the female to the first mount.
- Mount frequency (MF): number of mounts before ejaculation.
- Intromission latency (IL): time from introduction of the female to the first intromission (vaginal penetration)
- Intromission frequency (IF): number of intromissions before ejaculation.
- Ejaculation latency (EL) : time from the first intromission to ejaculation
- Ejaculation frequency (EF): number of ejaculations in a copulatory series.
- Post Ejaculatory interval (PEI): time from ejaculation to the first intromission of the second copulatory series.

STATISTICAL ANALYSIS

The Statistical Package for Social Sciences (SPSS) version 20.0 was used for data analysis. Results were expressed as Mean \pm SEM. The significant differences between means was determined using Least Significance Difference (LSD) and the results were considered significant at $p < 0.05$.

RESULT

Result Presentation

The female rats were very receptive to the male rats showing that they were in the physiological state of estrus.

The precopulatory behaviours such as, chasing, nosing and sniffing culminated in mounting. The result for sexual behavior tests are as presented in tables 1 to 4.

Table-1: Effect of Hydromethanolic extract of *Garcinia kola* seed coat on mounting behaviours in male wistar rats

Group	Mounting Latency(sec)		Mounting Frequency(n)	
	30 days	60 days	30 days	60 days
Control	62.64±6.72	54.61±4.85	10.15±2.10	9.52±1.53
100mg/kg	58.25±5.73	54.13±4.73	9.63±1.83	9.13±1.55
200mg/kg	52.00±5.65	56.25±3.24	9.63±2.35	9.25±1.63

Values expressed as Mean ± SEM. n=6.

Table-2: Effect of hydromethanolic extract of *Garcinia kola* seed coat on Intromission behaviours in male wistar rats

Group	Intromission Latency(sec)		Intromission Frequency(n)	
	30 days	60 days	30 days	60 days
Control	60.33±5.18	61.38±3.55	4.85±1.01	6.36±1.33
100mg/kg	54.88±6.02	58.50±3.58	5.50±1.00	6.63±1.07
200mg/kg	53.00±6.45	54.38±3.92	4.63±1.00	6.25±1.39

Values expressed as Mean ± SEM. n=6.

Table-3: Effect of hydromethanolic extract of *Garcinia kola* seed coat on ejaculation behaviours in male wistar rats

Group	Ejaculation Latency(sec)		Ejaculation Frequency(n)	
	30 days	60 days	30 days	60 days
Control	154.52±4.62	149.35±3.64	1.15±0.24	1.22±0.23
100mg/kg	151.13±3.81	150.38±3.00	0.88±0.23	1.13±0.13
200mg/kg	155.00±3.82	151.38±2.94	0.75±0.16	1.13±0.23

Values expressed as Mean ± SEM. n=6.

Table-4: Effect of hydromethanolic extract of *Garcinia Kola* seed coat on post ejaculatory interval on male wistar rats

Group	Post ejaculatory interval(sec)	
	30 days	60 days
Control	184.80±11.68	178.58±10.28
100mg/kg	181.88±11.32	178.88±8.21
200mg/kg	174.63±12.75	179.00±9.41

Values expressed as Mean ± SEM. n=6.

RESULT ANALYSIS

The extracts (100mg/kg and 200mg/kg) of the seed coat of *Garcinia kola* were administered for a duration of 30 and 60 days.

Table-1 showed that, following 30 days and 60 days extract administration, the changes in ML and MF were not significant ($P<0.05$) when the test groups were compared with control.

Table-2 showed that, following 30 days and 60 days extract administration, the changes in IL and IF were not significant ($P<0.05$) when the test groups were compared with control.

In table 3, there were no significant ($P<0.05$) changes for the EL and EF following 30 days and 60

days extract administration, when the test groups were compared with control.

Table-4 show the values of PEI for the groups following 30 days and 60 days extract administration. It also indicates that no significant ($P<0.05$) changes occurred when the test groups were compared with control for the PEI.

DISCUSSION

In the present study, the effects of seed coat extract of *Garcinia kola* on sexual behaviour of male wistar rats were evaluated and it was observed that, *Garcinia kola* seed coat extract did not diminish or enhance sexual activity in male rats. In effect, sexual arousability (libido) and potency were not affected. This is due to its inability to significantly alter the MF, IF, ML and IL. In a report [17], it was stated that the MF and IF

are important measures of both libido and potency, while, another report [18], indicated that the ML is an important index of sexual motivation. Medicinal plants with aphrodisiac potentials should cause a significant increase in the MF and IF and decrease in ML and IL. These parameters indicates degree to which the plants are able to cause sexual arousal, improve motivation and enhance sexual vigour [19, 20]. Furthermore, significant reductions in ML and IL indicates sustained increase in sexual activity and aphrodisiac potential in a plant extract [21].

The EF and EL were not significantly ($p < 0.05$) altered by the seed coat extract. The observed non significant change in EL implies that the extract is unable to cause a delay in ejaculation. This means that it will not prolong coital period and may not improve sexual activity. The incidence of early or premature ejaculation cannot be improved by the seed coat extract of *Garcinia kola*. The seed coat extract did not cause any significant alterations in PEI when test groups were compared with control. The PEI measures the recovery from exhaustion in early mating series [22].

No dose or time dependent relationship exist in this study. The low dose (100mg/kg) and higher dose (200mg/kg) of the seed coat extract did not cause any significant difference in mating behavior of male rats. This observation implies that, both doses of the seed coat extract did not elicit aphrodisiac effect. Long term (60 days) administration of the extracts did not improve mating behavior of the male rats just as those of 30 days could not. Some close similarities were reportedly observed between the effects of the extracts of uncoated (pulp) and coated seed (pulp plus seed coat) as they both caused improvement of the various sexual behavioural parameters [13]. However, from the findings in this study, it has now become clear that aphrodisiac effects attributed to the coated seed may have been produced only by the pulp component. The failure of the seed coat to enhance sexual behavior in male rats may be because of lack of capacity to increase testosterone level or capability to stimulate the cavernous nerve which normally lead to increase in nitric oxide and cyclic guanosine phosphate (cGmp) signaling, in corpus cavernosal smooth muscle relaxation. The findings in a study [23], showed that the seed coat extract at 100mg/kg had no significant effect on testosterone level but 200mg/kg dose reduced serum testosterone level, although this did not affect the sexual behavior of the rats in this study.

CONCLUSION

The seed coat extracts of *Garcinia kola* are not effective in enhancing sexual behavior in male rats at the dose of 100mg/kg and 200mg/kg body weight. The practice of consuming the seed coat of *Garcinia kola* for the purpose of promoting sexual vigour in males does not have any physiological value.

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