Influence of Long-term Ingestion of *Garcinia Kola* Seed Diet on Sperm Count, Sperm Motility, and Fertility in the Wistar Rat

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Abstract
The influence of long-term ingestion of *Garcinia kola* seed on the sperm count, sperm motility, and fertility was investigated in the rat. Twenty adult Wistar rats initially weighing between 150 and 160 g were randomly divided into 2 groups (A and B) of 10 rats each. Group A animals served as control and were fed normal rat feed. Group B rats were fed *Garcinia kola* seed diet, obtained by mixing 20g of *Garcinia kola* seed powder and 80g of rat feed (20% w/w). The animals were allowed their respective diets and tap water ad libitum for 8 weeks. The results obtained revealed that there was a significant difference ($p< 0.05$) between the sperm count ($16.42 \times 10^6 \pm 5.25 \times 10^6$/ml) and sperm motility($8.72 \pm 2.33\%$) of the treatment group (Group B) and the respective values of the control, sperm count ($89.38 \times 10^6 \pm 3.68 \times 10^6$/ml) and sperm motility ($75.56 \pm 1.23\%$). The findings suggest that long- term ingestion of *Garcinia kola* seed diet may cause a significant reduction in sperm count, sperm motility, and ultimately infertility in the male wistar rat.
Keywords: Fertility; Sperm Count; Sperm Motility; *Garcinia kola*; Wistar rat.

1. INTRODUCTION

Garcinia kola, a large fruit tree and member of the Guttiferae species is found in abundance in the Southern parts of Nigeria. The seed of *Garcinia kola* (bitter kola) is an important component in traditional herbal medicine in Nigeria (Dalziel, 1937).

An earlier study by Udoh (1998) demonstrated that long-term ingestion of *Garcinia kola* seed resulted in marked spermatogenesis arrest and degeneration of Spermatozoa. Braide et al (2003) reported that chronic consumption of *Garcinia kola* seed resulted in a marked reduction in serum testosterone in male rats. Furthermore, Naiho (2004) has shown that chronic consumption of *Garcinia kola* seed resulted in the disruption of the basement membrane of seminiferous tubules, near absence of sperm in the lumen and loss of intestinal cells of leydig.

The objective of this study therefore was to correlate the observations and results reported by Udoh (1998); Braide et al (2003); and, Naiho (2004) with the sperm count, sperm motility, and fertility following long-term ingestion of *Garcinia kola* seed diet in Wistar rats.

2. MATERIALS AND METHODS

2.1 *Garcinia kola* seed diet

Fresh *Garcinia kola* seeds were obtained from Akim market in Calabar, Nigeria. The seeds were washed and the outer coat removed, air-dried for 8 hours, and then dried in an Astell Hearson oven at a controlled temperature of 50^0C for 12 hours. The seeds were later ground with the aid of a laboratory mortar into a powdery form. 20g of the *Garcinia kola* seed powder was mixed with 80g of commercial rat feed (20% w/w) and labelled test diet.

2.2 Animals

Twenty adult male albino Wistar rats bred in the Department of Anatomy, University of Calabar, Nigeria were used for the experiments. The rats initially weighing between 150- 160g were randomly divided into 2 groups (A and B) of 10 rats each. Group A served as control and were fed normal rat feed (Livestock Feeds Nig, Ltd. Lagos, Nigeria) (20% w/w). The animals were allowed free access to their respective diets and tap water for 12 weeks.

2.3 Fertility Test

At the end of the feeding protocol, the experimental animals were mated with females (1 male: 2 females) to see whether pregnancy would occur.

2.4 Semen Analysis

Twenty – four hours after mating the animals were sacrificed by cervical dislocation. The caudal epididymes of each animal was removed and placed in a specimen bottle containing 1 ml of physiological saline.

2.5 Determination of Sperm Motility

Drops of semen were placed on clean slides and cover slips applied. These were viewed under the light microscope and the percentage of motile sperm determined. This was done in triplicates for each specimen according to the classification proposed by the World Health Organization and Dare et al (2002).

2.6 Determination of Sperm Count

Drops of semen were placed on the new improved Naubauers chambers and cover slips applied. This was viewed under the light microscope and the sperm cells counted in each of the fives squares. This was repeated in

triplicates for each specimen according to Dare et al (2002) and Mesembe et al (2004).

2.7 Statistical Analysis

Student's t-test was used to analyze the data. Values of $p< 0.05$ were regarded as significant.

3. RESULTS

The females that were mated with the treatment group males did not get pregnant despite the presence of vaginal plug after exposure to the males. On the other hand, females that were mated with control males got pregnant and reproduced litters. Table 1 shows that there was a significant difference ($p< 0.05$) between the sperm count ($9.42 \times 10^6 \pm 5.25 \times 10^6$ / ml) and sperm motility ($5.72 \pm 2.33\%$) of the treatment group (Group B) and the respective values of sperm count ($89.38 \times 10^6 \pm 3.68 \times 10^6$ / ml) and sperm motility ($75.56 \pm 1.23\%$) of the control group (Table 1).

4. DISCUSSION

Results obtained from this study have shown that ingestion of *Garcinia kola* seed diet resulted in significantly reduced sperm counts and sperm motility and consequently infertility presented in the Wistar rat. None of the rats that were fed *Garcinia Kola* seed diet was able to fertilize the females exposed to them. This is in line with the report that the low sperm count as well as low percentage of motile sperm is indicative of diminished fertility (Meistrich and Samuels,1985).

These findings are fully in consonance with the earlier reports of Udoh, (1998) who showed that long-term ingestion of *Garcinia kola* seed resulted in marked spermatogenesis arrest and degeneration of spermatozoa; Braide et al (2003) who reported that chronic consumption of *Garcinia Kola* seed resulted in a marked reduction in serum testosterone in male rats; and, Naiho (2004) who demonstrated that chronic consumption of *Garcinia kola* seed resulted in the disruption of the basement membrane of seminiferous tubules, near absence of sperm in the lumen and loss of intestitial cells of Leydig.

It is possible that the components of *Garcinia kola* seeds exerted a toxic effect on the sertoli cells, thereby interfering with spermatogenesis (Udoh, 1998; Naiho, 2004). These same components may also have impacted directly on the leydig cells (Naiho, 2004), thereby interfering with testosterone production (Braide et al 2003). This interference may have adversely affected the entire reproductive system since these organs depend on testosterone for their functionality. It is also conceivable that the observed reduction in sperm count motility may be a consequence of direct spermicidal action of the components of *Garcinia kola* seeds (Udoh, 1998).

The observation thus indicate that long-term ingestion of *Garcinia Kola* seed diet may result in significant reduction in sperm count, Sperm motility; and, ultimately infertility in the male Wistar rat.

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Table 1: Influence of *Garcinia kola* seed (20% w/w) and control diet on the sperm count and sperm motility in the Wistar rat.

GROUP	TREATMENT	SPERM COUNT ($N \times 10^6$ / ml)	SPERM MOTILITY (%)
A	Control	89.38 ± 3.68	75.56 ± 1.23
B	*Garcinia kola* Seed diet (20% w/w)	9.42 ± 5.25*	5.72 ± 2.33*

Values presented as mean ± SEM
n = 10
*$p<0.05$ compared to the control