

## Effects Of Aloe Vera (*Aloe Barbadensis*) Aqueous Leaf Extract On Testicular Weight, Sperm Count And Motility Of Adult Male Sprague-Dawley Rats.

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**ABSTRACT:** Aloe Vera has been widely reported for its numerous medicinal effects but little is known of its effects on the reproductive organs. This study investigated the effects of Aloe Vera aqueous leaf extract on testicular weight and semen parameters of Sprague-Dawley rats. Twenty- four adult male Sprague-Dawley rats weighing between 130-150 grams were divided into 4 groups. The experimental groups; B, C and D received oral doses of 30 mg/kg, 70 mg/kg and 100 mg/kg body weight of aqueous extract of Aloe Vera respectively; while, the control (Group A) received equal volume of distilled water for the duration of a complete spermatogenic cycle. The rats were sacrificed on the 57<sup>th</sup> day, the testes excised, weighed and processed for microscopic examination. The results showed that sperm count of rats that received 70 mg/kg and 100 mg/kg of Aloe Vera extract decreased significantly when compared with the control. However the decrease in sperm motility and testicular weight was not statistically significant across the groups. These results suggest that Aloe Vera has potential antifertility effects in the male rat. [Oyewopo A.O., Oremosu A.A., Akang E.N., Noronha C.C., And Okanlawon A.O. **Effects Of Aloe Vera (*Aloe Barbadensis*) Aqueous Leaf Extract On Testicular Weight, Sperm Count And Motility Of Adult Male Sprague-Dawley Rats.** Journal of American Science 2011;7(4):31-34]. (ISSN: 1545-1003). <http://www.americanscience.org>.

**KEYWORDS:** Aloe Vera, testicular weight, sperm count, sperm motility.

### INTRODUCTION

It is only in recent times that the renewed interests in natural products are being subjected to scientific method of testing. The use of Aloe Vera cuts across barriers of time and culture in the treatment of a broad range of illnesses. The basis of its reputation resides mainly with steadfast belief in claims of its curative properties, but without hard scientific evidence (Grover *et al.*, 2002).

Studies on Aloe Vera have largely upheld the therapeutic claims of anti-diabetic, anti- cancer and anti-biotic properties of this plant extract (Hu *et al.*, 2003; Kosif *et al.*, 2008). A study by Atherton (1998), showed that topically and orally administered Aloe Vera preparations to patients with chronic venous leg ulcers aid healing. It has also been reported that many diabetic subjects take the Aloe Vera gel because of its hypoglycaemic properties (Okyar *et al.*, 2001). However, it does not only possess hypoglycaemic properties but also has hypotensive, hepatoprotective and blood purifying properties (Tiwari, 2002). The antihypertensive effect of chemical constituents from Aloe Vera was also reported to cause 26 %, 52 % and 79 % reduction in mean arterial blood pressure at corresponding doses of 0.5, 1.0 and 3.0 mg/kg Aloe Vera in rats (Saleem *et al.*, 2001).

A report in "Clinical review" 1987 showed that a compound "acemannan" found in Aloe Vera seem to have remarkable antiviral properties (Saleem *et al.*, 2001). Moreso, the phytochemical analysis of Aloe

Vera gel shows that it has the following compounds, polysaccharides, steroids, organic acids, antibiotic agents, amino acids and minerals, which has skin soothing and cells protecting effects (Chithra *et al.*, 1998).

In Nigeria, the Yoruba's call the Aloe Vera plant "Ahon- Erin". It is one of the best medicinal plants used in ancient times. It was seen as a "magic plant" because it had a potential cure for all incurable disease (Olowokudejo *et al.*, 2008).

Aloe vera seems to ameliorate the body's physiology. However, Atherton (1998) cautions against generalisation of complimentary treatment with Aloe Vera. It has been shown to be harmful during pregnancy due to the purgative effect of its constituent glycoide (Lullmann *et al.*, 2005).

There is however scanty information on its effects on the reproductive system. The extracts of Aloe Vera are being used for many purposes with several claims of its efficacy (Hu *et al.*, 2003). Its possible beneficial effect on fertility or its anti- fertility effects have not been widely studied. The present study aims at determining the effect of Aloe Vera extract on the rat testes and semen parameters.

### MATERIALS AND METHODS

#### COLLECTION OF ALOE VERA

The plant was obtained from the Botany department NIHORT, Ibadan and authenticated with a

specimen deposited in the herbarium with voucher no-LUH 2764 Botany department, University of Lagos.

### PREPARATION OF EXTRACT

*Aloe Vera* extract was prepared from *Aloe Vera* leaf gel with slight modifications of the procedure by Grieve (1975). Mature, healthy and fresh leaves of *Aloe Vera* having a length of approximately 25 to 50 cm were washed with fresh water. The leaves were cut transversely into pieces. The thick epidermis was selectively removed. The solid gel in the center of the leaf was homogenized. The crude extracts were prepared freshly each time and administered orally. The dosing schedule used was once daily.

### THE EXPERIMENTAL ANIMALS

24 Sprague Dawley male rats obtained from Laboratory Animal center of the College of Medicine, University of Lagos were randomly selected. The rats weighed 130 g- 150 g and were about 10 - 12 weeks old. They were kept in metal cages at room temperature (27 °C – 30 °C) in the animal room of the department of Anatomy, University of Lagos and exposed to photo-periodicity 12:12. The rats were divided into 4 groups of six rats each. They were fed on rat pellet (Bendel Feed and Flour Mills Ltd) and had access to water *ad libitum*. The use of the animals was in accordance with the national law on animal care and use (Zimmerman, 1983), and approved by the Experimental Ethics Committee on Animals Use of College of Medicine, University of Lagos, Nigeria.

### THE EXPERIMENTAL PROCEDURE

The 24 rats were divided into 4 groups of 6 rats.  
 GROUP A: - Control group received distilled water orally  
 GROUP B: - Received orally 30 mg/kg b.w. of fresh extract *Aloe Vera* daily for 56 days.  
 GROUP C: - Received orally 70 mg/kg b.w. of fresh extract of *Aloe Vera* daily for 56 days.  
 GROUP D: - Received orally 100 mg/kg of fresh extract of *Aloe Vera* daily for 56 days.

The groups were subjected to the same feeding regime and also weighed weekly.

At the end of the experimental period, the rats were sacrificed and the scrotal sacs were opened, the testes removed, trimmed of fat; and the cauda epididymides were removed for seminal analysis.

### Sperm Motility Analysis

The slides on which the sperm cells were counted were warmed to 37°C until the time of the analysis. The analysis was carried out at room temperature using one epididymis of each rat.

The percentage of sperm motility was calculated using the number of live sperm cells over

the total number of sperm cells (both motile and nonmotile), from two samples from one epididymis of each rat. All sperm cells that were not moving at all were considered to be nonmotile, while the rest, which displayed some movement, were considered to be motile (Yan *et al.*, 2007).

### Sperm count

This was achieved using the new improved Neubauer's counting chamber (Haemocytometer). The epididymal fluid was diluted with normal saline by adding 0.9 ml to 0.1 ml of the crushed epididymis. The counting chamber was next charged with a cover slip until a rainbow picture was seen at the edges. This chamber was then filled with sperm fluid and placed under a binocular light microscope using an adjustable light source. The ruled part was then focused and the number of spermatozoa counted in five 16-celled squares. The sperm concentration was then calculated and multiplied by  $10^6$  and expressed as  $(X) \times 10^6/\text{ml}$ , where X is the number of sperm in a 16-celled square (Akang *et al.*, 2008)

### RELATIVE TESTICULAR WEIGHT

Testicular weights (g) were measured before immersing in 10 % buffered formalin using an electronic weighing balance. The testicular weights were recorded as g/kg body weight.

### STATISTICS

The data obtained were expressed as Mean  $\pm$  Standard Error of Mean. The statistical tool used is one-way ANOVA, with  $p < 0.05$  considered significant. This was done using the SPSS software.

### RESULTS

There was a significant decrease in sperm count of groups that received 70 mg/kg and 100 mg/kg b.w. of *Aloe Vera* crude extract compared to control ( $p < 0.05$ ). Sperm count were also reduced in the group that received 30 mg/kg b.w. of the extract  $p > 0.05$  (TABLE 1). The sperm motility (TABLE 1) and relative testicular weights (TABLE 2) of the experimental animals showed an insignificant decrease across the groups compared to control.

**TABLE 1 – Effect of Aloe vera on Sperm Count and Sperm motility.**

Groups	Sperm Count (Millions/ml)	Sperm Motility (%)
A	62 $\pm$ 1.85	70 $\pm$ 11
B	61 $\pm$ 2.23	65 $\pm$ 13
C	54 $\pm$ 2.41*	65 $\pm$ 13
D	40 $\pm$ 2.48*	60 $\pm$ 13

Values are mean  $\pm$  standard error of mean, \*  $p < 0.05$  vs. control group

TABLE 2 – Effect of Aloe vera on testicular weight

GROUP	MEAN ± S.E.M (g/kg)
A (control) n=6	0.0076 ± 0.01
B	0.0080 ± 0.01
C	0.0081 ± 0.01
D	0.0080 ± 0.02

Values are mean ± standard error of mean, \*  $p < 0.05$  vs. control group

S.E.M. = Standard Error of Mean

n = number of rats / group

## DISCUSSION

Our findings in this study are in accord with the observation of Lang (1993), who observed impairment of fertility as one of the major precaution in the use of the plant Aloe Vera. This study buttresses this point as it demonstrates that Aloe Vera has deleterious effect on testis. This findings is however at variance with Maurice (1993) who reported that a dose of 60 mg/kg b.w. aloe vera powder increased both the fertility rate and the litter size of rabbits.

Aloe Vera was also discovered to act as a biological active vehicle for hydrocortisone acetate, which was tested topically and systematically against acute inflammation (Davies *et al.*, 1991). Anthraquinones is another strong compound in Aloe Vera that is responsible for purgative and laxative in their pure forms which may cause hypoglycaemia (Lullmann *et al.*, 2005; Vinson *et al.*, 2005). This could have ultimately resulted in metabolic alteration affecting the production of sperm cells leading to the low sperm count and sperm motility across the groups (Ballester *et al.*, 2004; Vavaiya *et al.*, 2007).

The studies also revealed a decrease in testicular weight, sperm count and sperm motility in contrast with the findings of Nwanjo (2006) who reported that Aloe Vera is rich in antioxidants which reduce lipid peroxidation and mops up free radicals. The decrease in testicular weight could be attributed to the decrease in the production of sperm cells from the testis. This may have been as a result of reduction in seminiferous tubules which makes up about 80% of the testicular volume.

## CONCLUSION

The administration of Aloe Vera to adult male rat at therapeutic dose of 30 mg /kg. b.w. /day over a period of 56 days has no effect on testicular weight, but mild to moderate reduction in testicular weight were observed at doses of 70 mg/kg and 100 mg/kg body weight of Aloe Vera extract.

Aloe Vera reduced sperm count and motility hence, it could serve as a contraceptive drug.

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