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 57th 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.

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-biotoxic 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 glycolid (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) × 10^6/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 ±
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.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sperm Count ( Millions/ml)</th>
<th>Sperm Motility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>62 ± 1.85</td>
<td>70 ± 11</td>
</tr>
<tr>
<td>B</td>
<td>61 ± 2.23</td>
<td>65 ± 13</td>
</tr>
<tr>
<td>C</td>
<td>54 ± 2.41*</td>
<td>65 ± 13</td>
</tr>
<tr>
<td>D</td>
<td>40 ± 2.48*</td>
<td>60 ± 13</td>
</tr>
</tbody>
</table>

Values are mean ± standard error of mean, * p<0.05 vs. control group
TABLE 2 – Effect of Aloe vera on testicular weight

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MEAN ± S.E.M. (g/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (control) n=6</td>
<td>0.0076 ± 0.01</td>
</tr>
<tr>
<td>B</td>
<td>0.0080 ± 0.01</td>
</tr>
<tr>
<td>C</td>
<td>0.0081 ± 0.01</td>
</tr>
<tr>
<td>D</td>
<td>0.0080 ± 0.02</td>
</tr>
</tbody>
</table>

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 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 biological active vehicle for hydrocortisone acetate, (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.

References

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Aloe barbadensis. Planta Medica 2001; 67 (8): 757—760


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