

## **SPERMATOGENIC ACTIVITY OF ALOE VERA IN ADULT MALE RATS**

**Jasem Estakhr, Nasim Javdan**

**Science and Research Branch, Islamic Azad University, Fars, Iran.**

**Corresponding Address:** Jasem Estakhr, [j.estakhr@yahoo.com](mailto:j.estakhr@yahoo.com). Tel: +989179283966

### **Summary**

Infertility affects 15% of couples around the world. Male factor accounts for 40-50% of conjugal infertility. Aloe vera is a medicinal plant used to treat several diseases. The purpose of this study was to investigate effects of Aloe vera extract on rat spermatogenesis with emphasis on sperm parameters and hormonal assay. Aloe vera leaf pulp extract, gel extract, and a mixture of both administered to three groups of 10-week old male Wistar rats for 56 consecutive days. Then sperm analysis and hormonal assay were carried out. Results indicated that in all groups except control group the weights of the testes have increased. Epididymal sperm counts and sperm motility have been increased significantly compared to control groups. Analysis of testosterone level between groups showed that the level of this hormone in the groups that treated with Aloe vera has increased remarkably. According to the results of this study, Aloe vera has strong spermatogenic activity by increasing sperm parameters. This study strongly proposes that Aloe vera specially its gel fortifies spermatogenesis and can be a good candidate for manufacturing fertility drugs.

**Keywords:** Spermatogenesis, Testosterone, Aloe vera.

### **Introduction**

Infertility affects 15% of couples around the world. Male factor accounts for 40-50% of conjugal infertility. Half of all infertile couples have a component of male infertility and almost 30% of these cases are caused solely by a male factor (1). The causes of male infertility include obstruction, varicocele, infection, and exposure to toxins and radiation. Even with advancements in our understanding of human reproductive physiology, up to 23% of male infertility is idiopathic. Male infertility also can be caused by various genetic lesions such as gross chromosomal aneuploidies, rearrangements, microdeletions, and single-gene defects. It affects not only on genes controlling the male germ line, but also on the network involved in male gonadal development and male somatic development (2).

Aloe vera is an ornamental and medicinal plant. It is being used therapeutically, since Roman times and perhaps long before, different properties being ascribed to the inner colorless leaf gel and to the exudates from the outer layers. Aloe species have been used for centuries for their laxative, antiinflammatory, immunostimulant, antiseptic, wound and burn healing activities (3, 4). In the past 15 years there have also been reports on the antidiabetic activity of Aloe extracts (5, 6). The skin absorbs Aloe vera up to four times faster than water, it appears to help pores of the skin open and receive moisture and nutrients of the plants (7). Additionally, numerous constituents within Aloe vera have demonstrated enhancement of immune system functioning within the body (8).

Aloe also has the ability to stimulate macrophages. To date more than 75 ingredients have been identified from the gel. each of which may have a range of mechanism of actions, acting synergistically or individually to explain more than 200 different constituents notably mucopolysaccharides, enzymes, sterols, prostaglandins, fatty acids, amino acids and a wide variety of vitamins and minerals. It contains several potentially active bioactive compounds including salicylates, magnesium lactate, acemannan, lupeol, campesterol,  $\beta$ -sitosterol, aloin A and anthraquinones. In addition Aloe vera contains at least seven super-oxide dismutases with antioxidant activity(3-10).

In this study, we examined the effect of Aloe vera on male reproductive function in rats, using sperm analysis and testosterone assay.

### **Materials and methods**

**Plant material.** Specimens of Aloe vera were collected from Baghiyatallah Alazam Research Institute, Zabol, Iran. Fresh leaves of plant were used in this study.

**Preparation of the samples.** A. vera leaves were weighed, washed and cut from the middle, the gel was separated by scratching with a spoon.

**Aloe vera leaf pulp extract.** The leaf pulps were cut up into small pieces and homogenized with PBS by means of a Moulinex Masterchef blender. The extract was kept at 4C overnight, then filtered through cloth and the filtrate centrifuged at 20000 rpm (45 700 \_ g) for 30 min, at 2C in a refrigerated centrifuge (Cryofuge 20-3 Heraeus-Christ). The green pellet was discarded and the clear yellow supernatant was taken and lyophilized (Labconco apparatus). 7.5% Aloe leaf pulp extract was prepared by dissolving the powder in PBS and mixing thoroughly by a magnetic stirrer.

**Aloe vera leaf gel extract.** The gel was homogenized in a Waring blender, then diluted with an equal volume of PBS and homogenized for a second time. The extract was kept at 4C overnight, and then filtered through cloth. The clear filtrate was kept at -20C in small portions.

### **Animals and treatment**

Male wistar rats purchased from Razi Institute, (Mashhad, Iran) and after allowing 7 days for adaptation to the environment, divided, randomly, 4 groups of 8 animals each: the control (treated with normal saline), experimental group1 (treated with gel extract, 150 mg/kg/day) experimental group2 (treated with pulp extract, 150 mg/kg/day) and experimental group3 (treated with mixture of gel and pulp extract, 150 mg/kg/day).

### **Tissue preparation**

At the end of the treatment period, the pentobarbitol sodium was administered for anesthesia. The testes were removed, cleared of adhering tissues, and weighed. The weights were expressed in term of 100mg of body weight. The epididymis was removed, and used for the sperm analysis.

**Sperm analysis and Hormone assay**

For sperm analysis, the epididymis was exposed by scrotal incision and sperms were expressed out by cutting the distal end of the caudal epididymal tubule. Sperms with epididymal fluid were diluted with physiological saline and sperm motility and morphology were studied. For sperm count, spermatozoa were counted as per the method of Zaneveld and Polakoski (Zaneveld and Polakoski 1977). Sperm suspension was placed on both sides of Neubauer’s hemocytometer and allowed to settle in a humid chamber for 1 hour. The number of sperm in the appropriate squares of the hemocytometer was counted under the microscope of 100x magnification. Blood samples were collected from abdominal aorta, separated after centrifugation (3000 rpm) and stored at -80 C°, to carry out the hormonal assays. Hormone levels were measured by radioimmunoassay coat-A-count kit (diagnostic products corporation, LA, Calif) using Packard Cobra gamma-counter. Testes were removed, cleared of adhering tissue, and weighed.

**Statistical analysis**

Mean and standard error of mean [SEM] were calculated and the significance of difference was analyzed by applying Student’s t-test. Level of significance difference was P<0.05. The values were considered significant at P<0.05.

**Results**

The results recorded in table 1, show that there is no significant change in body weight between two groups, but there is a significant increasing in testes weight of experimental group compared with control group. Results about sperm characteristics showed, treatment of mice with Aloe vera increase sperm count and motility in experimental groups in compare with control group.

Parameters	Control	Gel	Pulp	Gel-Pulp
Body Weight (g)	276±20.1	278±15.6	277±31.4	275±17.5
Testes Weight (g)	1.49±0.06	1.59±0.09*	1.58±0.01*	1.59±0.01*
Sperm Count (10 <sup>6</sup> /ml)	11.07±0.57	17.13±0.17*	15.69±0.68*	17.08±0.24*
Sperm Motility (%)	62.73±1.07	70.86±0.81*	70.42±0.73*	71.05±0.06*
Testosterone Level (ng/ml)	4.408±0.11	6.065±0.037*	6.002±0.021*	6.112±0.076*

**Discussion**

This study demonstrated that Aloe vera treatment for 56 days affected sperm parameters and spermatogenesis in rats. Sperm analysis was carried out to investigate the effect of Aloe vera on male reproductive function and sperm parameters. In the present study treatment of rats with the extract of Aloe vera causes a significant increase in sperm count

and motility, and decrease in sperm abnormalities in compare with control group this extract also causes an increase in testes weight of rats. In the present study Aloe vera caused little change in body weight and no animal died during the study, no animal exhibited noticeable adverse effect from the administration of the extract. Results showed that Aloe vera may enhance male fertility by elevating sperm quality and we concluded that Aloe vera extract has spermatogenic activity in adult male rat due to chemical compounds in it and may be useful to produce drugs for improve male fertility.

### **References**

- (1) Iammarrone E, Balet R, Lower AM, Gillott C, Grudzinskas JG (2003). Male infertility. *Best Pract Res Clin Obstet Gynaecol.* 17:211–29.
- (2) Hassun Filho PA, Cedenho AP, Lima SB, Ortiz V, Srougi M (2005). Single nucleotide polymorphisms of the heat shock protein 90 gene in varicocele associated infertility. *Int Braz J Urol.* 31:236–42.
- 3- Davis D, Hartman D (1994). Anti-inflammatory and wound healing activity of a growth substance in Aloe vera. *J. Am. Pedia. Med. Assoc.* 84: 77-81.
- 4- Fostel JM, Lartey PA (2000). Emerging novel antifungal agents. *Drug Discov. Today.* 5: 25-32.
- 5- Rajasekaran SK, Sivagnanam K, Ravi S, Subramanian S (2004). Hypoglycemic effect of Aloe vera gel extract in streptozotocin-induced diabetes in experimental rats. *J. Med. Food.* 7: 62-67.
- 6- Rajasekaran SK, Sivagnanam K, Subramanian S (2005). Antioxidant effect of Aloe vera gel extract in streptozotocin-induced diabetes in rats. *Pharmacol. Rep.* 57: 90-96.
- 7- Haller J (1990). A drug for seasons; medicinal and pharmacological history of Aloe vera. *Bull. New York Academic Med.* 66: 647-659.
- 8- Rajasekaran SK, Sivagnanam K, Subramanian S (2005). Modulatory effects of Aloe vera leaf gel extract on oxidative stress in rats treated with streptozotocin. *J. Pharma. Pharmacol.* 57: 241-246.
- 9- Shelton RM (1991). Aloe vera. Its chemical and therapeutic properties. *Intl. J. Dermatol.* 30: 679-683.
- 10- Ali A, Swweedan H, Dhami H (1991). Identification of some prostanoids in Aloe vera extract. *Plant. Med.* 57: 38-40.