



In vitro Spermicidal Effects of Hydroalcoholic Crude *Aloe vera* Leaf Extract on Animal Sperm Motility

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Abstract

Background and Aim: *Aloe vera* impact on reproductive system has been reported to in previous studies. The main purpose of the present study was to examine the possible effects of *Aloe vera* extract on animal sperm motility in vitro.

Methods: Different concentration of *Aloe vera* extract were prepared and animal (cow) sperm samples were exposed to different concentrations of *Aloe vera* solution. The sperm motility was examined using routine laboratory method. Statistical significance was evaluated by one-way analysis of variance (ANOVA) test.

Results: Adding *Aloe vera* leaf extract to sperm specimen resulted in significant decrease in sperm motility. Adding the highest *Aloe vera* leaf extract (80mg/ml) to sperm specimen led to the lowest class A and class B sperm number and the highest class D (immotile) sperm number.

Conclusion: Our findings show that *Aloe vera* extract decreases animal sperm motility in vitro.

Keywords: *Aloe vera*, Animal sperm motility

Introduction

Aloe vera is a species in the *Aloe* genus, *Allium*. The *Aloe* plant is employed as a dietary supplement in a variety of foods and as an ingredient in cosmetic products. [1] *Aloe vera* is commonly used in the primary health care of human beings since time immemorial. Many laboratories are involved in investigation on *Aloe vera* for its pharmaceutical applications. [2] *Aloe* contains antioxidants, which may increase the shelf-life and nutritional value of food; therefore, it is widely used in cosmetic, pharmaceutical and food industry. [3] Antibacterial effects of *Aloe vera* also have been demonstrated in recent studies. [4] The association between *Aloe vera* extract and male reproductive system function has been investigated in recent studies. [5] It has also been shown that *Aloe vera* extract can improve spermatogenesis and has positive effect on testosterone and histological features of the testis. [6] Protective effects of *Aloe vera* on semen samples have been reported in in vitro investigations. [7] Although the effects of *Aloe vera* extract on male reproductive system have been studied extensively in vivo and in vitro, there are few research reporting in vitro effects of *Aloe vera* leaf extract on sperm motility. The main aim of this study was to determine the effects of aqueous crude *Aloe vera* leaf extract on animal sperm motility.

Materials and Methods

Extract Preparation

The selected plant was collected in different areas of Hamedan province, Iran in April, 2019. *Aloe vera* leaves were dried at room temperature in the dark and ground finely using blender. The dried leaves were weighted by a digital scale and after grinding, ethanol was added to the sample to cover almost all the powder surface. Then the erlen was placed in a percolator for 48 hours. The



solution was filtered to remove undissolved particles to obtain clear solution. The solution was divided into glass plates and was placed at room temperature to evaporate the solvent thoroughly. Finally, it was kept in refrigerator until used.

Sperm sample

Cow sperm samples were obtained from Association of Stockbreeders, Hamedan, Iran, and were kept in nitrogen tank until were used in our experiment.

Sperm motility

The motility of sperm is divided into four different grades:

Grade A: Sperm with progressive motility. These are the strongest and swim fast in a straight line. Sometimes it is also denoted motility IV.

Grade B: (non-linear motility): These also move forward but tend to travel in a curved or crooked motion. Sometimes also denoted motility III.

Grade C: These have non-progressive motility because they do not move forward despite the fact that they move their tails. Sometimes also denoted motility II.

Grade D: These are immotile and fail to move at all. Sometimes also denoted motility I.

Groups

We prepared samples as following:

Control: 10 μ L sperm sample

Sham: 5 μ L sperm sample + 5 μ L pbs

Group 1: 5 μ L sperm sample + 5 μ L Aloe vera leaf extract (20 mg/ml)

Group 2: 5 μ L sperm sample + 5 μ L Aloe vera leaf extract (40 mg/ml)

Group 3: 5 μ L sperm sample + 5 μ L Aloe vera leaf extract (80 mg/ml)

sperm count and motility was examined using routine laboratory method.

Results

Table 1 shows the motility and the classes of sperms in control and experimental groups.

Table 1. Sperm motility and the classes of sperms in control and experimental groups.

Groups	Motility (%)	Class A (%)	Class B (%)	Class C (%)	Class D (%)
Control	63	18	27	18	37
Sham	29	7	9	13	71
20 mg/ml <i>Aloe vera</i> leaf extract	58	8	25	25	42
40 mg/ml <i>Aloe vera</i> leaf extract	42	0	12	30	58
80 mg/ml <i>Aloe vera</i> leaf extract	0	0	0	0	100

Adding *Aloe vera* leaf extract to sperm specimen resulted in significant decrease in sperm motility. Adding the highest *Aloe vera* leaf extract (80 mg/ml) to sperm specimen led to the lowest class A and class B sperm number and the highest class D (immotile) sperm number.



Discussion

Our findings indicated that sperm motility is reduced when exposed to *Aloe vera* leaf extract, showing spermicidal potential of *Aloe vera* leaf extract in vitro. The effects of plant species of the genus *Aloe* on male and female reproductive system have been reported. [7, 8] Adverse effects of *Aloe vera* preparations have been reported in previous studies. These effects are: diarrhea, hypokalemia, pseudomelanosis coli, kidney failure, as well as phototoxicity and hypersensitive reactions. Recently, *Aloe vera* whole leaf extract also showed clear evidence of carcinogenic activity in rats. [1] In line with our findings, it has been shown that *Aloe vera* adversely affects on the spermogram of bucks. The plant can reduce fertility in male animals and is therefore not recommended for medicinal purpose in male animals especially those used for breeding. [9] *Aloe vera* toxic effects on male reproductive system have been investigated and the findings showed that the expression level of inducible nitric oxide synthase (iNOS) increases in testis of Wistar rat receiving *Aloe vera* extract. Therefore, *Aloe vera* may play a functional role in spermatogenesis via apoptosis, reducing sperm count. [10] The exposure of *Aloe* extract on specimens of the ejaculate with established normozoospermia and specimens with oligozoospermia, asthenozoospermia and hypospermia has shown that that depending on the time and temperature there was an essential difference between the percent of mobility and ultrastructure of spermatozoa. The most favorable effect on spermatozoa was produced by temperature ranges from 11 to 18 degrees C. [11]

Conclusion

In conclusion, we have shown that *Aloe vera* leaf extract has inhibitory effects on animal sperm motility.

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