

# Evaluation of anti-fertility activity of ethanol extract of *Achyranthes aspera* on male albino rat

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## ABSTRACT

In the present study, anti-fertility effect of ethanol extract of *Achyranthes aspera* was observed in male albino rat. The extract was administered to adult male rat as an experimental rat at the dose of 200mg/kg body weight for 15 days. In the present study it was observed the sperm count and motility were reduced significantly in all treated group of rats as compared to control group of rats. As results obtained in the present study, we can conclude that, ethanol extract of selected plant shows antifertility effect on male rat which might result in a male sterility.

**Keywords:** Anti-fertility, *Achyranthes aspera*, epididymis, sperm count and motility, albino rat

## INTRODUCTION

The control of fertility is a priority for both national and international public health. One form of population control is the use of anti-fertility drugs. Concerns concerning the usage of plant-based products affecting human fertility have arisen in recent years. In India, where there are abundant natural resources, several medicinal herbs are used to induce abortions and render persons permanently sterile (Dixit, 1992). Many herbal medications are used to regulate fertilization with good results.

The folklore knowledge and ancient literature can benefit about the plants and herbs in respect to antifertility effect. Numerous plants have recently been discovered, and numerous studies have evaluated the extracts and active ingredients from diverse plant components including seeds, roots, leaves, flowers, stems, or stem barks (Henshaw, 1953; Chopra *et al.*, 1958).

The plant commonly referred to as Aghada (Marathi), Latjeera (Hindi) and Prickly Chafftree (English), this weed is found around the world, particularly in tropical Asia, including India, Sri Lanka, Nigeria, and Nepal. In South Andaman Islands, it is known as *Achyranthes aspera* has historically been used to treat coughs and asthma.

It is astringent, anti-phlegmatic, antiperiodic, diuretic, and beneficial for oedema, dropsy, piles, boils, and skin ulcers, among other conditions. Alkaloids, betaine and achyranthine, which were found in the entire plant, are *Achyranthes aspera's* main ingredients (Varuna *et al.*, 2010)

Previous investigations indicated that *Achyranthes aspera* had antifertility properties (Sandhaykumary *et al.*, 2002). Composite extract of *Achyranthes aspera* found to have spermicidal action in male rats (Paul *et al.*, 2006). According to reports, the sperm toxicity and spermicidal action in male rats is caused by a protein found in the ethanolic extract of *Achyranthes aspera*. *Achyranthes aspera* possesses antifertility properties, antifertility efficacy on various reproductive parameters related to male reproduction (Anuja *et al.*, 2010; Anuja *et al.*, 2011).

## MATERIAL AND METHOD

### Collection of Selected Plant

Selected plant *Achyranthes aspera* was obtained from the forest region of Malkhed, Dist Amravati and the field area of Badnera, District Amravati, Maharashtra, India and it was verified by Dr. Kiran Jadhao, Assistant Professor, Department of Botany, Govt. Vidarbha Institute of Science and Humanities, (Autonomous), Amravati

### Selection of Animal

Normal healthy male albino rats (250-300 g) were used for the present investigation. Animals were housed separately in cages under environmental standard conditions and they were acclimatized 1 week under at temperature ( $25 \pm 20^\circ\text{C}$ ) and light and Dark (12: 12 h). Rats were fed with standard pellet and water *ad libitum* for 15 days of experimental periods.

### Preparation of plant extract used as positive control

The inflorescence of the *Achyranthes aspera* plant was dried in the shade and then grinded into a coarse powder by using a mechanical grinder. This coarse powder was then treated to ethanol extraction in a Soxhlet apparatus. A rotatory evaporator was used to concentrate the ethanol extracts.

**Drug used as standard control** : Clomifene Citrate IP 50 mg, Maneesh Pharmaceutical Ltd. purchased from Made Express Medical, Rukhmini Nager, Amravati, Maharashtra, India.

### Experimental design

The male rats were divided into 3 groups-  
Group I: Rats received normal water and fed daily for 15 days, orally (Normal control)  
Group II: Rats received clomifene citrate at the dose of 50 mg/Kg body weight daily for 15 days.  
Group III: Rats received ethanol extract of inflorescence of *Achyranthes aspera* plant at the dose 200mg/Kg body weight daily for 15 days.

### Semen collection

At the end of the 15 days of experiment, the rat was anaesthetized by using chloroform. The testis and epididymis were removed and distal part was cut and open the semen was collected by applying little pressure on caudal part of epididymis then semen collected on hemocytometer slide. Sperm count and motility was investigated through Neubauer's slide (counting chamber) as given by Saalu *et al.*, (2012).

### Statistical Analysis

The results were expressed as mean  $\pm$  standard error of the mean ( $\pm$  SEM). The data were statistically analysed using one-way analysis of variance (Standard Deviation). The level of significance was taken as  $p < 0.01$ , 0.01 and 0.001 were considered as significant.

## RESULTS

### Sperm count

The result of sperm count is presented in the above table and fig.1. The mean values of sperm count in Group 3 ( $68.54 \pm 1.56$ ) was significantly ( $P < 0.01$ ) reduced when compared with control Group I ( $90.13 \pm 1.21$ ) and Standard Group II ( $97.79 \pm 1.35$ ) of rat.

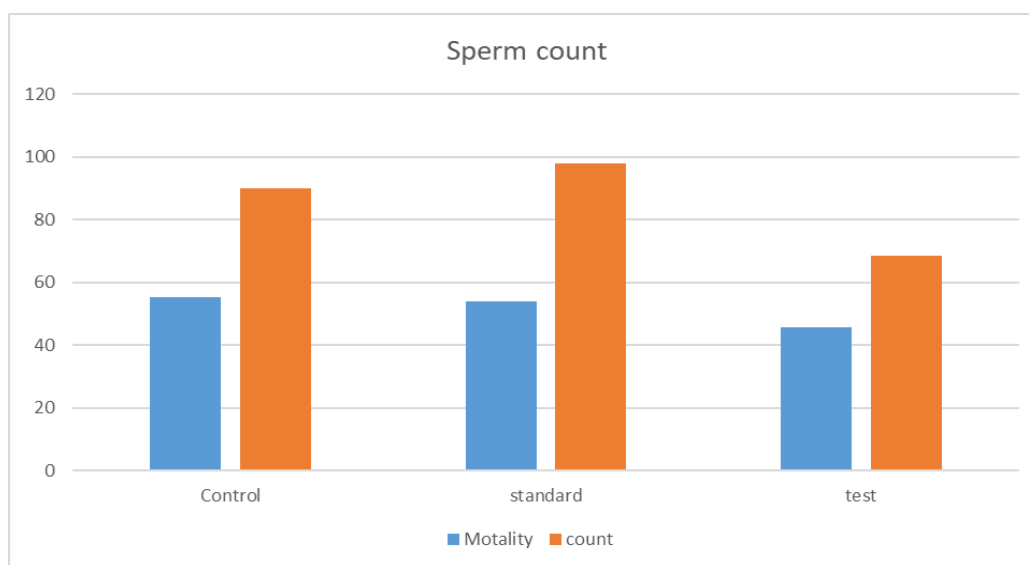
### Sperm motility

The result of sperm motility is summarized in the above table and fig.1 shows significantly ( $P < 0.01$ ) lower in Group III ( $45.90 \pm 1.05$ ) than compared with Group I ( $55.26 \pm 1.81$ ), Group II ( $54.02 \pm 2.20$ ).

**Table 1: Effect of ethanolic extract of *Achyranthes aspera* inflorescence on sperm count and motility of rat at 200mg/kg body weight for 15 days.**

	Group I	Group II	Group III
	Control	Standard	Test
Sperm Count ( $\times 10^6$ )	90.13 $\pm$ 1.21	97.79 $\pm$ 1.35*	68.54 $\pm$ 1.56
Sperm Motility (%)	55.26 $\pm$ 1.81	54.02 $\pm$ 2.20**	45.90 $\pm$ 1.05*

Significant result shows \* $P \leq 0.05$ , \*\* $P \leq 0.01$  and \*\*\*  $P \leq 0.001$

**Fig. 1: Graphical Representation of Sperm count and Motility of Albino rat.**

## DISCUSSION

In this study, we investigated a dose-dependent antifertility effect of the ethanolic extract of *Achyranthes aspera* inflorescence in male albino rats. The reduction in sperm count and motility rate are consistent with the treatment. In the present study we found that sperm count sperm count in Group 3 (68.54  $\pm$  1.56) was significantly ( $P < 0.01$ ) reduced when compared with control Group I (90.13  $\pm$  1.21) and Standard Group II (97.79  $\pm$  1.35) of rat and motility shows significantly ( $P < 0.01$ ) lower in Group III (45.90  $\pm$  1.05) than compared with Group I (55.26  $\pm$  1.81), Group II (54.02  $\pm$  2.20). similar result were observed by Srinivasulu and Changamma (2017) administration of *O. sanctum* leaf extract caused significant reduction in the sperm count, sperm motility and viability to the extent of 29.58, 20.15 and 11.83% respectively. This may suggest that the extract impacts of the spermatozoa's ability to

fertilized through a mechanism separate from the reduction in sperm motility, and that this effect works in concert with decreased sperm count and motility to reduce fertility. Rat spermatozoa's decreased capacity to penetrate ova is one potential explanation, which is caused by the reduction of hyaluronidase activity (Srivastava *et al.*, 2010). This theory is supported by the high flavonoid concentration in *A. aspera*, as demonstrated by present investigation (Atessahin *et al.*, 2006; Sato *et al.*, 2010 and Jalali *et al.*, 2013) reported similar types of findings. The peroxidation of unsaturated fatty acids in the sperm plasma membrane causes the latter to lose its permeability, which in turn causes the cells to stop functioning, which is what causes the loss of sperm motility. Sperm motility is a crucial functional test to determine sperm fertility, and any negative effects on motility would have a significant influence on fertilizing capacity (Mazoudy *et al.*, 2011).

The decreased sperm count clearly shows the elimination of sperm cells at different stages of development and experiment indicating *A.aspera* administration alleviated the negative effect of *Achyranthus aspera* in present study. The study of phytobiotics' antifertility effects, especially male antifertility effects has been observed in male rat (Priya *et al.*, 2012)

## CONCLUSION

The results of the present study indicate that the ethanolic extract of *Achyranthus aspera* have significant antifertility activity and it suppresses the process of spermatogenesis which can lead to infertility in male albino rats. In conclusion, the extract appears to be promising male contraceptive agent in order to develop the potential of herbal medicine. However, more detail and extensive studies would be required to find out the exact nature of the component showing anti-fertility activity and by further planning studies in human. Further studies are planned in this direction.

**Conflicts of interest:** The authors stated that no conflicts of interest.

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