

Evaluation of Antifertility Potential of Ethanolic Extract of whole Plant of *Achyranthes aspera* in Female Albino Rats.

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ABSTRACT

Achyranthes aspera is an important medicinal plant found throughout India. The antifertility activity of the ethanolic extract of *Achyranthes aspera* is now being investigated. The activity such as antizygotic activity, blastocystotoxic activity and abortifacient activity were investigated. The data suggests that the *Achyranthes aspera* extract exerted antifertility and antiestrogenic effects in female rats. The results revealed that ethanolic extract of *Achyranthes aspera* (ACE) treatment caused reduction in reproductive organ weights, number of implants. The effects brought by *Achyranthes aspera* extract are non-toxic and transient.

Key Words: *Achyranthes aspera*, anti fertility effect, anti implantation effect.

INTRODUCTION

Population explosion is an imminent hurdle for a country's development as the natural resources are limited. The population of India is multiplying at an alarming rate and has crossed one billion. Fertility regulation has therefore become the major concern of people of all walks of life. In recent years, plants are perused over steroidal contraceptive drug, because plants are easily available, economic and devoid of harmful side effects. Herbal medicine is a triumph of popular therapeutic diversity. A large number of plants have been reported to exhibit anti-implantation & abortifacient activity but a few have been evaluated for such effects in

laboratory animals¹. Plants above all other agents have been used for medicine from time immemorial, because they have fitted the immediate personal need, are easily accessible and inexpensive². Herbal medicines have a strong traditional or conceptual base and the potential to be useful as drugs in terms of safety and effectiveness leads for treating different diseases. According to WHO more than 80% of world's population relies on traditional herbal medicine for their primary health care³. Plants continue to serve as possible sources for new drugs and chemicals derived from various parts of plants⁴. Efforts are being made to develop antifertility products from plants. One such plant is *Achyranthes aspera*, a well-known plant drug in Ayurvedic, Unani-Tibbi, Siddha, Allopathic, Homeopathic, Naturopathic & Home Remedies. A numbers of phytochemical constituents have been isolated from the plant which possesses activities like antiperiodic, diuretic, purgative, laxative, antiasthmatic, hepatoprotective, anti-allergic and various other important medicinal properties. The crushed plant is used in pneumonia and infusion of the root is used as mild astringent in bowel complaints. Decoction of powdered leaves with honey or sugar candy is useful in early stages of diarrhoea and dysentery^{5,6}. A literature survey reveals that no systematic approach has been made in the past to study the antifertility activity of whole plants of *Achyranthes aspera*. Hence the antifertility activity of the ethanolic extract of *Achyranthes aspera* is now being investigated.

MATERIALS AND METHODS

Plant material and extraction: The whole plants of *Achyranthes aspera* were collected from Srivilliputhur, Virudhunagar district, Tamilnadu. Authentication was done by the Scientist, Botanical Survey of India, Agricultural University, Coimbatore-641003. The collected plants were washed in running water, dried under shade, segregated and pulverized by mechanical grinder and the powder was passed through No 22 sieve. The powdered material was successfully extracted with Ethanol by hot continuous percolation method in Soxhlet apparatus for 10 hours. The residue obtained was then utilized for evaluating antifertility efficacy by suspending in distilled water with Tween 80(2%) as suspending agent (ACE).

Experimental animals: Colony-bred albino rats (Wistar strain) were maintained in standard environmental condition (temperature $22 \pm 2^\circ\text{C}$ and 12hr light/12hr dark cycle & 45-60% humidity) fed a commercial diet and water *ad libitum*. All the experiments were performed according to the CPCSEA norms after obtaining the approval of the Institutional animal's ethics committee (IAEC). Female albino rat's vaginal smears were monitored every day. Rats with normal estrous cycles were caged with male rats of fertility in the ratio of 2: 1 and seen evidence of copulation next morning. Pregnant rats were divided into 9 groups of 6 animals

each. Group I- served as control received Tween 80, 2% for 7 days from day 1 to day 7; Group II – received ACE at 200 mg / kg for 7 days from day 1 to day 7. Group III – received ACE at 400 mg/ kg for 7 days from day 1 to day 7. Group IV- received ACE at 200 mg/ kg for 3 days from day 1 to day 3, which detects *antizygotic activity*. Group V- received ACE at 400 mg/ kg for 3 days from day 1 to day 3, which detects *antizygotic activity*. Group VI – received ACE at 200 mg/ kg for 2 days from day 1 to day 2, which detects *blastocystotoxic activity*. Group VII- received ACE at 400 mg/ kg for 2 days from day 1 to day 2, which detects *blastocystotoxic activity*. Group VIII – received ACE at 200 mg/ kg for 4 days from day 6 to day 9, which detects anti implantation or early *abortifacient activity*. Group IX- received ACE at 400 mg/ kg (p.o. daily) for 4 days from day 6 to day 9, which detects anti implantation or early *abortifacient activity*. All the groups were treated through gastric lavage per oral. On the 10th day, they are laprotomized under light ether anaesthesia ^{7,8}. Both the horns of the uterus are observed for the number of the implantation sites. Abdominal wound was sutured in layers and animal is allowed to deliver under full term. Rats did not deliver were laprotomized on day 25 and uterus is examined for the implantation sites.

RESULTS AND DISCUSSION

Table 1: Effect of ethanolic extract of *Achyranthes aspera* (ACE) on different Phases of estrous cycles

Sl.No	Treatment- (Dose mg/Kg Body Weight)	Mean days of Proestrous	Mean days of Estrous	Mean days of Metestrous	Mean days of Diestrous
1	Control	1.83 +/- 0.30	2.66 +/- 0.21	4.33 +/- 0.21	5.66 +/- 0.21
2	ACE -200	3.0 +/-0.00 ^a	2.33 +/- 0.21	2.33 +/- 0.21 ^c	5.82 +/- 0.30
3	ACE -400	3.22 +/-0.33 ^b	1.33 +/- 0.21 ^a	1.16 +/- 0.22 ^c	6.66 +/- 0.21

a= $P < 0.05$, when compared with the control; *b* = $P < 0.01$, when compared with the control; *c* = $P < 0.001$, when compared with the control.

Administration of ethanolic extract of *Achyranthes aspera* (ACE) showed non - dose dependant effect on the estrous cycle (Table: 1). Ethanolic extract at doses of 200 and 400 mg/ Kg body weight showed highly significant decrease in the duration of estrous & metestrous phase, a

Table 2: Effect of Ethanolic extract of *Achyranthes aspera* (ACE) on ovarian weight

Group	Treatment- (Dose mg/Kg Body Weight)	Ovarian wt. in mg/ 100G body wt. +/- SEM
1	Control	39.30 +/- 0.22
2	ACE -200	34.22 +/- 0.21*
3	ACE -400	30.01 +/- 0.24

*- $P < 0.01$, when compared to the control.

Table 3: Effect of Ethanolic extract of *Achyranthes aspera* (ACE) on implantations in rats, when fed orally from day 1 to 7 of pregnancy

Treatment- (Dose mg/Kg Body Weight)	Days of Administration	No. of implantation sites	No. of rats with implantation on day	No. of implantation sites (Mean +/- SEM)
Control	1 to 7	6	10	10.16 +/- 0.47
ACE -200	1 to 7	3		1.50 +/- 0.50
	1 to 3	3		1.60 +/- 0.55
	4 & 5	4		1.50 +/- 0.71
	6 to 9	3		1.33 +/- 0.49
ACE -400	1 to 7	1		0.16 +/- 0.16
	1 to 3	3		0.67 +/- 0.33
	4 & 5	2		0.33 +/- 0.71
	6 to 9	4		0.50 +/- 0.34

slight increase in the diestrous phase and an increase in the proestrous phase. The ethanolic extract at the doses of 200 & 400 mg/ Kg body weight, decreased the wt. of the ovaries, when compared to the control group (Table:2). Anti implantation is expressed as the percentage of animals, showing absence of implants in the uteri, when laparotomized on day 10 of pregnancy. Anti implantation effects of the extracts are shown in the above table. The maximum implantation sites was seen with 200 mg of the extract between day 4 & 5 and for 400 mg of the extract between day 6 to 9 (Table: 3). Administration of ethanolic extract of *Achyranthes aspera* (ACE) prevented pregnancy in the treated female rats by virtue of antiimplantational property with antiestrogenic activity (Fig:1,2). Further it interfere adequate nutrition for the embryo during its various developmental stages between its arrivals in the uterine lumen until it has achieved implantation and maintains an appropriate environment for the physical and biochemical integrity of the blastocyte structure.



Fig:1 Control rats showing implants in the uterus



Fig:2 Antifertility activity of the ACE in rat uterus showing absence of implants

CONCLUSION

The ethanolic extract of *Achyranthes aspera* showed promising antifertility activity and it is shown to have blastocystotoxic, antizygotic and antiovulatory activities. Further studies needed to be carried out to find out the cytotoxic effects and interaction at the receptor level to find out the most probable mechanism of antifertility activity.

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