



# Antifertility and reproductive outcome activity of *Aristolochia indica* in rats.

Nasir Ahmad Dar, Abha Upadhyay and Deepak Kumar Mittal

Sri Satya Sai University of Technology & Medical Sciences,  
Sehore - 466001 (M.P.) India.

## Abstract

**Objectives.** Antifertility and reproductive activities of *Aristolochia indica* in rats. **Methods.** The antifertility activity of the extracts of *Aristolochia Indica* in rats was evaluated using two experimental animal models. Anti-implantation and early abortifacient activity was performed in female Wistar rats by determining the number of implantations and implantation resorptions. **Results.** In estrogenic activity evaluations, the ethanolic and aqueous extracts offered significant estrogen-like activity at 200 mg kg<sup>-1</sup> p.o. by increasing the uterine weight compared to vehicle control group. Ethanolic extract (200 mg kg<sup>-1</sup>, p.o.) treatment significantly decreased the number of implants and increased the number of resorptions compared to vehicle control group. **Conclusion.** The results of the present study provide the evidence of the anti-fertility activity and reproductive outcomes of *Aristolochia indica* as claimed in the traditional use. The results are consistent with the literature reports related to the antifertility effect of flower extracts of *Aristolochia Indica*.

**Keywords:** Antifertility, Reproductive outcome, *Aristolochia Indica*, Rats.

## Introduction

Studies of many years have highlighted the unmet demand for safe, inexpensive, and acceptable contraceptives to avoid unwanted pregnancies and resultant abortions. The quest for the oral contraceptive agent that can control human fertility is as old as recorded history. Although a wide variety of synthetic contraceptive agents [1] are available, these cannot be used continuously due to their severe side effects. Hence, people are looking back to age-old tradition of using herbal medicines, which have minimum side effects. India in general and Western Ghats region in particular have enormous wealth of medicinal plants. Roots are used in leprosy, decoction of leaves is used as purgative and stomachic, leaves are used as febrifuge for intermittent fevers, and latex is used on ulcers.[2] It contains compounds other than diterpenoids. The chief compounds reported are triterpenoid, sterol, alcohol, and hydrocarbon. The phenolic compounds include flavonoid lignans, coumarin tannin, phenanthrenes, quinones, phenolic acid, alkaloids, cyanogenic glycosides, and glucosinolates.

## Experimental Design

### Anti-Implantation Activity

Female rats of proestrus phase were kept with male rats of proven fertility in the ratio of 2 : 1. The female rats were examined in the following morning for evidence of copulation. The animal were which showed thick clumps of spermatozoa in vaginal smear was separated from the male partner. Only the rats with normal estrous cycles were selected for the experiment. The animals divided into six groups of six animals each. The various groups were treated as follows:

- Group I: control (saline solution) p.o.,
- Group II: ethanolic roots extract of AI (100 mg kg),
- Group III: ethanolic roots extract of AI (200 mg kg),
- Group IV: aqueous roots extract of AI (100 mg kg),
- Group V: aqueous roots extract of AI (200 mg kg).

The extracts were administered orally from day 1 t day 7 of gestation. On the 10th day, laparotomy was carried out under light ether anesthesia in sterile conditions. The uteri were examined to determine the number of implantation sites; the numbers of corpora lutea in ovaries were recorded. The abdomen was sutured, and the animals were left in cages. The drugs were administered orally again for 3 days (days 14–16). On the 18th day, laparotomy was carried out again for evaluating the early abortifacient activity.

### Reproductive outcome in rats

Three groups of mature female rates (five rat/group) were selected for received extracts for 8 days and control group received vehicle for the same period. All the experimental rats were then allowed to mate with mature fertile male rat and the treatment continued for 21 days. The number of litters was determined after the completion of one gestation period in all-experimental groups. The litters were allowed to grow and the growth of litters produced from the extractadministered group was compared with those of control group. The reversibility of antifertility effect of the extracts was also studied in the treated groups. For this study, the extracts were administered continuously for 21 days and then the extract was withdrawn. After 21 days of extracts withdrawal, animals were allowed to mate with male rate. The number of litters was determined after the completion of one gestation period.[3]

## Results and Discussion

The anti-implantation activity is expressed as the percentage decrease in the number of implantations in the uteri on day 10 of pregnancy, and the number of resorbed implants from the existing number of implants will be recorded on day 18 for evaluating the early abortifacient activity. [4]The ethanolic and aqueous extracts have offered significant and dependent anti-implantation and early abortifacient activity by decreasing the number of implantation sites and showed significant resorption of the existing implants compared to vehicle control. The ethanolic extract at 200 mg kg<sup>-1</sup> p.o. showed 74.27% antifertility activity

and it was found to be more potent than aqueous extract; at 200 mg kg<sup>-1</sup> p.o., aqueous extract (200 mg kg<sup>-1</sup> p.o.) offered 46.78% antifertility activity. The results are shown in Table-1.

Table-1 Effect of Aristolochia Indica root extracts on anti-implantation and early abortifacient activity in rats

( $\bar{x} \pm s$ , n=6).

Treatment/dose	% anti-implantation activity	% abortifacient activity	early	% antifertility activity
Vehicle control	0	0		0
Ethanollic extract 200 mg kg	12.35±0.24	1.45±0.24**		13.23±0.32
Ethanollic extract 400 mg kg	22.42±0.20	3.41±1.32***		38.14±0.14
Aqueous extract 200 mg kg	15.23±0.28	1.29±0.21**		17.15±0.08
Aqueous extract 400 mg kg	32.35±0.17	05.04±2.07***		23.34±0.14

P < 0.01, P < 0.001 versus vehicle control.

#### Reproductive outcome study

Table 2 shows the effect of different extracts on the fertility of female rats. The control rats showed good number of litters. Treatment of animal with different extracts resulted a significant (P< 0.05, P< 0.01). A significant antifertility activity (42.2% and 7.8%) was exhibited by AAV and WAV respectively. It was also found that the litters of the extract treated rats did not show any physical deformity. All litters grew up to normal adult stage, which indicates that the extracts do not have teratogenic effect and the absence of teratogenic effect of extracts at a given dose justifies the safety of the plant. The present observations reported the reversible antifertility effect of Ricinus communis (castror beans) on female rabbits.[5] who reported the same effect of the methanolic root extract of Rumex steudelii on female rats.

Table 2: Effect of Extracts on Reproductive Outcome

Group	Oestrous Cycle	Fertility	Litters Present
Vehicle Control	Regular	100 % + Ve	10.00 ± 0.03
Ethanollic extract 200 mg kg	Irregular	42.2% - Ve	5.78 ± 0.10 a
Ethanollic extract 400 mg kg	Irregular	7.8% - ve	9.22 ± 0.15b
Aqueous extract 200 mg kg	Regular	80.5 % + Ve	8.05 ± 0.05 a
Aqueous extract 400 mg kg	Regular	84.5 % + Ve	8.45 ± 0.25 b

The antifertility activity of the ethanolic and aqueous extracts may be mainly due to their estrogenic activity. The phytochemical constituents such as isoflavones along with coumestans (also flavonoids) and lignans belong to a class of substances known as nonsteroidal phytoestrogens, and they produce infertility in animals. In addition, it has also been proved that several commonly occurring flavonoids mimic the biological effects of  $17\beta$ -estradiol by virtue of their ability to bind and activate the nuclear estrogen receptors.[6]

*Aristolochia Indica* is a traditional plant used for family planning. It was found that this plant has a variety of phytochemical constituents, which have a multiplicity of pharmacological actions.[7] The present preliminary phytochemical investigation on leaves extracts reveals the presence of carbohydrates, steroids, glycosides, flavonoids, alkaloids, and tannins in ethanolic extract. The ethanolic extract of *Aristolochia Indica* revealed more significant estrogenic activity with the increase in uterine weight, as compared to control group of rats.[8]

The results of the present study provide the evidence for the antifertility activity of *Aristolochia Indica* as claimed in the traditional use. The terpenoids, phytosterols, and flavonoids present in the extracts may be responsible for their activity. Further studies are going on in this laboratory to find out the active principals and the exact mechanism of action.

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