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ANTIFERTILITY ACTIVITY OF STRIGA LUTEA — PART I

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Abstracts : The petroleum ether and chloroform extracts of the whole plant striga lutea have been found to possess significant antifertility activity in mice. Both these extract exhibited complete and partial resorption of implants at a dose of 100 mg/kg and 50 mg/kg body weight, respectively. Histological studies of the uterus and ovary were carried out to confirm the antifertility activity of these extracts.

Key words : *Striga lutea* Scrophuleriacea implantation site resorption

INTRODUCTION

There are many indegenous plants possessing the property of preventing conception when administered orally. Some of them are being used orally in the rural areas for termination of pregnancy. In recent years work is going on in ayurveda and allopathy to study the antifertility activity of these plants (1-4). One such plant is *Striga lutea* called urimallige in the local language belonging to the family scrophulariacea. It is an erect scabrous hirsute, branching parasitic herb on sugar-cane and sorghum. This plant is distributed in all districts and upto 7000 ft in hills, in dry grassy places and among crops. The leaves are upto 1.5" long, very narrow, often rough with pustular prickles. The flowers are long, laxspikes, bracts usually longer than calyx. Corolla is usually bright yellow, occassionally red or white in well grown specimens (5). Administration of this plant material for three days during menstruation has been reported to prevent conception. (Personal communication with local vaidyas). Uptill now neither chemical examination nor antifertility testing have been carried on this plant. No biological testing of any species belonging to this genera has been done. Hence we were interested to submit the plant S. lutea to detailed chemical and biological investigation as antifertility agent, supported by histological studies on albino mice.

METHODS

The plant was collected from the fields in and around Gulbarga (Karnataka), during January to March. The whole plant including roots, leaves, flowers and stem was dried under shade, powdered and subjected to soxhlet extraction successively with petroleum ether (b.p.60-80°), chloroform, 95% alcohol and distilled water for 18-20 hours. The extracts were then concentrated to dryness in a flash evaporator under reduced pressure and controlled temperature (50-60°C). The aqueous extract was concentrated on a water bath by slow evaporation at 50-60°C. All the extracts were preserved in a refrigerator.

In the present study the petroleum ether and chloroform extracts were used. Each extract was separately tested for antifertility activity in female albino mice as described by Khanna and Chaudhury (6). Different doses of 50 mg and 100 mg/kg body weight of these extracts were prepared by suspension in 1% gum acacia. Animals used in the experiment were colony bred Swiss albino female mice (25-30 mg). All animals were maintained under controlled standard husbandry conditions with food and water *ad libitum*. The vaginal smears of such female mice were studied microscopically for estrous cycle. Only the mice of normal estrous cycle were selected for the experiment. The mice found in estrous phase of the estrous cycle were caged with males of proven fertility in the ratio of 2:3. The females were examined the following morning for evidence of copulation, the animals which showed thick clumps of spermatozoa in vaginal smears were separated for the experiment. The day when spermatozoa were detected in the vaginal smear was considered as day 1 of pregnancy. Sixty pregnant mice

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were allocated to five groups of 12 each and treated as follows:

Group A — Vehicle control (1% gum acacia).
Group B — 50 mg/kg body weight of petroleum ether extract.
Group C — 100 mg/kg body weight of petroleum ether extract.
Group D — 50 mg/kg body weight of chloroform extract.
Group E — 100 mg/kg body wight of chloroform extract.

The plant extracts were administered orally by means of stomach tube from day 1 to day 7 of pregnancy. The animals were laparotomised under ether anaesthesia on day 10 of pregnancy. Both the horns of the uterus were observed for number and size of implantation sites. Out of the 12 animals in each group, 6 were laparotomised and were allowed for full term. The remaining 6 were sacrificed by decapitation. Ovary and the uterus were dissected and fixed in Bouin's fluid for 24 hours. Standard procedures were followed for tissue preparation and the samples were cut in to thin sections of 6μ after embedding in paraffin. Tissues were stained with haematoxylin and eosin stain.

RESULTS

The antifertility effect of the petroleum ether and chloroform extracts together with dose, the day of administration, number of implantation sites and the average number of litter size are shown in Table I. The results clearly showed that both petroleum ether and chloroform extracts at 100 mg dose were much more effective than 50 mg dose of extract. Resorption of implants were observed with 100 mg dose of both the extracts on laparotomy, on day 10 of pregnancy as evidenced by scar marks of implantation sites in the uterine horns of the animals. ($p<0.001$).

In animals treated with 50 mg dose of both the extracts, on laparotomy, the uterine horns showed not only reduced number of implantation sites but also of smaller size ($P<0.01$) while the control animals exhibited intact implantation sites of normal size. However no litters were produced at the completion of the term.

Histological study: The ovaries of animals treated with 50 mg of petroleum ether extract showed corpora lutea and atretic follicles. In the corpora lutea, luteal cells and granulosa cells were visible. Trophoblastic cells were noticed in the uterus indicating partial resorption of implants.

In animals treated with 100 mg of petroleum ether extract, uterus remained thick, long and empty in appearance. Myometrium was also visible. The uterus was undergoing changes to come to normal stage. Ovaries in all the animals showed regressed corpora lutea and prominent corpus albicans.

In animals treated with 50 mg of chloroform extract, the uterus, ovary and the vagina revealed uterine glands,

TABLE I: Effect of petroleum ether and chloroform extracts of *Striga lutes* on implantation in mice when fed orally from days 1 to 7 of pregnancy, (12 animals were used in each group).

Treatment	*Dose mg/kg*	*No. of mice having no implantation sites on day 10*	*No of mice having implantation sites in individual mice*	*% of mice having no implantation sites on day 10*	*Average No. of letter size with range in parentheses*
Vehicle control	—	0	10, 11, 9, 9 10, 10, 9, 9 11, 10, 9, 10	0	9.8 (9-11)
Petroleum ether Eextract	50	2	0, 7, 6, 8 0, 7, 8, 8 7, 7, 6, 8*	16.6	NIL
	100	12	0	100	NIL
Choloroform Extract	50	1	8, 7, 6, 7 5, 6, 8, 8 7, 7, 7, 6**	8.3	NIL
	100	12	0	100	NIL

*Significant reduction in the number of implantation sites when compared to control animals ($P < 0.01$).
**Highly significant reduction in the number of implantation sites when compared to control animals ($P < 0.001$).

degenerating trophoblasts, corpora lutea, atretic follicles and vaginal bleeding. The ovarian histology of the animals treated with 100 mg of chloroform extract showed degenerating corpus lutea and some atretic follicle. Uterus remained thick, long and empty in appearance with normal endometrium.

No toxic effect was observed either by naked eye appearance or by histological studies at these dose levels. After discontinuation of the extract treatment, six of the laparotomised animals in each group were mated, resulted in pregnancy and normal litter size indicating that the extracts action was reversible.

DISCUSSION

Hafez has described that in mouse, corpora lutea persist during the period of gestation and are the only source of progesterone(7). Histological observation of the ovaries of the animals treated with 100 mg/kg dose of both the extract indicated the possibility that resorption might be due to a change in progesterone level as shown by degenerated corpus luteum. It is well established that the inhibition of implantation in albino rats is due to imbalance in the progesterone estrogen ratio. Further work is in progress to pin point the mode of action and to elucidate the mechanism of antifertility action of these extracts by studying antizygotic, blastocystotoxic, anti-implantation activity, by giving the extracts during different periods of gestation as described by Hafez(7). Research on Indian plants with antifertility activity has been exhaustively reviewed recently by Satyavati(8).

Further work is also in progress to screen the alcoholic and aqueous extracts of the plant for their antifertility activity.

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