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Ethnic practices and human welfare in India: An attempt for controlling fertility

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Abstract

Population explosion in certain parts of the world, especially in the developing countries like India, has led to a continuous effort towards development. The therapeutic properties of medicinal plants are conditioned by the presence in their organs of active substances, such as alkaloids, glycosides, vitamins, tanins and coumarin compounds which physiologically affects the bodies of humans and animals or which are biologically active in relation to causative agents of various diseases. The tribal people and ethnic races throughout the world have developed their own medical practices. The root extract of *Abutilon indicum* (L.) (Beng-Potari) was selected for the present experimental study of antifertility activity in the male albino mice. Treatment after seven days (dosage of 1 g/kg.bw./day), the gradual decease in the seminiferous tubular area. Nuclear diameter of epithelial cells and tubular area of the epididymis, Sertoli cells and sperm populations were also decreased significantly.

Keywords: Antifertility, ethni, infertility, traditional.

Introduction

Population explosion in certain parts of the world, especially in the developing countries like India, has led to a continuous effort towards development of safer, reversible and easy to deliver modes of contraception. The development of new antifertility drugs from medicinal plants used by the tribal people is an attractive preposition. de Laszlo and Henshaw (de Laszlo and Henshaw, 1954) have published a long list of such plants with original references. A number of articles have been published, suggesting the possibility of systemic contraceptives interfering with fertility by acting at any of the vulnerable points associated with reproduction (Henshaw, 1953). Some of these plants have been mentioned repeatedly in the literature as antifertility agents (Lans et al., 2003; Lans, 2007; Sandhya, B., Thomas, S., Isabel et al., 2006).

The main objective of this investigation is to extend observations in details on the histological changes within the testicular tissues and other accessory sex organs that are affected due to the oral administration of the *Abutilon indicum* (L.) root extract. It seems

that the changes which will be noticed due to the action of a component of the Tribal medicine for antifertility purposes can be used in human being also, for the greater interest of the Society.

Materials and Methods

Animal model

Male albino mice of Swiss strain were used in the present investigation. Mice weighing about 25g and aged between 60-70 days were taken and divided into three experimental groups of 6 animals each. Animals were housed in metallic cages and in uniform laboratory conditions (12.5hr. light: 11.5hr. dark cycle) and ambient room temperature ($22^{o}C – 24^{o}C$). Food and water were given to the animals *ad-libitum*.

Extract preparation

The root of *Abutilon indicum* (L.) was freshly collected during the months of September and October from the hilly regions of the Purulia District of West Bengal, India. Plant parts were dried under shade and mechanically pounded separately to obtain a coarse powder and submerged in 50% methanol for 48 hrs. The extracts were filtered and concentrated to dryness in a flash evaporator under reduced pressure and controlled temperature (50^{0}- $55^{0}C$) to obtain a solid viscous brown mass, that was 'Crude extract' and was stored at $0^{0}C$. The 'Crude extract' was weighed and diluted with distilled water (400mg/ml) before use. The aqueous suspension was administered orally (1g/kg. B.Wt.) by glass syringe fitted with specially designed blunt needle.

Experimental protocol

The mice were randomly divided into two experimental groups of 6 individuals each, namely Control and Treatment. All the mice in control group received 50% crude methanolic extract of the root of *Abutilon indicum* (L.) at a dose of 1g/kg B.Wt.) /day for 7 days and were autopsied on 8th days. All the mouse of treatment group received the same dose of *Abutilon indicum* (L.) root extract for 7 days and were sacrificed at 8th days. Control animals received equivalent amount of distilled water as vehicle.

Final body weight of individual mice was recorded on the day of autopsy. At necropsy, the various organs of interest (testes, epididymes, vasdeferens & seminal vesicle) were quickly taken out, weighed on a torsion balance and processed for histological studies.

Histological Study

For histological work, tissues were fixed in Bouin's fluid and processed for routine microtomy. 6µm thick paraffin sections were made, stained with Cason's trichrome and Haematoxylin-Eosin procedures. From the well-stained sections of the testes and the epididymes of various groups, observations were made and photomicrographs taken. Well stained sections were mainly used for the cytometric measurements. The quantitative data were recorded properly for analysis.

Statistical Analysis

The quantitative histological data were recorded and analysed statistically, with the help of Student's 't' test procedure (Keel and Abney, 1980). Significant tests were considered at 5% level.

Result

Body weights of the animals remained unaltered in all the treatment groups. Significant changes in the weight of the testis, epididymis and vasdeferens were noticed in treatment group (Table 1).

Table 1. Changes on the body, testis, Epididymis and Vasdiference weight of the male Swiss mice after treatment of *Abutilon indicum* (L.) at a dose of 1g/kg B.Wt.) /day for 7 days.

Group	Body wt (gm)	Testis (mg)	Epididymis (mg)	Vasdiference (mg)
Control	28.5±3.5	687.6±76.34	264.44±48.98	135.21±33.45
Treatment	25.6±2.7	433.76±54.33*	176.54±33.21*	111.76±23.76*
Mean ± Standard Deviation; *P-value (p>0.5%)				

Table 2. Changes on the percentage of germ cells of the male Swiss mice after treatment of *Abutilon indicum* (L.) at a dose of 1g/kg B.Wt.) /day for 7 days.

Group	Spermatogonia	Primary spermatocyte	Secondary Spermatocyte	Spermatid	Sertoli cell
Control	4.56±1.21	20.65±9.76	36.78±12.45	34.45±9.23	3.56±.78
Treatment	87±14.78 *	8±1.32*	5±1.06*	00±00*	00±00*
Mean ± Standard Deviation; *P-value (p>0.5%)					

A major depletion on the relative spermatocytes and spermatids and elevation primary spermatocytes and Sertoli cells were observed in *Abutilon indicum* (L.) treated groups (Table 2). The gradual decrease in seminiferous and epididymal tubular area height of the ciliated epithelium, nuclear diameter of the Sertoli cells and epididymal epithelial cells were also observed in treated group. The histo-architecture of the testis showed drastic degenerative changes in the seminiferous epithelium, arrest of spermatogenesis at the secondary spermatocyte stage, cytolysis and the lumen were filled up with eosinophilic materials.

Discussion

Results of the present study have furnished ample evidence that oral administration of methanolic extract *Abutilon indicum* (L.) root extract for 7 days at the dosage of 1g/kg b.wt./day caused adverse effect on the testicular tissue of the albino mice. The root extract of *Abutilon indicum* (L.) did not cause loss in bodyweight. It produced a noticeable decrease in the weight of the epididymis, seminal vesicles and vasdeferens. The drastic percentages of the secondary of the relative percentage of spermatogonia, decrease of the testicular weight and shrunken appearance of the seminiferous tubular areas indicate wide spread testicular damage (Keel and Abney, 1980). The decrease in weight of the accessory sex organs indicates the atrophy of the glandular tissue and also reduction in secretory ability of the gland (Malaravizhi and Mathur, 1995). The histoarchitecture of the testis showed degenerative changes in the seminiferous epithelium, significant reduction of the seminiferous tubular area, arrest of spermatogenesis at the secondary spermatocyte stage, cytolysis, and the tubular lumen filled up with eosinophilic necrotic tissue materials. During the course of study some multinucleated germ cells were also observed within the tubules, which seemed to be formed by the coalescence of developing spermatids or secondary spermatocytes. These testicular degenerative features indicate that the extract of *Abutilon indicum* (L.) may inhibit the gonadotrophin (FSH), which is essential for spermatogenesis. Sertoli cells play a fundamental role, either directly

or via secreted factors, in the control and maintenance of spermatogenesis, for which FSH and testosterone are also required (Steinberger, 1971). The seminiferous tubular area and Sertoli cells nuclear diameter were significantly reduced due to *Abutilon indicum* (L.) treatment. Sertoli cells control testis growth, including the proliferation and differentiation of spermatogonia (De France et al., 1995). Apparent increase of Sertoli cells per tubular cross section could simply result from tubular shrinkage. At 7 days of *Abutilon indicum* (L.) treated animals, all the tubules showed spermatogenetic arrest. These tubules were devoid of secondary spermatocytes, spermatids and spermatozoa. Rapid decrease in testis weight is due to the significant reduction in the seminiferous tubular area and increase in the interstitial volume and depletion of the spermatocytes, spermatids and spermatozoa in all the tubules. There are no normal spermatozoa in the cauda epididymis for 7 days of *Abutilon indicum* (L.) treatment. These results lead to conclude that in the present study *Abutilon indicum* (L.) was found to induce definite suppressing effect on the secondary spermatocyte, spermatid and spermatozoa population. In conclusion, the oral administration of the crude 50% methanolic extract of *Abutilon indicum* (L.) root (1g/kg B. Wt./ day) induced reversible infertility in male albino mice due to interference in the testicular androgen levels altering the process of spermatogenesis without inducing any side effects.

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