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Research Article

Siddha Medicine

EFFECT OF *CURCUMA AROMATICA* ON NICOTINE INDUCED HISTOLOGICAL CHANGES ON FEMALE RATS

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ABSTRACT

Nicotine in cigarette smoke is one of the toxic substances which impair the fertility. In this research the effects of nicotine tartrate on female albino rat's reproductive system was studied. The rats were divided into 4 groups. Group I: control animals received normal saline, Group II: injected with nicotine 4mg/kg, Group III: injected with nicotine 4mg/kg and *Curcuma aromatica* 100mg given orally. Group IV: given *Curcuma aromatica* 100 mg/kg orally. The experimental group were injected subcutaneously 4 mg/kg of nicotine tartrate daily for 30 days. At the end of the experiment, uterus and ovaries were removed and were prepared histological studies. Histological studies showed that there were atretic follicles in 4 mg/kg treated groups. In group III rats these pathological changes were reversed and there is no change in group IV rats.

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INTRODUCTION

Reproductive toxicity means the interference by an external agent with the reproductive processes in one or more ways. Reproductive toxicity can be defined as the adverse effect of chemicals [1]. The environmental and life style factor have an adverse effect on fertility. Nicotine in cigarette smoking is thought to affect female fertility via a number of alterations in ovarian function, including irregularities in the estrous cycle, depleted ovarian reserves, impaired ovulation and spontaneous abortion [2].

Histopathology is the study of the structure of abnormal tissue and has important application in toxicology. Most histological and histopathological studies are made on mammals. There are routine diagnostic tests to evaluate abnormal tissue changes resulting from exposure of organisms to the toxicant. Suitable preparations of affected, exposed tissues are observed under light and electron microscopes for studying changes in tissues. Affected tissues showing changes of pathological significance may be located in liver, kidney and gonads.

Plants of genus *Curcuma* belongs to zingiberaceae family and is known for their high therapeutic potentials. It is an annual or biennial

erect herb with light yellow (internally orange) coloured rhizomes having a camphoraceous odour and is commonly known as “kasturi manjal” (musk turmeric) in south India. It is a time tested medicinal cosmetic and is even in practice today in India for various skin ailments and cosmetic uses. The drug is used in various kinds of diseases related to skin, cardiovascular and respiratory system. CA is used in cosmetic formulations and traditional medicinal applications as an anti-inflammatory agent, to promote blood circulation, to enhance complexion, to remove blood stasis and also for the treatment of cancer [3]. Rhizomes are used in combination with astringents and aromatics for bruises, sprain, hiccup, cough, leucoderma and skin eruptions. *Curcuma aromatica* rhizomes are also used in snake poison. The paste of CA rhizomes is commonly used as a domestic remedy in headache [4].

The purpose of this study is to understand the effect of nicotine injection on the rat ovaries and uterus and investigate the histo-pathological changes of the ovarian follicles and uterine changes in albino rats .

METHODOLOGY

Female rats were divided four groups. Group I control, group II nicotine induced, group III nicotine induced and *Curcuma aromatica* treated and group IV only drug *Curcuma aromatica* treated. Group II received a subcutaneous injection of nicotine tartrate (4mg/kg bw per day for 30 days). Along with nicotine, *Curcuma aromatica* was given at the dosage of 100mg per kg body weight for Group III rats. At the end of experiment female rats were dissected & the ovaries were removed from their bodies, and then fixed in 10 % formalin for 48 hours. The routine histological processing was carried out on the ovaries specimens, the histological blocks were cutting by micrometer in 5 -6 thickness. Then the histological sections were stained with hematoxylin & eosin stain [5].

RESULTS AND DISCUSSION

The present study showed the normal histological structure of the rat ovary in the control group which is covered with simple squamous epithelium & consist of cortex & medulla. Histological observations of the ovary of nicotine treated groups showed decrease in the number of Graffian follicles and corpora lutea compared to the saline treated control groups. It revealed failure of the folliculogenesis & desquamation or sloughing of the epithelium that covering the rat ovary , disarrangement of the cellular elements of the theca interna , thickening & irregular pattern of the connective tissue in the theca externa. The size of Graffian follicles and corpora lutea was decreased as

evident from significant reduction in their diameters in the nicotine treated groups compared to the respective control groups. There was significant reduction in the diameter of uterus, thickness of endometrium and myometrium and epithelial cell height in nicotine treated groups compared to their respective control groups. A reduction in the secretion of endometrial gland was also observed.

Fibrosis, follicular degeneration and endometrial degeneration observed in the ovary and uterus following chronic nicotine administration in this study may explain the reason for early onset of menopause observed among smokers by Kaufman *et al* (1980)[6]. Other workers have reported an increase in number of regressing follicles in the ovary and reduction in the thickness of myometrium and endometrium in nicotine treated albino rats [7]. Patra *et al*, (1979)[8] has earlier reported that nicotine will either interfere with estrogen production or the ability of estrogen to regulate follicular development thus the delayed in ovulation following nicotine administration reported by Iranloye and Bolarinwa (2007)[9].

According to Soares *et al*. (2007), [10] heavy smoking disrupts the stability of cells in the lining of uterus differently which overall reduces general pregnancy rate. He also reported that a change of endometrium in heavy smokers. In present study noted that endometrium of the uterus of nicotine treated rats becomes thinner than that of control groups (fig 8). *Curcuma Aromatica* regains the normal structure and architecture of endometrium as a result of which the endometrium becomes thick. Many scientists have already shown that curcumin has a broad range of biological activities which are beneficial for our health (Srivastava *et al.*, 2011). [11] Our results are in line with the observations reported earlier.

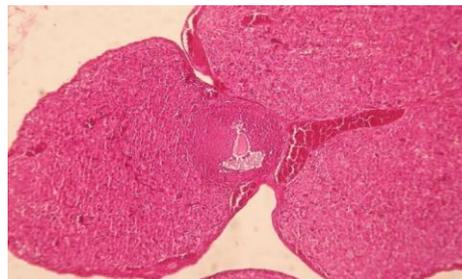


Figure.1: Section of ovarian tissue of control rats (40 x, H & E). This section shows ovarian cortex follicles at different stages of development.. In this section, there is a matured Graffian follicle with other primordial follicles. The entire stroma appears normal without obvious pathology.

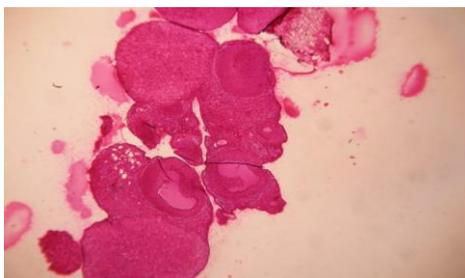


Figure.2: Section of ovarian tissue of rats exposed to nicotine (40 X, H & E).The stroma shows distortions in its architectural integrity with vacuolations permeating the entire stroma of the ovarian cortex

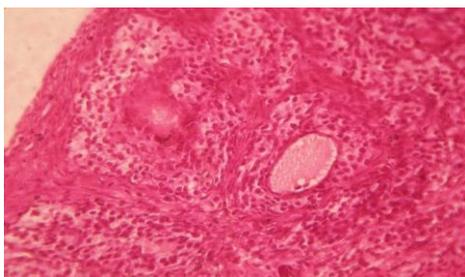


Figure.3: Section of ovarian tissue of rats exposed to nicotine and treated with *Curcuma aromatica* (100 X, H & E). In this section, the ovarian follicles presents a corpus luteum with thickened granulosa cells surrounding a follicular antrum, thus representing a Graffian follicle. The presence of corpora cells indicate ruptured oocyte or post ovulation ovary. There is no obvious pathology.

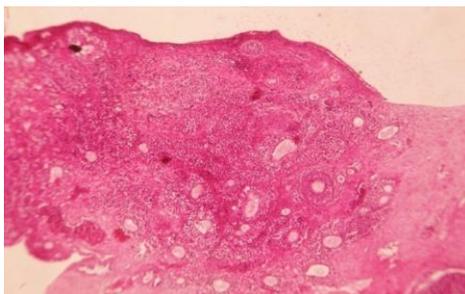


Figure.4: Section of ovary of *Curcuma aromatica* treated group showing normal histo-architecture with well-organized surface epithelium and different follicles such as developing and mature graffian follicles. Stromal cells of ovarian follicles and corpus luteum are also well developed (H & E 40X)

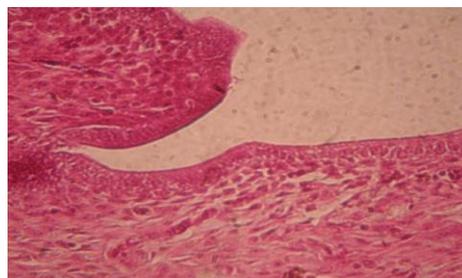


Figure.5: Section of control uterus of Rat showing well organized outer layer of serosa, middle layer of myometrium with muscle layers and inner layer of endometrium with uterine gland. Endometrium is lined by simple columnar epithelium. Lumen is also well developed (H & E 40X). epithelial cells

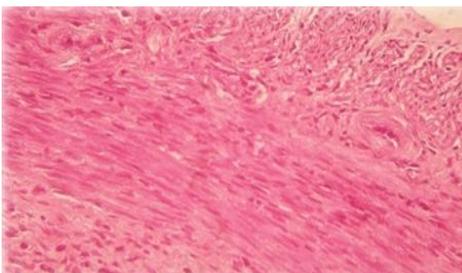


Figure.6: Section of nicotine treated uterus exposed group at dose (30 day) showing obliteration and fibrosis in the uterine arteries was obtained. (H & E 40 x)

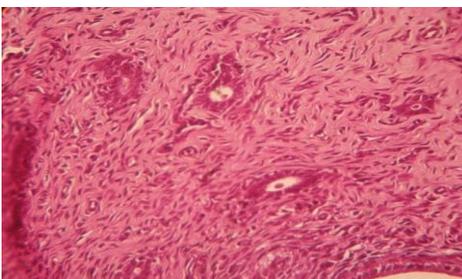


Figure.7: Section of nicotine and *Curcuma aromatica* treated uterus of rat showing areas of vasoconstriction, smooth muscle atrophy, vacuolated endometrium with slightly degenerated

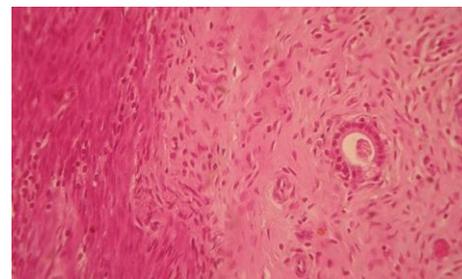


Figure .8: Section of control uterus of Rat showing well organized outer layer of serosa, middle layer of myometrium with muscle layers and inner layer of endometrium with uterine gland

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