

CHAPTER ONE
INTRODUCTION

CHAPTER – ONE

I INTRODUCTION

- 1.0 General introduction.
- 1.1 Review of Plants having antifertility activity
- 1.2 Reasons for undertaking present investigation and selecting oscinum sanctum for present dissertation.
- 1.3 Choice of parameters of study
- 1.4 Presentation of thesis.

1.0. General Introduction :-

Today the world is facing with large many number of problems evoked due to the major cause of increasing population. Human population on earth has tended to increase gradually from the Christian Era (25 Crores)to 1650 when it got doubled (50 Crores). By 1500, it increased considerably and now it is more then 500 Crores. Thus a sudden alarming population explosion in the last four decades resulted into so many problems in human life and made the social thinkers, biologists and naturalists to find out solution to bring down the rate of population growth to a manageable level.

Researches in the field of reproductive physiology helped more to understand the mechanisms which will put a limit on or arrest human fertility. As a result good deal of contraceptive methods are made & being made available such as surgical termination of pregnancy, many mechanical devices, and us of drugs for fertility control in human beings. Most of earlier contraceptives tried were naturally occurring and synthetic drugs. For a long time , human female was a target of trial. But due to more complexity in reproductive physiology of females as compared to those of males, now a days the pendulum has swung towards males side. We are now in a position of significant progress in our understanding of hormonal control of spermatogenesis, the mechanism of sperm release, sperm maturation , the physiological processes of sperm release and the mechanism of fertilization. The testes and accessory reproductive organs were hence became the targets for solving the problem in males.

Many contraceptives are being tried by scientists on experimental male animals to produce a safer and effective measure to achieve male

sterility. Scientists are in search of an effective, reversible male contraceptive without side effects or with least effects on other parts of the body.

A critical review of literature available on experimentally induced aspermatogenesis in laboratory animals such as rat and mice showed that number of synthetic compounds have been proved for their potency for functional aspermatogenic effect.

Many chemicals like triethylene melamine (Jackson and Bock , 1955) nitrogen mustard (Jackson,1966) Busulfan (singh and Mathur 1968) Progestational steroids (Kar et al. , 1967) prostaglandins (Ericsson , 1972 , Tso and La cy , 1975) hydrocortisone (Nair et al 1987) Flutamide (Dhar and setty 1987) , formaldehyde (Shah et al., 1987), B - sistosterol (Malini and Vanitakumari , 1988) cyproterone (Menon and Bhiwagade, 1988, Murgavel and Akbarsha 1991, chinnoy et al 1988) Medroxy Progesterone acetate (Bhiwagade et al , 1991) P-amino diphenyl amine (singh et al 1992) Styrene (Shrivastava et al 1992) DMPA and testoslerone ananthate (Bhiwagade , Awari 1992) N- Pipecoline – methyl – 5- hydroxy indone maleate – PMHI (Ananthlaxmi et al , 1994) Lithium chloride (D Ghosh et al , 1990) Vincristine sulphale (Horne, Iona Averal, Stanley, Murvgaian et al., 1996) etc. were proved to be effective antifertility agents in experimental animals. But they were unsuitable for human beings due to their toxic side effects. Therefore many of the plant materials are being investigated for that purpose.

A good number of Indian medicinal plants were claimed to possess potential post-coital antifertility properties and find their place in ancient Ayurvedic Medicine . Folk-lores and materiamedica . Majority of research workers are actively engaged in India and abroad in exploring the effect of

different plant materials on the reproductive organs of male as well as female experimental animals.

1.1 Review of plants having antifertility activity: -

A review of work carried out at different Indian Institutes now a days is throwing light on histological, biochemical and histochemical alterations occurring in experimental animals after introducing different doses of plant extracts orally, intramuscularly or intraperitoneally.

Following is a brief review of the available literature

Punica granatum (Gujral et al, 1960), Hippophae salicifolia (Joshi et al 1965) Ananus comosus (Bhandari et al, 1968), Butea monosperma (Khanna and Choudhary, 1908, Awati 1985), Vinca rosea (Joshi and Ambai, 1968 and Toro 1984, Murgavel and Akbarsha 1991), Butea frondosa (Razdan et al 1969) Oscimum sanctum (Kasinathan et al 1972, Khanna, Gupta and Grover 1985, Kantak and Gogate 1992), Opium seed (Vyas and Singh, 1976), Malvaviscus conzantii (Dixit, 1977), Aristolochia indica (Pakrasi and Pakrasi, 1977), Memordica charantia, (Biswas, 1977), Blighia sapida (Saxena et al 1977), Hibiscus rosa sinensis (Kholkute 1977, Mankapure 1980 (unpublished data, Reedy et al, 1997), Vitex negundo (Singh et al 1978, Sohani, 1985), Vinca rosea and Emberia ribes (Chauhan et al, 1979), Artobotrys odoratissimus (Prakash 1979), Calotropis procera (Garg 1979), Hibiscus rosa sinensis (Singhwi and Lall, 1980), Papaya seeds (Das 1980, Chinoy and Sondarvia, 1988, Lohiya and Ravi, 1992) Oscimum sanctum (Kasinathan et al, 1977), Seth et al 1981, Khanna, Gupta and Grover 1986, Kantak and Gogate 1992) Allium sativum (Dixit and Joshi 1982) Plumbago Zeylencia (Bhargava 1984), Daucus carota (Shah, 1985), Gossypol (Nair et al 1988), Piper betle (Toro and

Hiremath 1988 , Adhikari et al , 1989) , Terminalia bellirica (Rao, 1988, 1990) , Solanum xanthocarpum (Rao , 1988) , Azadiracta indica and Chordia dichotoma (Choudhari et al 1988) Abrus precatorius (Sinha et al , 1990) Carica papaya (Lohiya N.K.and Ravibala Goyal 1992) , Azadiracta indica (Joshi et al , 1996) , etc Prooved to have antifertility effects in various laboratory animals.

1.2. Reasons for undertaking present investigation and selecting Oscimum sanctum for present dissertation. Following is the review of various medicinal properties of Oscimum sanctum :-

- 1) Kusinathan et al (1972) stridied the effect of O. sanctum on male reproductive system.
- 2) Khanna S. , Gupta S.R. , Gorver J.K. (1986) studied the effect of long term feeding of O. sanctum on reproductive performance of adult albino rats. They reported its depressive action on mating behaviour but not producing azoospermia.
- 3) Godhwani et al (1987) studied anti inflammatory , and antipyretic activity of O. sanctum in rats.
- 4) Mediratta P.K. et al (1988) , studied effect of O. sanctum on humoral immune responses.
- 5) Godhwani , et al (1988) evaluated immunoregulatory profile of O. sanctum leaf extract.
- 6) Sarkar A. and Pant C. (1989) made a comparative study of hypoglycemic action of the seeds and fresh leaves of O. sanctum.
- 7) Sarkar , Pandey and Pant (1990) , studied effects of O. sanctum leaves and seeds on blood and urinary uric acid , urea and urine volume in normal albino rats.

- 8) Kankat and Gogate (1972) , studied short term effects of Tulsi on reproductive behavior of adult male rats.
- 9) Sen P. , et al (1992) studied mechanism of antistress activity of O. sanctum in rats along with eugenol and Tinospora malbarica.
- 10) Mandal S , et al (1993) studied antiulcerogenic property of O. sanctum and concluded that O. samcum leaf extract has antiulcerogenic property and it is due to its ability to reduce acid secretion and to increase mucous secretion.
- 11) Chattopadhyay (1993) studied hypoglycemic effect of O. sanctum leaf extract in rats and reported lowering of blood sugar level in normal , glucose fed hyperglycemic and streptozotocin induced diabetic rats.
- 12) Prashar R. et al (1994) reported chemopreventive property of leaves of O. sanctum in male albino rats.
- 13) Devi and Ganasoundari (1995) studied radio protective effect of leaf extracts of O. sanctum.
- 14) Singh et al (1996) carried out chemical and pharmacological studies on fixed oil of O. sanctum.
- 15) Ganasomndari and Devi (1997) reported protection against radiation induced chromosome damage in mouse bone marrow by O. sanctum.
- 16) Surender Singh (1998) studied anti inflammatory activity of O. sanctum seeds against pawedema
- 17) Its volatile oil distilled from leaves has been claimed to have anti inflammatory and anti histaminic (Singh S. and Agarwal S.S., 1991), antibacterial (Grover et al , 1977) and antifungal activity (Dey B.B. and Chowdhary M.A, 1984).

- 18) Surender Singh (1999) reported the anti inflammatory effect of fixed oil of ocimum basilium in rats.

Thus Oscimum sanctum Linn., popularly known as holybasil, is a well known sacred plant of Hindus , to which several medicinal properties have been attributed in traditional system of medicine. It is a widely available Indian Medicinal Plant . Leaves of this plant have been used in traditional remedies to control diabetes since antiquity – Anabolic , hypotensive smooth muscle relaxant and antistress activity of the plant have also been reported.

After the discovery of potency of number of plant parts and their extracts as antifertility agents, it became clear that the holybasil, Tulsi is also a plant having rich antispermatogenic potency. A critical review of literature on effect of O. sanctum on male reproductive system revealed following point---

- 1) The focal interest of most of the studies is the “degeneration” and “damage” caused to seminiferous tubules in the testis by effective oils in the plant Not much is known about the mechanism of such damage.
- 2) These studies throw some light on histological changes in testis and one or two accessory reproductive organs.
- 3) Some workers have focussed their attention mainly on testis and one or other accessory reproductive organ. All the accessory reproductive organs have not yet been studied simultaneously along with changes in testis by all workers.

Hence , it was decided to study the details of histological changes by O.sanctum induced alterations in testes, both caput and cauda epididymes,

seminal vesicles, prostate and cowper's glands. Simultaneously. Similarly experimental animals were also tried to find out whether there is recovery if any after the termination of feeding of the *Oscimum* leaves in testes, epididymes, seminal vesicles, prostate & cowper's glands. To make the study consolidated and as detailed as possible, it was decided to study changes in body weight of animals, organ weights and histological alteration in testes and all the accessory reproductive organs of male albino rats.

1.2 Choice of Parameters of study: -

Following parameters were chosen for the present investigation.

- 1) Body weight.
- 2) Organ weights.
- 3) Tubular diameter.
- 4) Histoarchitecture.
- 5) Recovery (if any).

1.3. Presentation of thesis.

It was decided to divide the present thesis into five chapters. The first chapter being an introduction giving a review of the literature on agents having antispermatogenic effect in vertebrates, reasons that stimulated to take in to consideration the present work and plan of proposed work.

The second chapter is devoted to detailed description of the materials used & methodology and techniques employed in the present investigation.

The third chapter deals with observations of alterations in the body weight of rats treated with *O.sanctum* and alterations in the histoarchitecture

in the different organs in male reproductive system such as testes, epididymes (caput and cauda) seminal vesicles, prostate gland and cowper's glands found in the rats treated with O.sanctum at different intervals of time.

Fourth chapter deals with discussion and concluding remarks based on the observations as compared with the available literature on effects of various antifertility agents. The results are supported by tabular data and photomicrographs of histological alterations.

Fifth chapter comprises of summary of the present dissertation in brief and some conclusions derived, based on the observations made in the experimental animals after administration of O. sanctum leaves.

At the end of the thesis, some ideas for the scope for future work on the study of ocimum sanctum induced alterations are given in brief . The thesis ends with a bibliography of exhaustive literature cited in this thesis.