In the last 125 years the world’s population has grown from one billion to 4.5 billion. It is presumed that by the turn of the century the population may very well reach from 8-10 billion. In the face of diminishing resources, this staggering growth of population is a major crisis of our time. The only answer for such a rampant growth of human population is an effective and popular birth control measure. In the field of fertility regulation in female a plethora of information is available, and it scarcely needs to be stressed that impressive progress has been made within the last decade in research concerned with male reproductive functions. Two problems in particular have received special attention, namely those of infertility and regulation of fertility in the male. It is extremely interesting to note that whereas, some investigators are trying hard to find ways and means for suppressing fertility and developing new antifertility agents, others are making equally strenuous efforts to counteract sterility and thereby enhance fertility in the male.

As a result of relentless research, innumerable contraceptive methods have been devised, yet most of them have side effects, are expensive to adopt or are less efficacious. In view of all these problems, reproductive endocrinologists, neurophysiologists and biochemists are
faced with the herculean task of developing a new contraceptive which is economical, effective and has least side effects.

Most of the conventional contraceptives are extensively devised for women, and at present research activities are concentrated for developing anti-pregnancy vaccines, nasal sprays, vaginal rings, cervical devices, combination pill, morning after pills, etc. One of the methods which seems to have potential effects is implant with norgestrel or d-norgestrel. The latter drug has been used in implants that may last as long as 6 years; other devices include intra-cervical devices, contraceptive bracelets, nasal sprays, methods influencing the gonadotropin binding sites, egg and sperm membrane methods etc., and drugs to slow or speed gamete or syngote transport through fallopian tubes, whereby interference with implantation could be achieved. These drugs also make the cervical mucus impenetrable.

The progestins and in particular, Depo-Provera will be effective in doing this. Sterilization (female) is an important method of contraception, which is permanent and is relatively simple surgical procedure. Sterilization until recently was an irreversible method of family planning. However, there are new methods that have been developed and experimentally used that may allow more choices in the future for reversibility.
The 'Pill' is perhaps the only twentieth century birth control measure, but many people feel that everything regarding the pill - its history, its interpretation, its evaluation and its use still illustrate the tensions that exist in family planning.

Biologically there are two reasons why a pill for woman was developed before one for man. One of the first physiological events in pregnancy is the suppression of the next ovulation. There is no analogous turning off in the male reproductive tract. Secondly in the female, all the ova that are going to be used during the reproductive life are fixed at the time of birth. However, in the male the sperm production continues, throughout life and any compound that might suppress spermatogenesis, could also damage the sperm, which may result in the risk of causing abnormal babies, due to chromosomal damage. It is therefore, fervently hoped not only by reproductive biologists all over the world, but by the entire mankind, that these problems will be overcome in the near future and the world may well enjoy a safe male pill.

For a large number of years, male sterilization (Vasectomy) was the most straight forward and cost effective way of family planning for a large number of couples. The first vasectomies were not done for fertility regulation,
but for reasons arising from lack of understanding of the physiology of the prostate gland and ideas of sexual rejuvenation. Sterilization has proved to be acceptable in all communities at all stages of socio-economic development; it is more common in Puerto Rico than in Sweden; a third couples on the west coast of the U.S.A. have had some form of sterilization operation by the later thirties. The demand for sterilization in Bangladesh, Mexico and Philippines greatly outrun the available services.

Although sterilization as mentioned above is the most popular and inexpensive method to control human population, many other agents, acting by a variety of mechanisms, are known to diminish fertility in the male. According to their main site of action, they have been classified into three different categories. Viz., 1) agents which exert their action on spermatogenesis, 2) which suppress sperm maturation and 3) agents which affect the sperm transport. However, it is to be clearly understood, that some agents may act at more than one site. Some of the alkylating agents and heterocyclic compounds appear to be unsuitable as contraceptives because of their toxicity and the danger of genetic mutations in spermatocytes as these agents directly affect spermatogenesis. Perhaps for this reason, suppression of spermatogenesis by altering the hormonal stimulation of
the testis has received more attention in recent years. Suppression of gonadotropin release by the pituitary gland can also be achieved by naturally occurring steroid hormones such as estrogen, progesterone, and testosterone administered alone or in combination. Inhibition of gonadotropin release has also been shown to be accomplished by non steroidal compounds such as clomiphene (in a number of species) and methallibure. Fertilization can also be interfered with, by using compounds that affect post-testicular sperm saturation because mammalian spermatosa acquire fertilisability, motility in the epididymis. a-chlorothydrin has been extensively studied in this respect, but its exact site of action whether it is on the epididymal epithelium vasculature or saturation of sperm is still disputable and besides it has toxic side effects. The anti-androgens such as cyproterone acetate, interfere with the action of testosterone at the target organ level. Thus, by now it is well established that all these drugs influence the sex accessory complex, as well as the seminiferous tubules, thereby, rendering infertility. Most methods of altering fertility by interfering with the transport of sperm have involved measures such as condom, vasectomy, vas occlusion and vas ligation. However, better methods should be developed which can be completely reversed and which can ensure complete normosperma after reversal.
At present the research activities are diverted to the development of a male contraceptive, which is of plant origin. Developing countries like China, Bangladesh, Ghana, Sri Lanka and India are interested in them, for economic reasons in terms of self-reliance and the greater acceptability of local products by the common man. The World Health Organization's 'Special Programme of Research, Development and Research Training in Human Reproduction' at present mainly emphasises on post-coital agents that would be taken orally. These include semi-purified isolates, stabilised and standardised plant extracts or pure chemical substances of defined structure. A network of centres in Hong Kong, Republic of Korea, Sri Lanka and the U.S.A. has been established, and from these countries experts in Botany, natural products, Chemistry and reproductive biology have been engaged to carry out this prestigious project on human reproduction.

The People's Republic of China gives high priority on fertility regulation method in male and with the WHO collaboration, has set up basic, clinical and epidemiological research on male reproduction and fertility control. The largest project is the establishment of the National Research Institute for Family Planning in Beijing. Initially, such research work has been carried out on gossypol, a yellow phenolic compound of cotton seed origin.
Recently, the Chinese workers discovered through mass investigations that cooking with crude cotton seed oil led to infertility in human males; the active ingredient associated with cotton seed oil to induce infertility is gossypol, a polyphenolic colouring agent. The Chinese workers have demonstrated very interesting antifertility effect of gossypol in male rat, rabbit, mouse, hamster, guinea-pig, dog, pig and monkey (National Co-ordinating Group, 1978). Although many workers claim the nontoxicity of this antifertility agent in human males, many physiological side-effects have been reported by several others. Likewise, a number of other plants such as Zopatle, Montanoa jongioides (Cerv.), and Mentha arvensis etc. are known to cause uterine contractions and enhance abortion in Mexico and some other countries. However, none of the methods in use at present for regulation of male fertility control could be rated as 100% efficacious, widely acceptable and cause minimum side effects and totally reversible.

The present thesis deals with the studies of antifertility effects of two plant extracts. They are the seed extracts of Carica papaya (Family, Caricaceae, Linn) and Leaf extracts of Vinca rosea (Linn., Catharanthus roseus, Family, Apocynaceae). The effects of these plant extracts were studied on the reproductive functions of male albino rats, since there are very few reports which elucidate their
effects on male reproductive system of mammals. The reversibility of the effects by discontinuation of treatment, for 1 and 2½ months as well as the effects of the combined extract + ascorbic acid feeding were also investigated.

Special attention has been drawn to study the physiology and histoarchitecture of caput and cauda epididymides as well as proximal and distal regions of vas deferens. Besides, the seminal vesicle fructose content, being an important androgen dependent parameter was studied with respect to all treatments. Sperm counts, percent motility and fertility rate, scanning electron microscopy of cauda epididymal spermatozoa, the contractile pattern of isolated vas deferens and radioimmunoassay studies on the levels of some circulating hormones were also undertaken.

A special attempt has also been made to investigate the metabolic role of ascorbic acid (AA) under various treated conditions, since it is known to function as an important source of electron energy via the formation of its free radical, mono-dehydro ascorbic acid (MDHA) which is a more powerful reducing agent than AA by virtue of possessing an unpaired electron.

The thesis consists of Chapter I which is a general introduction and review of literature. Chapter II deals with
the various materials and methods used, Chapter III includes the observations and results followed by Chapter IV wherein, the results obtained are discussed in the light of recent data in the field. Chapter V has summary and conclusions and some future lines of work which could be undertaken in the field. In the last chapter, the bibliography has been presented in chronological and alphabetical order.

The work incorporated in the present thesis reveals for the first time the reversible antifertility effects of Carica papaya seeds and Vitex rosea leaves although scanty reports of the antifertility effect of the former has appeared earlier elsewhere. The results obtained by short term administration of the two plant extracts indicate that both these plants possess potent contraceptive activity, which was reversible by 2 - 2½ months of withdrawal of the treatment.

Although both plant extracts could cause functional sterility in male albino rats, papaya seed extract could be rated as more superior to that of Vitex rosea leaves in that the reversibility of the effect was almost total for the same time given to both the treatments. These changes are discussed in detail in the discussion part of the present thesis. As such, the work embodied in the thesis, is an important contribution in the field of male contraceptive technology derived from plant extracts, so as to enable the future generation enjoy a new male pill.
The following papers/abstracts have been published:


