Environmental contamination is increasing day by day and has become a major threat to health of humans and domestic animals. A wide variety of chemicals e.g. fertilizers, pesticides and herbicides are globally used to enhance the agriculture production as well as to control ectoparasites. Pesticides are chemical substances that are used for the destruction of organisms which are harmful to people (WHO, 1989). Many of these toxic chemicals are extremely toxic to mammals and other non-target creatures (Abdollahi et al., 2004). There is often a period of vulnerability to the effects of toxic chemicals, including pesticides during fetal development and early childhood. This vulnerability occurs during the period of development of various organ systems (period of organogenesis) wherein permanent structural birth defects or permanent functional changes may occur (Arbuckel and Server, 1998).

Pesticides are used in every country for control of agricultural and household pests and there is a growing public concern regarding indiscriminate use of pesticides. Everyone (men, women and children) is exposed to certain pesticides directly or indirectly through many ways. Since contamination of soil, water and air with pesticides is erroneously increasing people around the world are drinking, breathing and eating contaminated water, air and food respectively, resulting in adverse health effects. These include difficulty in breathing, headache, neurological or psychological effects, irritation of skin and mucous membranes, skin disorders, immune system disorder and cancer. In addition, exposure to pesticides might adversely affect reproduction and reduce the human fertility as well as other beneficial animals. Hence, there is a need to study the effect of every pesticide on reproduction of mammals. Since the control of reproduction is similar in all mammalian species, observations made in laboratory mammals (such as mice, rats etc.) can be extrapolated to other mammals including human (WHO, 1989). Carlsen et al., (1995) reported decrease in human sperm count over last several decades throughout the
world which is correlated with increase in use of chemical pesticides. One of the side effects caused by exposure to pesticides is infertility.

The word pesticide means "killer of pests". Pesticides are chemicals and biological materials that are used by man to reduce pest organisms. The food and agriculture organization (FAO) of the United Nations defined a pesticide as any substance or mixture of substances intended for preventing, destroying or controlling any pest including vectors of human or animal disease, unwanted species of plants or animals causing harm or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood, wood products or animal feedstuffs or which may be administered to animals for the control of insects, mites/spider mites or other pests in or on their bodies (WHO, 1989). However, in addition to these intended effects pesticides may also have adverse health effects on animals and human beings.

The use of pesticides has a long history. There is evidence that ancient Roman and Chinese used various minerals and plant extracts as pesticides to control pests. Man's desire to control his environment has created many useful chemicals. Evolution of chemical insecticides essentially began with readily available materials such as arsenicals, petroleum oils and botanical insecticides (e.g., nicotine, pyrethrum, and rotenone). The first synthetic organic insecticides that appeared for public use were dinitro compounds and thiocyanates (Murphy and Peet, 1932). Perhaps the most significant discovery leading to the proliferation of new synthetic insecticides was the DDT. This unusual compound was first synthesized by Zeidler in 1874 but its insecticidal properties were first discovered in 1939 by Muller of Switzerland (cited in WHO, 1989). Use of anthropogenic pesticides started in the beginning of 1930s and dramatically increased after World War II (WHO, 1989).

Acute toxicity of a pesticide refers to the chemical's ability to cause injury to a person or animal from a single exposure, generally of short duration. The harmful effects that occur from a single exposure by any route of entry are termed "acute effects."
The chronic toxicity of a pesticide is determined by subjecting test animals to long-term exposure to the active ingredient. The harmful effects that occur from small repeated doses over a period are termed “chronic effects.” Suspected chronic effects from exposure to certain pesticides include birth defects, toxicity to foetus, and production of benign or malignant tumours, genetic changes, blood disorders, nerve disorders, endocrine disruption and reproductive effects. The chronic toxicity of a pesticide is more difficult to determine through laboratory analysis than acute toxicity.

Pesticides are classified according to their intended targets. The more common pesticides are, insecticide (kills or control insects), herbicide (kills or control plants), fungicide (kills or control fungi), rodenticide (kills or control rodents) and miticide (kills or control mites).

Pesticides are also classified into natural and synthetic, natural pesticides are obtained from plant extract and minerals, while synthetic pesticides are classified into different categories. One of the methods of classification is on their chemical composition. According to this criterion, they are classified into organochlorines, organophosphates, carbamates and pyrethroids.

Organochlorines were the first formed synthetic pesticides. They have residual effect and residues are isolated from various organs of the body including human milk. They are quite resistant to biological disintegration e.g., DDT, endosulphan, methoxychlor etc. Organochlorines were replaced with organophosphates as they were said to have no residual effect as they were eliminated in the urine. Later it was reported that organophosphates affect sex hormone levels (Garry et al., 2003; Xavier et al., 2004). Some of the organophosphates are tri ethyl pyrophosphate (TEPP), mevinophos, nuvan, methyl parathion. Carbamates were developed in the last 40 years. They are mainly used in agriculture as insecticides, fungicides, herbicides and nematocides or sprout inhibitors. In addition, they are used as biocides for industrial or other applications and in household products. They are used for domestic disinfection and vector control in public health as well. More than 50 carbamates are known. Carbaryl and benomyl are widely used carbamates.
**Pyrethroids**

A pyrethroid is a synthetic chemical compound similar to the natural chemicals, pyrethrins produced by the flowers of pyrethrums (*Chrysanthemum cinerariaefolium* and *C. coccineum*) (Casida, 1980). Pyrethroids are in common use in agricultural and home formulations for more than 30 years and account for approximately one-fourth of the world wide insecticide market (Casida and Quistad, 1998). Their prevalence in insecticide formulations has increased particularly in the last decade (Wolansky et al., 2006). They are usually broken apart by sunlight in one or two days and do not significantly affect groundwater quality. Pyrethroids were developed during 1970s. There are two types of pyrethroids labeled as Type I (e.g. bifenthrin, sbioallethein, permethrin, resmethrin, tefluthrin) and Type II (e.g. cypermethrin, deltamethrin, fenvalerate, B- cyfluthrin, x-cyhalothrin, permithrin act).

While the use of pyrethroid insecticides has been documented since 1970s, preliminary evidence suggests that usage has been increasing and the pyrethroid insecticides are replacing the organophosphorus insecticides for residential control (Jose, et al 2010). So the number of human exposures to organophosphorus insecticides decreased while exposures to pyretheroid insecticides increased (Sudakine, 2006). It has been reported that pyrethroids are preferred over organochlorine and carbamates due to their high effectiveness against wide range of insects, low toxicity to mammals and easy biodegradability (Dorman and Beasley, 1991; Ahmad et al., 2009).

Pesticides may cause reproductive toxicity through several different mechanisms viz. direct damage to the cells, interference with biochemical processes necessary for normal cell function, biotransformation resulting in toxic metabolites and endocrine disruption (Breveeled et al., 2006).

Reproductive effects are more important because pesticides may not cause visible effect like loss of fertility but would have induced changes in gametogenic activity which may manifest at later date. For instance, there has been significant drop in spermatozoa count in humans globally over last few decades which is correlated with increase in use of pesticides (Carlson et al., 1995). Hence there is a need to investigate every chemical introduced into the environment for its reproductive toxic effects. Although, female toxicity of the pesticide is studied in many animals most of the studies are confined to fertility test. Alternations in ovarian follicular developments are not thoroughly investigated. Similarly alterations in spermatogenic stages are not
thoroughly investigated. In addition there is a need to investigate effects of chronic exposure to very low doses i.e. less than 1/100 of the LD<sub>50</sub> dose as generally animals or humans are exposed to very doses most of the time i.e. other than accidental acute exposures. It is also evident from critical survey of literature that there are no studies on reversibility of effects of pyrethroids in general and cypermethrin in particular. Studies on these lines are essential to understand whether or not pesticides cause permanent damage. In view of these facts the present study was undertaken with an objective to investigate the effects of chronic exposure of male and female mice to cypermethrin for short and long periods (6 and 12 weeks) on gametogenic activity and sex steroid levels and their impact on fertility.

The thesis embodies two chapters, the first one deals with male reproductive toxicity and the second, female reproductive toxicity using different parameters. The significant part of the work is that effect of pesticides exposure on pubertal onset of progeny of treated mice has been studied.

The data obtained are presented in the form of tables and graphs. They are statistically analysed using appropriate tests and histopathological changes are shown by photomicrographs. The significance of the results obtained is discussed in the light of findings reported by earlier workers in the pertinent field. Each chapter is followed by a brief summary. Bibliographic information of the literature cited in the text has been provided under “literature cited”. The present study in Swiss albino mice forms a good basis for future studies on the significance of toxicological effect on the mammalian reproduction and fertility.