The extensive encouragement for the establishment of industries in the interest of improvement in economy especially in developing countries has resulted in the introduction of harmful chemicals into the environment. These chemicals reach the living organisms including man directly or indirectly. Their levels which are far beyond the permissible quantity to human beings become toxic and affect their health status, despite the fact that the classical group of trace elements in their minute concentrations are highly beneficial, but pose health hazards at high concentrations. As the pioneer toxicologist, 'Paracelsus' said "All substances are poisons and a poison is remedy", but they both differ by dose. The striking example is fluoride, which within permissible level (1 ppm) has a paramount action in the prevention of dental caries as well as osteoporosis, while its higher concentrations promote mottling of teeth and skeletal deformities.

The main source of fluoride to human beings has been known to be water, food stuffs and industries. As a result, the health hazards have enhanced mostly in rural areas among economically backward people, making them handicapped and afflicted. In this view, considerable attention has been paid on the malfunction of hard tissues, but very scant information is available on soft tissue interrealtionships to fluoride, in particular reproduction process.

A large number of population are exposed to a variety of chemicals in their daily life, occupationaly. Prolonged exposure to chemicals have been found to alter the status of sensttive and complex reproductive processes. Hence, it is essential to evaluate the effects of environmental toxicants by taking into consideration the alterations in fertility due to effect on germ cells or somatic cells, changes in the genetic material of the germ
cells and the defects if any, in embryo or foetal development.

Although, different toxicants are known, in the present thesis, emphasis has been made on fluoride toxicity, since it is naturally occurring, unavoidable source to human population in endemic areas, and is known to pose both beneficial and harmful effects, which is often referred as two-edge sword. Its action on reproductive and other soft tissue functions have received considerably inadequate attention.

During the course of this work, efforts were made to investigate the effects of fluoride on (i) reproductive functions, structure and metabolism, motility, density and fertility rate in experimental animals, (ii) The metabolic alterations in adrenal, thyroid, liver and muscle, (iii) Withdrawal studies on the reversibility from fluoride induced effects and (iv) the therapeutic effects of ascorbic acid and calcium alone and in combination administered simultaneously with sodium fluoride (NaF). In addition, effects of water-borne fluoride in endemic district, Mehsana were studied, which deal mainly soft tissue functions.

The thesis contains Chapter I, General Introduction and Review of Literature. Chapter II consists of Materials and Methods used. Chapter III incorporates Results, while in Chapter IV the results have been discussed in the light of earlier investigations. Chapter V has Summary and Conclusions and some future lines of work which could be undertaken. At the end, a Bibliography in alphabetical and chronological order is presented.

The investigations carried out during the tenure of this thesis reveal that fluoride affects the structure and function of reproductive organs viz., testis and cauda epididymis. Sodium fluoride treatment affected the internal milieu of cauda epididymis resulting in alterations in sperm structure and metabolism. As a result, sperm motility and density were
declined leading to a reduction in fertility in experimental animals. Similarly, the structure of adrenal gland was also altered. The adrenal catecholamines exhibited enhancement in their levels. However, the thyroid hormones viz., T3 and T4 were decreased. The liver and muscle phosphorylase activity was inhibited, which is a causative factor for alterations in carbohydrate metabolism. However, these effects were to a significant extent recovered to normal in many parameters. Thus, it is concluded that fluoride induced effects are transient and reversible. Interestingly, administration of vitamin C and calcium individually and in combination was found to suppress fluoride toxicity effectively. Moreover, combined treatment of vitamin C and calcium have synergistic action.

The survey carried out in 36 villages of Mehsana district revealed high amount of fluoride in their drinking water. Due to consumption of high fluoride-bearing water, the serum as well as urine also exhibited elevated fluoride levels. As a result, the soft tissue functions were found to be affected as evidenced by alterations in SGOT, SGPT (liver function), catecholamine levels (adrenal), T3, T4, TSH (thyroid), Na+, K+ and calcium (kidney) levels. Therefore, preventive measures by administering ascorbic acid (vitamin C) and calcium should be undertaken, since human beings cannot synthesize vitamin C and calcium deficiency is often found to be prevalent. It is concluded that these studies have important implications in the national context and human exposure, since 15 states in India have been found to be under the influence of fluorosis. The investigations are useful contribution in understanding fluoride effects on soft tissues as well as in undertaking preventive measures.