PREFACE

Rapidly expanding industrialization with its accompanying hazards to human health is responsible for an increasing wide and complex range of health problems in developed and developing countries. An increase in growth of population impose changes on natural ecosystems and the environment on the whole. This involves enhancement in the utilization of renewable as well as non-renewable natural resources and mis-allocation of resources which are leading to over production of wastes which eventually becomes dangerous to the very survival of the mankind.

In India, environmental conditions are highly influenced by air, soil and water pollution in urban and rural areas mainly due to this rapid industrialization. An escalation in the concentration of toxic pollutants in the biosphere and their ultimate entry into the biological system will pose serious problems on human and natural resources and also on the ecological balance. Indiscriminate use of metals in various industrial and agricultural processes also leads to various health hazards in the environment.

Fluoride is one of the environmental agents which is known to be a potentially hazardous contaminant. It causes a crippling disease - fluorosis in persons living in fluoride endemic regions. It is widespread in certain developing countries like India, Kenya, China, Algeria, Argentina, Morocco, Senegal, Turkey and Thailand and also developed countries like Japan, USSR and USA. In India, it is widespread in 15 states affecting more than 25 million people.

In view of the millions of people suffering from fluorosis, there is an acute need to investigate an agent or agents which will effectively ameliorate the effects of fluoride in endemic populations the world over. Although fluorosis in the past was
regarded as a disease affecting only bone and teeth, recent studies have provided ample evidence to suggest that fluoride intoxication causes pathological manifestations in various soft tissues and organs in male mammals including human in endemic areas. However, the role of fluoride in females is far from adequate and rather conflicting. As the literature reveals sex variations on the extent of fluoride toxicity in human populations from endemic areas, the present study was an attempt to evaluate: The effects of fluoride on the structure and functions of reproductive organs of female mice. The possible therapeutic effects of vitamins C, D, E, calcium and amino acids (Glycine and Glutamine) alone as well as in different combinations for mitigation of fluoride-toxicity was also carried out during the tenure of the study.

The investigations carried out revealed that fluoride affects the structure and function of reproductive organs viz., ovary and uterus. Sodium fluoride treatment affected the interstitial tissue and follicles of the ovary. Ultrastructural changes in the cell organelles of granulosa cells was observed resulting in alterations in ovarian metabolism. Several metabolic alterations were observed viz., hampered ovarian steroidogenesis, hormonal imbalance and altered oxidative metabolism, rendering the tissue susceptible to injury with increase in lipid peroxidase and decline in superoxide dismutase. Pathological changes were also observed in the uterus leading to alterations in uterine nucleic acid and carbohydrate metabolisms. These changes are not conducive for nidation nor implantation and thereby caused reduction in fertility in experimental animals. However, these fluoride induced effects were to a significant extent recovered to almost normal state in many parameters, after withdrawal of treatment. Thus, it is concluded that fluoride induced effects are transient and reversible. Interestingly, administration of Vitamin C and calcium individually and in combination, Vitamin E
and/or Vitamin D and aminoacids (glycine and glutamine) were found to suppress fluoride toxicity more effectively. The combined treatments were found to be more effective in mitigation of fluoride induced toxicity. Amongst the antidotes used, ascorbic acid and Vitamin E were found to have the most beneficial effect in the amelioration of fluoride toxicity.

These studies have important implications in scourging fluoride induced hazards in endemic regions the world over.

The thesis consists of Chapter I which gives an introduction and a resume of earlier work. Chapter II deals with the various materials and methods used. Chapter III presents the results of the study while in Chapter IV the results obtained are discussed in the light of earlier work. Chapter V contains the summary and conclusions. At the end, a bibliography is given in an alphabetical and chronological order.

**PUBLICATIONS**


**CONFERENCES ATTENDED / ABSTRACTS PUBLISHED / AWARDS RECEIVED**


   **This paper was awarded the FIRST PRIZE for the best oral presentation.**

This paper was awarded the FIRST PRIZE for the best oral presentation.


This paper was awarded the FIRST PRIZE for the best oral presentation in the Young Scientist programme.


This paper was awarded Diagnostic Systems Laboratories (DSL) prize in cash and a certificate for oral presentation.


This paper was awarded a Gold Medal for the best paper of the Annual Conference.

Received the ISCA Young Scientist Award - Section Physiology for this work.


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