PREFACE
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Our rapidly expanding industrialization with its accompanying hazards to human health is responsible for an increasingly wide and complex range of health hazards. Trace elements are essential and beneficial for human health at minute concentrations but exert toxic effects if their concentration exceed the permissible level. Certain trace elements such as fluoride, arsenic, aluminium, lead, cadmium are considered toxic to man and animals.

Fluoride is a widespread non-biodegradable pollutant, and is relatively persistent in the environment. As it has high biological activity and small ionic radius, it penetrates easily into many organs, tissues and cells and is encountered in plants, micro organism, animals and human beings. On one hand, fluoridation of drinking water seems to be effective for the treatment of dental caries and osteoporosis, while on the other hand, excess fluoride intake leads to its toxic effects and causes fluorosis. Fluorosis is a crippling disorder affecting bones, teeth, central nervous system, gastrointestinal tract, liver, kidney, cardiovascular system, respiratory system, reproductive system and muscle. An estimated 62 million people in India in 17 out of the 32 states are affected with dental, skeletal, and/or non-skeletal fluorosis. The extent of fluoride contamination of water varies from 1.0 to 48.0 μg/l. It is known for alteration of permeability of membranes and has an adverse effect on many enzymes even at low concentration. As there is paucity of data regarding fluoride toxicity on soft tissues, studies in this direction were envisaged.

Aluminium is nutritionally non-essential but a health hazard metal if it is used in
higher concentration. There are indications that aluminium may have certain essential function, it can also induce toxic manifestations such as amyotrophic lateral sclerosis, dialysis encephalopathy, Parkinsonian dementia of Guam, Alzheimer's disease. Higher concentrations of aluminium could cause serious effects on several body functions including central nervous system, energy metabolism, haematological system and could even be genotoxic. Present knowledge on toxic effects of aluminium is limited and therefore more attention is required in this field.

Aluminium and fluoride are both known to be potential hazards. In the earth's crust they are found in the form of cryolite (Na$_3$AlF$_6$). Combined effects of F and Al in biological systems are very contradictory and not well understood. Aluminium is known to decrease the intestinal absorption of fluoride and thus help in its increased excretion in human beings thus reducing its toxicity but contradictory to this, some reports show that the combined effects of aluminium and fluoride aggravated toxicity in the blood, bone, muscle and brain.

There is a paucity of data on the effects of fluoride and aluminium toxicity in animals and human beings. Besides this, the search for an agent(s) which could help in the amelioration of fluoride and aluminium toxicity is very essential. Therefore, to bridge this gap, the present study was undertaken with a view to investigate:

1. The effects of sodium fluoride and/or aluminium chloride ingestion in vivo on some tissues of male mice.
2. The possible therapeutic efficacy of ascorbic acid, calcium and vitamin E administered alone or in combination on the reversibility of fluoride and aluminium toxicity.

(ii)
3. The *in vitro* genotoxic effects of sodium fluoride and/or aluminium chloride on human lymphocyte cultures and mitigation by ascorbic acid.

Some therapeutic agents like vitamin C, D, E, calcium, protein-rich diets, amino acids like glycine and glutamine are known to ameliorate toxicity induced by different chemicals. It is of prime importance to study their therapeutic property against fluoride and aluminium administered alone or in combination.

The present investigation revealed that fluoride and/or aluminium affected reproductive and non-reproductive tissues of male mice and they were capable of causing genetic effects. Withdrawal of treatments produced non significant or partial recovery. However, antidotes used in the study were found to suppress toxicity more effectively.

The thesis consists of the following chapters:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter I</td>
<td>General Introduction and Review of Literature</td>
</tr>
<tr>
<td>Chapter II</td>
<td>Materials and Methods</td>
</tr>
<tr>
<td>Chapter III</td>
<td>Results</td>
</tr>
<tr>
<td>Chapter IV</td>
<td>Discussion</td>
</tr>
<tr>
<td>Chapter V</td>
<td>Summary and Conclusions</td>
</tr>
</tbody>
</table>

At the end, a Bibliography in alphabetical and chronological order is given.

The results have very significant bearing on the amelioration of human suffering in the individuals exposed to fluoride and aluminium alone and in combined toxicity. The present investigation has also elucidated the mechanism of action of fluoride and aluminium induced toxicity as well as its mitigation and as such is an important contribution to our knowledge in the field.
PAPERS/ABSTRACTS PUBLISHED

1. Chinoy N.J. and Memon M R. Beneficial effects of some vitamins and calcium on fluoride and/or aluminium induced toxicity on gastrocnemius muscle and liver of male mice, Fluoride (In press).


TRAINING PROGRAMMES ATTENDED
1. UGC-DSA sponsored training on "Recent Advances in Zoological Sciences", Department of Zoology, Gujarat University, Ahmedabad, 29th January 1999.

2. UGC-DSA sponsored training on "Recent Trend in Molecular Technique and Biotechnology", Department of Zoology, Gujarat University, Ahmedabad, 28th March, 2000.