Aim and Scope
2. AIM AND SCOPE

Living beings encounter a wide range of xenobiotics, most of which pose threat to the system. The level of genetic integrity of human populations is increasingly under threat due to industrial activities that result in exposure to chemical and physical genotoxins. Other factors that can influence genetic damage include lifestyle factors (e.g., diet), various medical therapies and climatic changes (e.g., increased exposure to ultraviolet radiation due to depletion of atmospheric ozone).

Testing chemicals for their ability to induce genetic damage is necessary because it has been shown that most, if not all, cancers are characterized by chromosomal changes. Genetic apparatus of cells is a major target for carcinogenic action of diverse classes of chemicals.

Avian embryos have been proposed as an experimental model for genotoxicity (Tempel et al., 1992) and carcinogenicity (Enzmann and Brunnemann, 1997) testing of chemical substances. Experiments using avian embryo as a model system can provide valuable information on the carcinogenic potential of chemical in study and may fill the gap between experiments employing whole organisms and the in vitro experiments, combining some advantages of both approaches (Enzmann and Brunnemann, 1997). Chick embryo model has also been used to investigate the genotoxic effect of various physical and chemical agents using metaphase analysis, chromosome banding, sister chromatid exchange analysis etc., (Smith et al., 1978; Bloom, 1982; Lahijani and Ghafoori, 2000; Wilmer and Bloom, 1991; Moore and Owen, 1967).

The formation of micronuclei is a widely used and accepted endpoint of genotoxicity testing. The micronucleus assay provides a simple and rapid indirect measure of the induction of structural or numerical chromosome aberrations. Micronuclei analysis in chick embryo implicates the formation of micronuclei in erythrocytes of the peripheral blood as an end point of genotoxicity testing.
The chemical carcinogen used in the present study is acrylamide. The genotoxic effects of acrylamide using mammalian systems as well as in vitro have been well documented (Adler et al., 1993; Abramson-Zetterberg, 2003; Jagetia and Adiga, 1994).

The purpose of the present study was to investigate whether the micronucleus test (MNT) in chick embryo is able to identify the genotoxicity of acrylamide and the possibility of using chick embryo as an alternative model for genotoxicity study using micronuclei analysis. Further evaluations involving well characterized mutagens and non-mutagens is necessary to expand the knowledge on sensitivity and specificity of this model.

Human beings are exposed to various chemicals either intentionally (therapeutically), in the course of their daily lives (e.g., domestic products, cosmetics etc) or inadvertently (e.g., pesticides). The level of genetic integrity of human populations is increasingly under threat due to industrial activities that result in exposure to chemical and physical xenotoxins. Acrylamide is carcinogenic to experimental animals, causing tumors at multiple organ and chromosom al sites in mice, rat and chick embryo when given in drinking water or by other means. The chemicals entering into the biological systems are either degraded or modified and gets involved in modification of the existing metabolism. During this metabolism the modified molecules become activated and further cause damage to proteins, nucleic acids and tissues. Due to this, normal functioning of the individual varies and creates abnormality in the biological systems.

The excess concentration of chemicals in suits can cause damage to defense system, modifies tissue and leads to cancer. To encounter the above damage, the organisms are well equipped with defense enzymes like superoxide dismutase, catalase, peroxidases, glutathione S- transferases, mixed function oxygenase etc. These enzymes can participate either to catabolise the molecules or excrete them from the body. Some of these enzymes are induced for secondary defense by using glutathione as primary substrate and the other chemical as secondary substrate.
The present study was focused on the effect of glutathione, acrylamide and combination exposure of Acrylamide and Glutathione on lipid peroxidation and antioxidant defense system in liver of chick embryo; and also on the effect of acrylamide on the of glutathione S-transferases. The induction of GSTs in the presence of battery of substrates varies and are used as marker proteins to detect the chemical toxicity, carcinogenicity and tissue specificity.

The aims of the present investigation are:

1. To examine the effect of glutathione, acrylamide and combination exposure of Acrylamide and Glutathione on lipid peroxidation levels in chick embryo liver.
2. To examine the effect of glutathione, acrylamide and combination exposure of Acrylamide and Glutathione on enzyme and non-enzymatic antioxidant activities in developing chick embryo liver.
3. To purify 14\textsuperscript{th} day old chick embryonic liver GSTs by using affinity chromatography and to characterize both affinity and individual GST subunits of chick embryonic liver by using SDS-PAGE analysis, a wide array of substrates and Ouchterlony double immuno diffusion and western blot analysis.
4. To characterize both affinity and individual GST subunits of GSH, acrylamide and acrylamide+GSH treated chick embryonic liver by using Ouchterlony double immuno diffusion and western blot analysis.
5. To investigate the genotoxicity of acrylamide in chick embryo using micronucleus test and
6. To conduct histopathological studies and analyze the tissues using microscopic study for tissue variation.

To study the above aims, experiments were conducted on chick embryos and the results obtained in this study were documented.