CHAPTER 6

SUMMARY

In this study emphasis was given to collect ground water sample from three districts of Southern Assam. In Cachar district highest arsenic concentration in ground water is 161 μg/L and 65.29 % (121) water samples are above WHO permissible limit. In Karimganj district highest concentration was recorded to be 317.2 μg/L and 87.07 % samples out of 116 samples are above permissible limit (WHO, 1996). In the Hailakandi district highest concentration of arsenic in ground water is 139.2 μg/L and 70.47 % samples from collected 105 ground water samples are above permissible limit. The mean arsenic concentration in ground water tubewell of Cachar, Karimganj, and Hailakandi district are (44.98 ± 43.06), (61.75 ± 65.77) and (39.89 ± 32.45) respectively.

Arsenic concentration of hair and nail can be used as a good measure of past exposure to arsenic via drinking water. The highest arsenic concentration in nails and hairs are 7.62 μg/g and 7.75 μg/g in arsenic exposed individual respectively corresponds to 0.74 μg/g and 0.53 μg/g in control individuals. The mean arsenic concentration in water of control sample was (5.46 ± 2.69) and in the exposed sample it was (155.18 ± 78.95). The mean arsenic content in nail and hair of control individuals were 0.41 ± 0.12 and 0.36 ± 0.11 respectively whereas in the exposed individuals the mean arsenic content in nail and hairs were 4.72 ± 1.71 and 4.04 ± 1.45 respectively and found to be statistically significant.

In BMCyt assay, exfoliated buccal epithelial cells are collected from tobacco chewers, arsenic exposed individuals and individuals having chewing habit and also exposed to arsenic. In the DNA damage markers, the percentage of MN cells, NBUD frequency and cell proliferation markers, the percentage of BC and BN cells and in the apoptotic biomarker, the percentage of KHC, KYL, PYK cells, and CC cells in Group
IV (arsenic exposed and tobacco chewers) were found to be statistically significant when compared with arsenic exposed, tobacco chewers and control group. This study shows the correlation between genetic damage and chewing of tobacco and also arsenic exposure.

The percent of cell viability decreased in arsenic trioxide treated lymphocytes. In the combined treatment of Vitamin C (10μg/ml) and arsenic trioxide in the culture increased the cell viability significantly and proving the ameliorative effect of Vitamin C.

We found that Vitamin C (10μg/ml) significantly protected DNA of normal human lymphocytes against primary DNA damage induced by arsenic trioxide.

In arsenic trioxide treated group there is a dose dependent decrease in MI indicating increase in cytotoxicity. Vitamin C (500 mg/kg bw) treatment enhanced the percentage of MI against the of arsenic trioxide induced clastogenic damage. The frequency of chromosomal aberration (CA) increased significantly in a dose dependent manner of arsenic trioxide treatment. Vitamin C (500 mg/kg bw) pretreatment apparently reduced the frequency of CA in arsenic trioxide treated Swiss albino mice. The percent of aberrant cells significantly increase with increasing doses of arsenic trioxide. Vitamin C (500 mg/kg bw) pretreatment with arsenic trioxide significantly reduced the percent of aberrant cells.

Arsenic trioxide showed dose dependent increase in the percentage of PCTs with MN. Vitamin C (500 mg/kg bw) pretreatment reduced arsenic trioxide induced MN frequency.

In Sperm Head Abnormality (SHA) assay, arsenic trioxide treatment induced significant rise in the SHAs in mice. In the combined treatment of Vitamin C (500 mg/kg bw) with arsenic trioxide reduced the frequency of SHAs significantly.

The numbers in the sperms count decreased significantly in dose-dependent manner in arsenic trioxide treatment but in the combined treatment of Vitamin C (500 mg/kg bw) and arsenic trioxide increased sperm counts in mice in vivo.
Arsenic trioxide treated swiss albino mice significantly decreased the level of GSH. Treatment with vitamin C (500 mg/kg bw) along with arsenic trioxide enhanced the GSH activity significantly.

Arsenic trioxide, sodium fluoride and in the combined treatment of both in mice in vivo significantly raised the level of MDA formation. Administration of Vitamin C (500 mg/kg bw) reduced the level of MDA formation significantly.

In MN assay, arsenic trioxide, sodium fluoride and the combined treatment of both significantly increased the frequency of MN in mice in vivo. It was observed that supplementation with Vitamin C (500 mg/kg bw) prior to arsenic trioxide, sodium fluoride and in combination studies drastically reduces the frequency of MN.

Significantly increase was observed in percent DNA in tail, tail extent moment and olive tail moment in the arsenic trioxide, sodium fluoride and also in combined treatment in mice in vivo. Significant decrease was observed in the percent tail DNA, tail extent moment as well as olive tail moment in the group receiving vitamin C (500 mg/kg bw) against arsenic and fluoride induced genotoxicity and indicating mitigating action of vitamin C.

The percent of cell viability decreased in sodium arsenite treated lymphocytes. In the combined treatment of Vitamin C (10µg/ml) and sodium arsenite in the culture increased the cell viability and proving the ameliorative effect of Vitamin C.

Increased percent DNA in comet tail, tail extent moment and olive tail moment clearly indicated sodium arsenite induced DNA damage at the given treatment. DNA damage by sodium arsenite escorted with the decreased in comet parameters when supplemented with Vitamin C (10µg/ml) in cultures and proving its protective action against sodium arsenite induced DNA damage.
There was a significant increase in PCEs with MN in sodium arsenite treated mice in vivo in a dose dependent manner. Pretreatment of vitamin C (500 mg/kg bw) with sodium arsenite shows the protective action of vitamin C.

Significantly increase was observed in percent DNA in tail, tail extent moment and olive tail moment in the sodium arsenite treated mice in vivo. Significant decrease was observed in the percent tail DNA, tail extent moment as well as olive tail moment in the vitamin C (500 mg/kg bw) and sodium arsenite treatment. This findings visibly indicated protective action of Vitamin C.