Abstract

Background: Arsenic contamination consistently provides a negative impact especially by drinking water and resulted in many fatal disorders. Numerous treatment approaches have been availed to combat arsenic assisted distress with plenty of side effects. Antioxidants with chelation properties become more advantageous to treat arsenication with the least toxicity.

Aims & objectives: Present study highlighted the expansion of risk-free, safe, and nontoxic treatment strategy to oppose arsenication. The whole experimentation also focused on the antioxidant plus chelating possession and remedial index of NAC against sodium arsenite driven reproductive complications in rat model.

Methods: In different mode of treatment sodium arsenite and NAC were employed wherein 10 mg/kg body weight of sodium arsenite and 100 mg/kg body weight of NAC were applied respectively. But the dietary application of NAC was provided at the dose of 250 mg/kg body weight. Arsenic mediated oxidative stress was justified by the assay of MDA-CD, SOD, catalase plus GPx activities along with NPSH. Arsenic interfered usual reproductive functions were justified by the assay of Δ^5, 3β-HSD and 17β-HSD, and also ovarian hormones like LH, estradiol, and FSH were studying the regulation of reproductive functions of female rats. Serum SGOT, SGPT, creatinine were assayed to indicate hepato-renal functionality. Few inflammatory indicators were assayed such as TNF-α, IL-6, NF-κB and also apoptotic markers (Bax, Bcl-2, p53) were assessed. Serum level of vitamin B_{12}, MT-I, folic acid, homocysteine were assayed as well. DNA damage, histopathology of

ovarian-uterine tissues, immunohistochemistry for affirmation of ER-α was also illustrated.

Results: Arsenic aggravated oxidative stress implicated with higher levels of MDA-CD with lowering activity of antioxidative enzymes. Steroidogenic action in ovary was suppressed notably by diminishing the level of gonadotropins and estradiol in circulation. This causes structural dysintegration of ovarian-uterine tissues. Arsenic also promulgated DNA abnormalities by higher and significant discharge of inflammatory indicators and stimulating the pro-apoptotic gene manifestation. The controlling function of NAC worked against all these abnormal circumstances and brought back in homeostasis. Arsenic primed over-creation of oxidative stress was neutralized by NAC via improving antioxidant enzymatic activity in repro-organs. NAC guided improvement of gonadotropin's utility significantly favoured ovarian steroidogenesis. The inflammatory condition following arsenication was well managed by the accessibility of NAC and also controlled the apoptotic progression. The important vitamin's level was up-surged in NAC availed group while protected against homocysteine surge in arsenite challenged group.

Conclusion: The above said outcomes specified that NAC may be a novel bio-component against arsenic and its proposed adverse implications. Antioxidant plus chelating conformity of NAC combat against arsenic directed oxidative stress. Also it has anti-apoptotic and anti-inflammatory possessions and thus maintains the system from arsenic aggravated complications.

Keywords: Sodium arsenite, NAC, Oxidative stress, Reproductive hazards, Antioxidant