Abstract

Arsenic is a nonessential trace element. A large population worldwide is being affected by sodium arsenite polluted drinking water. Arsenic intoxication is responsible for the severe health hazards mainly infertility in humans and animals. Various treatment approaches: DMSA and BAL becoming a challenge to manage the arsenic-induced reproductive malfunction. Sometimes this chelation remedy for arsenic induced health hazards gives rise to moderate to severe side effects. Now a day's researchers tried to use different natural herbal plant extracts and polymer-based nanoparticles to overcome the problem of arsenisation in animal model. Hence, the present thesis work emphasized to mature a non-invasive therapeutic model using chitosan, curcumin and pectic polysaccharide. The present study focused the structure of the extracted pectic polysaccharide (CCPS) of bitter gourd (*Momordica charantia*) contains D-methyl galacturonate and D-galactose in 4:1 molar ratios. FTIR study of CCPS indicates that it has hydroxyl groups to bind with arsenic in its structure. Series of negatively charged galacturonate remains in CCPS provides the better potential activity for the cation chelation. The synthesized water soluble encapsulated curcumin chitosan nanoparticles (ECNPs) having a diameter of 8-40 nanometres appeared to relief arsenic-mediated hazards. These studies fulfill to search out the efficacy of curcumin, CCPS and ECNPs against sodium-arsenite mediated female repro-toxicity. The solo or combined treatment mode at 20 mg/ Kg BW of the curcumin, 2.0 mg/ Kg BW of CCPS and 1.0 mg/ Kg BW of ECNPs doses were selected against 10 mg/ Kg BW of sodium arsenite. The curcumin, CCPS and ECNPs extensively attenuate the arsenic-mediated oxidative stress and lipid peroxidation level in uterus and ovary. Treatment of these biomolecules mitigates the suppression of ovarian steroidogenesis in the arsenicated Wistar rats by regulating the estradiol receptor along with the normal tissue histo-architecture. Oral administration of curcumin and CCPS also suppress the inflammatory markers TNF-α, IL-6, and NF-κB in the

arsenicated rats. Up-regulation of Bax, caspase-3, PARP, PCNA and phospho p53 in arsenicated rats was followed by down regulation of Bcl_2 and AKT respectively. CCPS significantly reverts back these arsenic induced expressional changes. Dietary CCPS also makes sure the successful fertility rate with healthy pups in arsenic fed rats. This study helps to understand the underlying mechanism of curcumin, CCPS and ECNPs in attenuating arsenic mediated uterine and ovarian dysfunction involving regulation of SAM pool components, B_{12}, folate and homocysteine. Moreover, the encapsulated curcumin-chitosan nanoparticles at tiny establish greater efficacy than that of higher dose of curcumin alone against the arsenic induced female repro-toxicity.