Title : **Mitigation of arsenic-mediated toxicity in hepatic, renal and hematological systems by high protein supplementation in adult male rats**

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Introduction:

Arsenic, a major water pollutant, is known to cause various systemic disorders and cancers in different organs. A newer approach has been undertaken to explore the mitigatory aspect of some dietary proteins, casein and pea on arsenic-induced hepatic, renal and haematological disorders in adult Wister male (120±10gm) rats.

Methods:

Rats (24) were randomly divided into three groups where Gr I served as control, Gr II was treated with arsenic trioxide (3mg/kg b wt/rat/day) and Gr III was supplemented with isocaloric, excess protein (27%) diet by addition of casein and pea. After 30 days treatment, alterations in hepatic, renal and hematological parameters were assessed by biochemical, histological and molecular biology techniques.

Results:

Marked alterations of hepatocellular and renal histoarchitecture were observed in arsenic treated rats which were nearly absent in the supplemented group. Arsenic-induced oxidative stress in hepatic and renal tissues was evidenced by increased malondialdehyde ($p<0.01$ and $p<0.05$) and reduced glutathione (GSH) levels ($p<0.01$ and $p<0.05$) respectively. Impairment of hepatic activities caused decrease of serum protein ($p<0.05$) and alteration of serum lipid profile such as increase of total cholesterol ($p<0.01$), LDL ($p<0.01$), TG ($p<0.05$) associated with a decrease of HDL ($p<0.05$). The dietary supplementation effectively protects the changes except the insignificant restoration of serum protein level. Morphological alterations of RBCs were visualized in SEM in arsenic treated group which were reduced in the protein supplemented group. The status of DNA integrity upon arsenic exposure was estimated by Comet assay. Increased DNA Comet tail length ($p<0.001$) in isolated hepatic cells revealed damaged DNA which was significantly reduced in the protein supplemented rats. Further analysis of DNA damage has been performed by immunoblotting. Assessment of the DNA damage marker, poly ADP-ribose polymerase (PARP) revealed the characteristic 85kDa and 24Kda cleavage products in the arsenic treated rat liver. These cleavage products were absent in the liver from protein supplemented rats.

Conclusion:

The study has shown that a combination of high casein and pea proteins is extremely effective as food supplements to stall arsenic-induced hepatic, renal and hematological alterations in adult male rats.