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Protective effect of Vitamin E on lipid symmetry of membrane against ethion induced toxicity in erythrocytes

Gurjit Kaur Bhatti[1], **Jasvinder Singh Bhatti**[1], **Rajat Sandhir**[2] and **Ravi Kiran**[2]
[1]SGGS College, India
[2]Panjab University, India

Ethion is one of the widely used organophosphates, which have been identified as contaminants in many components of the global system. Present study was designed to ascertain the toxic effects of oral administration of ethion on erythrocytes and to see if the supplementation of vitamin E along with ethion could modulate these toxic effects. To carry out the present investigation, adult male Albino (Wistar strain) was orally administered ethion and vitamin E daily for 15 days. Animals were divided into four groups: Control (corn oil only); ethion treated (2.7 mg/kg bw/day); vitamin E treated (100 mg/kg bw/day) and ethion and vitamin E treated. Overnight fasting animals were sacrificed. Erythrocytes and erythrocyte membranes were prepared. There was a significant decrease in body weights of ethion intoxicated rats as compared to control and vitamin E treated rats. Lipid peroxidation was increased significantly with the ethion exposure in the erythrocyte membrane. A significant decrease in total lipids, cholesterol, phospholipids and protein content of erythrocyte membrane was observed after ethion administration. A significant decrease in membrane bound enzymes such as total-ATPase, Mg2+ATPase, Na+K+ATPase, Ca2+ATPase and acetylcholinesterase was observed and as result there is increase in calcium uptake by ethion treated erythrocytes (as a function of time as well as a function of concentration) as compared to controls. Scanning electron microscopy of ethion treated erythrocytes revealed that administration of ethion resulted in prominent morphological changes. It can be concluded from the present study that the ethion induced toxic effects on erythrocytes in terms of biochemical and morphological alterations and mechanism involved appears to be mediated through the increased lipid peroxidation, decreased membrane composition, decreased membrane bound enzyme activities lead to the impaired membrane functioning and ultimately resulting in altered morphology of erythrocytes. In addition, alterations in calcium homeostasis were also observed in ethion treated erythrocytes. Vitamin E found to alleviate the toxic effects of ethion induced biochemical and morphological changes (as evidenced by scanning electron microscopy of erythrocytes) suggesting that vitamin E supplementation to individuals exposed to ethion as well as to other OP pesticides would be beneficial.

bhattigk@yahoo.com