SUMMARY
Global estimates revealed that more than 2 billion people consume alcohol worldwide and which is alarmingly increasing with addition of new drinkers every year. Though moderate alcohol consumption is beneficial, it is well known that excessive alcohol intake results in a broad spectrum of diseases including alcohol liver disease (ALD), coronary heart disease (CHD), and other 60 alcohol attributable disease. Alcoholism is perceived as a male problem till now, but there has been a dramatic increase (6-fold increase) in the number of female alcoholics suggesting a need for a better understanding of biological/biochemical mechanisms underlying the gender differences with a view to develop therapeutic strategies and measures to prevent mortality and morbidity of alcoholic deaths. Very limited information is available on females pertaining to alcoholism.

Unlike other drugs, alcohol is consumed in large quantities over prolonged periods. Studies demonstrated that men and women respond differently to alcohol. Blood alcohol rises faster in women due to differential body size and composition, differential enzyme activities and metabolism, different hormonal milieu and difference in physiology of organs. The characteristic effects of alcohol (ethanol) are related to its ability to perturb the bilayer. Chronic excessive alcohol consumption leads to biophysical and biochemical changes in membranes and the organism tends to develop a set of adaptive responses to the continued effects of this exposure and such an adaptive response is referred to as membrane tolerance. Besides, reports reveal that the alterations in nitric oxide metabolism are partially related to changes in alcoholic membranes. Furthermore variations in hormonal milieu affect membrane properties leading to gender based differences. Present study is undertaken to evaluate the impact of gender on alcohol-induced biochemical changes in plasma profile, membrane properties, nitric oxide (NO) involvement and also the role of hormones.

Results of the study confirmed the blood glucose lowering effect of alcohol in both the genders. Increased HbA1c in male and female alcoholics strongly suggested minor disturbances in glucose homeostasis. Increased plasma gamma glutamyl activity, and higher plasma ethanol concentrations confirmed the regular intake of alcohol by the chosen
subjects. Alterations in plasma lipid profile and lipoprotein pattern point to cardiovascular risk in female and male alcoholics. Observed increase in plasma and erythrocyte membrane lipid peroxidation suggested an increased oxidative stress which in turn leads to tissue damage in alcoholic males and females when compared to the controls.

Changes in concentrations of testosterone, estradiol and cortisol as well T₃, T₄ and TSH strongly suggested alcohol-induced disturbances in endocrine function leading to related clinical manifestations and disorders in female alcoholics when compared to other groups. Female alcoholics appear to be at higher risk than males. Furthermore, endocrine dysfunction affected hypothalamo-pituitary-thyroid axis (HPT axis) and hypothalamo-pituitary-gonadal axis. Observed increase in cholesterol in erythrocyte membrane of alcoholic females and changes in SDS-PAGE protein/peptide revealed the following: Alcohol induced alterations in red cell membrane might have affected lipid-lipid, lipid-protein, protein-protein interactions causing destabilization of membrane proteins leading to disappearance/decrease. Membranes from alcoholics may have weak lipid-protein, protein-protein interactions and repeated washings during isolation and preparation of membranes, the protein loss might have occurred/taken place. An increased self digestion of proteins or decreased expression of these proteins might have resulted. It is well known that alcohol induces hemolysis. However the observed increase in nitric oxide production in alcoholics in both the gender with no change in osmotic fragility of red cells suggested no change in osmotic fragility of red cells suggested a role of nitric oxide in conferred tolerance to ethanol. In all, the study indicated that there exist the gender based alterations are prominent and also specific in female alcoholics. The precise mechanisms of the observed changes need further in-depth study.