The present study tries to assess and evaluate various biochemical aspects which include, the generation of NADPH through the pentose pathway and its utilization through glutathione cycle in relation to cataractogenesis; the assessment of glutathione and its linked enzymes in relation to cataractogenesis; the assessment of possible utilization of pentoses in HMP shunt pathway through the action of transketolase and transaldolase; the evaluation of lipid peroxidative changes in relation to various stages of cataractogenesis; the study of antioxidant scavenger enzymes in relation to cataractogenesis and the assessment of protein through the soluble and insoluble fraction in relation to the above said changes during the progress of cataract.

Experiments were conducted in male albino rats of Sprague Dawley strain. Cataract was induced by feeding the rats with 30% galactose along with normal laboratory chow. The experiment was designed to be completed within a month duration. There were two major groups viz., control and experimental, which were again subdivided into three, each of which was sacrificed in 10 days interval. Various biochemical parameters were studied in lens and erythrocytes. These include the shunt enzymes like, glucose-6-phosphate dehydrogenase, 6-phosphogluconolactonate dehydrogenase, transketolase and transaldolase; the enzymes of glutathione system viz., glutathione reductase, glutathione peroxidase, glutathione transferase and tripeptide reduced glutathione; the antioxidant enzymes viz., superoxide dismutase and catalase and the soluble and insoluble
protein fractions in the lens. The rate of production of NADPH was indirectly assessed by taking the ratio of G6PD to GR.

The results showed a decrease in the activity of shunt enzymes and glutathione. Depletion of all the enzymes were observed towards the 30th day of experiment. The failure of the antioxidant enzymes like superoxide dismutase, catalase, and glutathione peroxidase might cause a decrease in the reduced form of glutathione. In other words, glutathione fails to tide over the peroxidative stress. The availability of NADPH decreased in the present study which shows the failure of glutathione reductase to generate reduced glutathione. This in turn may be due to the depletion of ATP, which causes decreased generation of glucose-6-phosphate through the Leloir pathway. The accumulation of galactose causes its increased flux through the polyol pathway. The accumulation of galactitol causes the swelling of lens fibers. The proteins were found to be cross-linked and resulting in high molecular weight proteins, as evident from the decreased water soluble protein and increased insoluble fraction. This cross-linking might also inactivated the enzymes. All these changes together cause the opacification and degeneration of lens. The results observed in the erythrocyte are not a true reflection of the lens metabolism. However, in some cases it shows the same trend of lens metabolism.

The results show that just by developing an inhibitor of polyol pathway or by administering an antioxidant, we cannot solve the problem of cataract. It is a complex process which involves the participation of various pathways. All these metabolic pathways have to be maintained unaltered while searching for a true medication. However, it has to be stressed that the peroxidative insult is the major cause for cataract. The present study makes it clear that erythrocytes and lens have common etiology as far as cataract is concerned.