It is known that diabetics are more prone to atherosclerosis. The metabolism of glycoproteins and glycosaminoglycans is known to be deranged in atherosclerosis. Even though there are some reports on the changes in these macromolecules in diabetes, no systematic investigation seems to have been carried out on the metabolism of these substances in diabetes. Moreover the available reports in this respect are also not in agreement. In view of these, detailed investigations were carried out in this laboratory on the metabolism of glycoproteins and glycosaminoglycans in alloxan diabetic rabbits. This thesis incorporates the results of studies on the changes in the metabolism of glycoproteins in tissues in alloxan diabetic rabbits as also the effect of administration of insulin and the oral hypoglycemic agents (tolbutamide and phenformin) to the alloxan diabetic animals on the metabolism of these substances.

The following aspects have been studied:

1. Serum glycoproteins (GP) in normal and alloxan diabetic rabbits and the effect of administration of insulin,
tolbutamide and phenformin — concentration of total hexose, fucose, sialic acid, hexosamines and neutral sugars other than fucose. Electrophoretic separation of the serum proteins into albumin, $\alpha_1$ and $\alpha_2$-globulins, $\beta$-globulin and $\gamma$-globulins and determining the concentrations of total hexose, fucose and sialic acid in these fractions.

ii. Glycoproteins in the liver, heart, kidney, aorta, brain, skin and cartilage in normal and alloxan diabetic rabbits and the effect of administration of insulin, tolbutamide and phenformin — concentration of total hexose, fucose, sialic acid, hexosamines and neutral sugars other than fucose.

iii. Changes in collagen and elastin in aorta, skin and cartilage in alloxan diabetic rabbits and effect of administration of insulin, tolbutamide and phenformin.

iv. Fractional precipitation of the glycoproteins of kidney, liver and heart from normal and diabetic rabbits by acetone followed by chromatography of the acetone fractions on DEAE cellulose and study of the changes in the concentration of total hexose, fucose and sialic acid in the various fractions.
v. Enzymes of GP catabolism in normal and alloxan diabetic rabbits and effect of administration of insulin, tolbutamide and phenformin activity of \( \beta \)-N-acetyl hexosaminidase, \( \beta \)-glucuronidase, \( \beta \)-glucosidase, \( \beta \)-fucosidase, \( \beta \)-galactosidase and cathepsin in the liver, heart, kidney, aorta and serum.

vi. Lysosomal stability of the liver, kidney and aorta in normal and alloxan diabetic rabbits and effect of administration of insulin, tolbutamide and phenformin.

In addition, the effect of administration of insulin on the metabolism of glycosaminoglycans (GG) was also studied in normal rabbits. the metabolism of GG were investigated:

(a). Concentration of different GG fractions -- hyaluronic acid, heparan sulphate, chondroitin-4-sulphate, chondroitin-6-sulphate, dermatan sulphate and heparin in the aorta and liver.

(b). Activity of the enzymes concerned with the biosynthesis of hexosamine and uronic acid precursors of GG -- L-glutamine: D-fructose-6-phosphate aminotransferase, UDPG dehydrogenase and UDPG pyrophosphorylase.
(c). Activity of enzymes concerned with the degradation of GG -- hyaluronidase, β-glucuronidase, N-acetyl β-glucosaminidase, aryl sulphatase and cathepsin.

(d). Sulphate metabolism -- concentration of 3'-phospho adenosine-5'-phosphosulphate (PAPS), activity of sulphate activating system and sulphotransferase.