Glycoproteins are compounds of protein molecules with a substance containing carbohydrate group, other than nucleic acid. They occur in most organisms: bacteria, fungi, plants, animals, and also in some viruses. They perform a variety of functions in the cell. A number of diseases are characterized by abnormalities in synthesis and degradation of glycoproteins. Altered glycosylation of protein generates variations in the level of carbohydrate components incorporated in the complex and disturbed system of enzyme activity. Enzymes affected are glycosyl transferases (synthetic) and glycohydrolases (destructive). The very intrinsic metabolism of glycoprotein is thus disrupted leading to certain pathological states. Basic studies on glycoproteins and other glycoconjugates will lead to effective treatments for diseases in which they are involved. Even though the topic selected was very wide, we could concentrate only on a single disease, the Rheumatoid Arthritis (RA) which is more common in Kerala and is also prevalent even among young people.

Rheumatoid Arthritis, an autoimmune disease shows variations in glycoprotein metabolism. The question whether the altered glycoprotein metabolism caused the inflammatory condition or the inflammation led to abnormal glycosylation still remains a puzzle. Because of the functional similarity to human Rheumatoid Arthritis (RA), Collagen Induced Arthritis (CIA) in rat model was selected for the study. The concentration of carbohydrates like protein bound Hexoses, Fucoses, Hexosamines and Sialic acids were taken as indices of glycoprotein level in normal and inflamed rats. Variations in the activity of glycohydrolases like α-Mannosidase, β-Glucosidase, β-Galactosidase in the disease condition were correlated to the carbohydrate content of the glycoproteins. Effects of nutraceuticals like Vitamin C, Vitamin E, Ginger and Turmeric on these parameters are studied in CIA rat model as no such work has been reported so far. Since the plant product Sallaki and the drug Glucosamine have recently been used for the treatment of RA, they too were included in the experiment. The external symptoms of inflammation was Paw oedema which was measured as thickness of the paw. The reduction in paw thickness was the positive sign of cure in these treatments. The regulation of enzyme activities and restoration of normal carbohydrate contents were taken as the curative effects of these agents.
Recently, oxidative stress has been suggested as a reason for inflammatory conditions. The free radical scavenging system is impaired in arthritis. Anti-inflammatory effects of certain drugs are mediated through anti-oxidative activity. Some antioxidant potentials of the above mentioned neutraceuticals, Sallaki and Glucosamine were investigated and correlated with reduction in paw oedema. The involvement of excessive free radicals and the disturbed antioxidant defense system in arthritis are to be targeted in design and delivery of drugs against this disease. This work opens a venue for further research in this line.

The study is reported in 10 chapters in this thesis.

Chapter 1. Introduction.
Chapter 2. Review of Literature.
Chapter 3. Materials and Methods.
Chapter 4. Effect of Vitamins C and E on the levels of carbohydrate components of Glycoproteins in Collagen Induced Arthritis.
Chapter 5. Effect of Ginger, Turmeric and Sallaki on the levels of carbohydrate components of Glycoproteins in Collagen Induced Arthritis.
Chapter 6. Effect of Glucosamine on the levels of carbohydrate components of Glycoproteins in Collagen Induced Arthritis.
Chapter 7. Effect of Vitamins C and E on Anti-inflammatory and Antioxidant status in Collagen Induced Arthritis.
Chapter 8. Effect of Ginger, Turmeric and Sallaki on Anti-inflammatory and Antioxidant status in Collagen Induced Arthritis.
Chapter 9. Effect of Glucosamine on Anti-inflammatory and Antioxidant status in Collagen Induced Arthritis.
Chapter 10. Summary and Conclusions.

MADHAVAN