This study examined the effect of quercitrin on experimental diabetes mellitus induced by STZ. A single intraperitoneal injection of STZ (50 mg/kg) lead to deranged carbohydrate and lipid metabolism accompanied with decreased antioxidant status in male Wistar rats. Three different doses of quercitrin (10, 20 and 30 mg/kg) were administered to diabetic rats and the effective dose was found to be 30 mg/kg. Further studies on carbohydrate and lipid metabolism and on the antioxidant status were conducted with only 30 mg/kg of quercitrin.

Male albino Wistar rats were divided into four groups as: normal control, normal + quercitrin (30 mg/kg), diabetic control and diabetic + quercitrin (30 mg/kg). Quercitrin was orally administered to rats for a period of 45 days. After the treatment period, rats were sacrificed by cervical dislocation and plasma and tissues were obtained for further biochemical investigations.

Increase in fasting plasma glucose and decrease in insulin levels were observed in diabetic rats. A decrease in total haemoglobin and increase in glycated haemoglobin levels were also noted. Administration of quercitrin to diabetic rats significantly decreased plasma glucose and glycated haemoglobin and increased the levels of plasma insulin and total haemoglobin levels.

The glycogen content was decreased in liver and muscle, but increased in kidney of diabetic rats. Decreased hexokinase activity was noted in liver,
kidney and skeletal muscle of diabetic rats. The activities of glucose 6-
phosphatase and fructose 1,6-bisphosphatase increased in the diabetic tissues.
Quercitrin administration to diabetic rats, altered the glycogen content,
increased the activity of hexokinase and decreased the activities of glucose 6-
phosphatase and fructose 1,6-bisphosphatase activities in the tissues of
diabetic rats.

Increased levels of glycoproteins such as hexose, hexosamine, fucose
and sialic acid were observed in plasma, liver and kidney of diabetic rats.
Treatment with quercitrin decreased the levels of these glycoproteins in plasma
and tissues.

The derangement in carbohydrate metabolism in diabetic rats were
restored to near normal by the administration of quercitrin. An increase in
insulin levels could have a profound effect on the deranged parameters that
lead to the restoration.

In plasma and tissues of diabetic rats, increased lipid peroxidative
products (TBARS and HP) and decreased levels of nonenzymic antioxidants
(GSH, vitamin C and vitamin E) were observed in plasma and tissues (liver and
kidney). The activities of antioxidant enzymes (SOD, catalase and GPx) were
found to be decreased in the tissues (liver, kidney and pancreas) of diabetic
rats.

Administration of quercitrin to diabetic rats resulted in decreased lipid
peroxidation in plasma and tissues. The antioxidant status was also improved in
diabetic rats treated with quercitrin. Quercitrin, due to its antioxidant property effectively scavenged free radicals and decreased lipid peroxidation. A decrease in lipid peroxidation might be the cause of improved antioxidant status in the diabetic rats.

Lipid (cholesterol, TG, FFA and PL) levels were increased in plasma and tissues (liver and kidney) of diabetic rats. The levels of plasma lipoproteins (LDL-c and VLDL-c) were increased with decrease in HDL-c in the diabetic rats.

Treatment of diabetic rats with quercitrin decreased the levels of lipids in plasma and tissues and the levels of plasma lipoproteins were also found to be positively altered. Decreased lipid peroxidation and improved antioxidant status could be the reason for the restoration of lipid metabolism in quercitrin treated diabetic rats.

Histopathology of pancreas was also carried out. Pathological alterations were found in the pancreas of diabetic rats. Administration of quercitrin effectively reduced the pathological alterations induced by STZ that resulted in the improved functioning of the tissues.

In conclusion, quercitrin was found to exhibit a protective role in rats administered with STZ. It could be observed from our results that quercitrin is antihyperglycemic, antioxidant and antihyperlipidemic. Treating diabetes mellitus and its complications is the need of the hour worldwide. Numerous studies indicate that dietary supplementation with antioxidant nutrients may be a safe and simple complement to traditional therapies for preventing and
treating diabetic complications. Hence, diets rich in quercitrin or dietary supplements with quercitrin will play a leading role in reducing the complications of diabetes mellitus. Further clinical trials are needed before quercitrin could be developed as a drug for the treatment of type 2 diabetes mellitus.