# Summary and Conclusion

Diabetes mellitus is one of the most common chronic diseases all over the world. It is a leading cause of both mortality and early disability. Diabetes mellitus is one of the pathological conditions that are associated with increased formation of reactive oxygen species together with depletion of total antioxidant capacity. Direct exposure of tissues to reactive oxygen species or oxygen free radicals has been found to reduce insulin gene transcription and induce apoptosis in beta cells in vitro and in vivo. The development of type 2 diabetes is associated with pancreatic beta cell dysfunction occurring together with insulin resistance. Accumulating evidence suggests that apoptosis is the main form of beta cell death in type 2 diabetes mellitus.

This study was carried on sixty patients with type 2 diabetes mellitus selected from diabetic out patients clinic in Benha University Hospital (30 with diabetic neuropathy and 30 without complications) twenty age and sex matched apparently healthy subjects were selected as control group.

The 60 patients were supplemented with N-acetyl L-cysteine (NAC) 200 mg/day and vitamin E 20 mg/day and vitamin C 100 mg/day for 3 months.

All patients and controls were subjected to full history taking and clinical examination. They were subjected to laboratory investigations as Fasting Blood Glucose (FBG), post prandial blood glucose, Glycohaemoglobin (HbAlc), lipid profiles as (total cholesterol (TC), triglycerides (TG), high density lipoprotein cholesterol (HDL-C), [low

density lipoprotein cholesterol (LDL-C) and cholesterol / HDL ratio] were calculated, serum total malondialdehyde MDA (as marker of oxidative stress) and apoptotic marker soluble Fas (sFas).

In our study, we found that diabetic patients showed significantly higher fasting blood glucose, post prandial blood glucose, HbAlc than the control (p-value < 0.01). The lipid profiles of diabetic patients showed significant increase in total cholesterol, triglycerides, LDL-C, cholesterol/HDL at a p-value < 0.01. Also there were significant increase in serum malondialdehyde, sFas than the control (p-value < 0.01).

Also diabetic patients with neuropathy showed significantly higher total cholesterol ($p < 0.05$), malondialdehyde ($p < 0.05$) and sFas ($p < 0.01$) than diabetic patients without complications.

After supplementation of diabetic patient's with NAC, vitamin C and E, there were significant improvement in glycemic control: FBG, post prandial glucose and HbAlc at a p-value < 0.01. There were also significant decrease in serum triglycerides level, total cholesterol, LDL-C, cholesterol/HDL at a p-value < 0.05.

Also, there were significant increase in HDL-C at a p-value < 0.01, there were significant decrease in serum malondialdehyde and sFas levels at a p-value < 0.05).

# Conclusion:

From this work we can conclude that, type 2 diabetic patients face a high oxidative stress state and increased β-cell apoptosis (as indicated by elevated serum levels of MDA and sFas respectively) especially those

with uncontrolled diabetic states and those with diabetic neuropathy. Treatment of diabetic patients with antioxidants using NAC or vitamins E and C can improve glycemic control probably through ameliorating oxidative stress and protecting β-cell from death by apoptosis. Thus a sufficient supply of antioxidants may prevent or delay β-cell dysfunction in diabetes. Therapeutic approaches designed to arrest apoptosis could be a significant new development in management of type 2 diabetes, because this approach might actually reverse the disease to a degree rather than just palliate glycemia. However, their effects on other target tissues as adipocytes and their role in preventing or delaying some diabetic complications need to be investigated.