Chapter 6

Summary and Conclusions

The aim of this study is to analyze the epidemiological, clinical, biochemical and molecular genetics of Type II Diabetic complications in Vellore population. The T2DM cases (n = 2328) were selected based on their clinical manifestation and were classified as follows based on their complications. Patients with diabetes only (DM); Patients with neuropathy only (DNe); Patients with nephropathy only (DMi) ; Patients with both neuropathy and nephropathy (DNe + DMi); Patients with both nephropathy and retinopathy (DMi + DRe); Patients with all three complications – neuropathy, nephropathy and retinopathy (DNe + DMi + DRe).

The results obtained in the analysis of risk factors in this population broadly concur with other published literature; however there exists subtle variation in their clinical presentation and the associated risk factors. Epidemiological studies show that females are more prone to develop any one of the MVCs. Even more risks appear to exist with the urban living. It has to be analysed in future studies whether the males from either rural or urban living pose lesser risk or not. It is found that the duration of diabetes was almost more than a decade for all the complications except DMi. Hence all the T2DM patients should be under strict vigilance for all the MVCs in the first 10 yrs after the onset of diabetes. This is exactly the period during which most of the T2DM patients are generally not serious about their treatment protocol. Thus education regarding the MVCs of diabetes should be emphasized from their first visit to the diabetes centre.

The urban rural differences that are noted in the results could be partly explained by the lifestyle parameters. Diet and physical activity seem to have a significant association with the outcome of T2DM. T2DM and its complications show an increased incidence among those who consume a diet including mostly animal products. The traditional diet has been slowly westernized by the urban style of living with very less fiber content. The vegetarians whose diet comprised of nuts, viscous fibres and whole grains were found to be on the safer side of the diabetic spectrum. The epidemiological data suggest that the lifestyle parameters are the precursors for the highly risky metabolic milieu observed in
this study population. Also recently sedentary lifestyle has been found to be associated not only with metabolic diseases but also cancer. Fatty liver, a condition commonly found in diabetics is also associated with sedentarianism. Nonsmokers also had equal risk of developing MVCs however, alcoholism was not found to be significantly associated with the risk of developing MVCs. The socioeconomic parameters were found to have a significant association with the outcome of T2DM. The scope of this study does not involve the impact of each of this category to be studied in detail. However, further studies are recommended in this area.

Though the family history of diabetes has a definite impact on T2DM and its complications, the mode of inheritance did not have a strong association with MVCs. Similarly obesity does not influence the varied clinical outcomes noted in T2DM patients. Hypertension may be targeted to minimize the health hazards.

VPT and microalbumin values could evolve as definite clinical markers for the prediction of MVCs. The glycemic and lipidemic status correlate well with the different points in the diabetic spectrum. Microalbuminuria has already been established as a marker for overt renal and cardiovascular diseases but the association of this condition with the other two MVCs was not brought out in any of the studies carried out in this population. All the subjects who had two and three complications had microalbuminuria in common. Hence the microalbuminuria can be routinely followed up in the diabetic clinics, along with simultaneous screening of all diabetic microvascular complications.

The statistical study of the risk factors using ANOVA, which are routinely done in the diabetic clinics show many of them to be significantly different between the five different clinical categories (with diabetic complications) than within. These results necessitate the need to carry out more detailed studies in each of the different mechanisms involved behind these factors. The demographic, clinical and biochemical risk factors are significantly associated with the DC patients and hence all the DM patients also need to undergo routine screening and monitoring of all the factors.
The application of molecular studies to understand the association of RAGE gene with MVC was carried out. Three common SNPs were observed which could be used as common marker and five novel SNPs in the complication groups were also observed which needs to be correlated with more samples.

This study paves way for several avenues – the early diagnosis of the condition and management of high risk individuals and an early treatment of these individuals to possibly prolong and improve their quality of life.

Finally, teamwork between the patient, clinician and genetic counselor can provide the highest standard of patient care.