World today is in clutches of metabolic dysfunctions and diabetes is one of them attaining epidemic proportion. Diabetics are steadily increasing in number and strategies to halt this process, ultimately morbidity and huge economic burden for management of resultant complications, are in full swing globally. It is thus to be seen that who are those subjects potentially prone to be diabetic. We selected such vulnerable group of subjects, i.e., of first degree relatives of established type-2 diabetes mellitus patients. Many of these are in stage of prediabetes and have many metabolic abnormalities as found in patients of diabetes mellitus.

A total number of 450 first degree relatives of type-2 DM patients (cases) and 450 controls are included in the study. All these cases and controls were subjected to estimation of fasting and post prandial plasma glucose, fasting lipid profile, fasting plasma insulin and fasting adipocytokines (leptin and adiponectin). Both groups were subjected to anthropometric measurements to find out degree of obesity by BMI (Body Mass Index) and WHR (Waist-Hip Ratio). Fasting and post prandial plasma glucose estimation was done by autoenzyme stat glucose test based on enzymatic method using glucose oxidase and peroxidase as enzymes. Fasting serum lipid profile was measured colorimetrically. Fasting plasma insulin, leptin and adiponectin were measured by \(^\text{125}I\)-radio immuno assay (RIA) technique. Insulin resistance was measured by various methodologies including HOMA\(_{IR}\) (Homostasis Model for Assessment of Insulin Resistance), QUICKI (Quantitative Insulin Sensitivity Check Index), FPI (Fasting Plasma insulin), Insulinogenic index, ISI (Insulin Sensitivity Index / McFarland index) and Bennett Index. Odd's ratio was calculated to express the risk of developing insulin resistance in obese subjects. Plasma glucose level was divided into four categories in both cases and controls as NGT, IFG, IGT and frank
diabetes mellitus. Study demonstrated very significant observations in all the parameters studied in first degree relatives. Following

On the basis of results obtained and their analysis, the following conclusions have been drawn:

1. The prevalence of IFG, IGT and diabetes mellitus was significantly higher in first degree relatives of type-2 diabetes mellitus patients as compared to that in general population.

2. 40.20% (41 out of 102) of first degree relatives with IFG had associated IGT, whereas 34.17% (41 out of 120) of first degree relatives with IGT had associated IFG.

3. The prevalence of IFG, IGT and diabetes mellitus in both male and female first degree relatives of type-2 diabetes mellitus was significantly higher then among males and females in controls.

4. The prevalence rate of IFG, IGT and Diabetes mellitus, within a particular age group, was higher in first degree relatives than in general population. Moreover, the highest rate of prevalence of IFG was found in age group of 40-50 years whereas highest rate of prevalence of IGT & DM was found in 50-60 years of age group.

5. The prevalence of obesity in first degree relatives having IFG, IGT and Diabetes mellitus was more common as compared to controls.
6. The prevalence rate of IFG, IGT and diabetes mellitus was more in obese first degree relatives than in general population. Moreover, the first degree relatives having IFG, IGT and diabetes mellitus were abdominally more obese than when obesity was considered as per BMI.

7. The prevalence rate of obesity in first degree relatives having NGT & IFG was higher in males than in females. However, in first degree relatives with IGT & Diabetes mellitus, the prevalence rate of obesity was higher in females than in males.

8. The prevalence rate of rise in serum triglyceride and decrease in serum HDL levels followed the natural pathway of diabetes mellitus i.e., NGT → IGT → IFG → DM.

9. The mean level of fasting serum insulin in first degree relatives was significantly higher (28.97±11.28μU/ml) than that in general population (21.30±10.88μU/ml).

10. Fasting insulin level was found to be higher in obese first degree relatives having NGT (31.35 ± 16.07μU/Ml) than in obese controls having NGT.

11. The mean fasting insulin level was highest in obese first degree relatives having IFG than in obese first degree relatives having IFG and having diabetes mellitus.
12. The rise in mean fasting insulin level in obese subjects followed the natural pathway of diabetes mellitus i.e. it progressively raises from NGT → IGT → IFG.

13. The prevalence of insulin resistance in first degree relatives of type-2 diabetes patients was found to be significantly higher as compared to controls by all indices of measuring insulin resistance. This prevalence in case vs. control was 49.78% vs. 24.89% with P<0.001, when insulin resistance was measured by HOMA$_{IR}$. The prevalence rate was 50.44% vs. 26.44% by QUICKI (p<0.001); 58.44% vs. 27.56% by fasting plasma insulin (p<0.001); 61.56% vs. 26.89% by Insulinogenic Index (p<0.001); 60.67% vs. 24.67% (p<0.001) by McFarland Index and 50.44% vs. 27.78 (p<0.001) by Bennett Index in case vs. control respectively.

14. Similarly, in our study, the insulin resistance in first degree relatives with NGT was 23.73% as compared to controls 15.63%, when insulin resistance was measured by fasting insulin level; and was 17.51% as compared to 13.13% in controls, when IR was measured by HOMA$_{IR}$ method. This prevalence was 12.43% vs. 15.31(p=0.379) by QUICKI, 29.38% vs.15.63%(p<0.001) by Insulinogenic Index, 37.29% vs. 15.94% (P<0.001) by McFarland Index, 14.69% vs. 16.25% (p=0.647) by Bennett Index.

15. The prevalence rate of insulin resistance was higher in first degree relatives having IFG, IGT and DM as compared to controls having IFG, IGT and DM.
16. The highest prevalence rate of insulin resistance was found in first degree relatives having IFG.

17. The prevalence of insulin resistance (by either criteria) was found to be more common in males (51.39% by HOMA$_{IR}$, 59.38% by FPI, 52.08% by QUICKI, 66.67% by Insulinogenic index, 64.24% by McFarland Index and 53.13% by Bennett Index) than in females (46.91% by HOMA$_{IR}$, 56.79% by FPI, 47.53% by QUICKI, 52.47% by Insulinogenic index, 54.32% by McFarland Index and 45.68% by Bennett Index).

18. The prevalence of insulin resistance in obese first degree relatives was 55.88% as compared to obese controls (37.31%) with p<0.001.

19. The risk of developing insulin resistance was 2.14 times higher in obese first degree relatives as compared to in non-obese controls, when obesity was considered as per WHR; and was 1.46 times higher in obese first degree relatives as compared to non-obese controls, when obesity was considered as per BMI.

20. The prevalence of metabolic syndrome in first degree relatives having NGT, IFG, IGT and diabetes mellitus was higher as compared to that in controls.

21. The prevalence rate of metabolic syndrome in first degree relatives was seen to rise gradually from NGT→IGT→IFG→DM.

22. There was strong positive correlation between fasting plasma insulin and HOMA$_{IR}$. 
23. Fasting plasma leptin concentrations in first degree relatives of type-2 DM patients was significantly higher (11.302±6.455ng/ml) than that in general population (5.386±2.558ng/ml).

24. The mean values of leptin were significantly higher in first degree relatives having NGT, IFG, IGT and Diabetes as compared to controls.

25. Leptin level was increased in insulin resistant first degree relatives of type-2 DM patients as compared to controls.

26. Elevated leptin levels were found in obese first degree relatives as compared to controls.

27. The concentration of fasting plasma adiponectin in first degree relatives was significantly lower (10.046±1.694 mg/l) than that in controls (13.804±7.189 mg/l).

28. The mean values of adiponectin levels were significantly lower in first degree relatives having NGT, IFG, IGT and DM as compared to controls.

29. Circulating adiponectin levels were significantly decreased in insulin resistant first degree relatives as compared to insulin resistant controls.

30. Adiponectin levels are significantly reduced in obese first degree relatives as compared to controls.
31. Bivariate regression analysis showed that in first degree relatives, leptin and adiponectin were inversely correlated with a statistically significant correlation coefficient (-0.242).

32. Multivariate regression model showed that fasting plasma insulin was positively associated with leptin (correlation coefficient $\beta=0.198185$) and negatively correlated with adiponectin (correlation coefficient $\beta=-0.01072$).

33. Bivariate analysis showed that the co-efficient of correlation of leptin with HOMA$\text{IR}$ was 0.235 which signified that there was strong positive correlation between leptin and insulin resistance (HOMA$\text{IR}$) whereas adiponectin is negatively correlated with insulin resistance (HOMA$\text{IR}$) (correlation coefficient= -0.174).

34. Adiponectin showed a significant negative correlation with leptin, fasting plasma glucose, fasting plasma insulin, postprandial plasma glucose, triglycerides, and VLDL; of which the significant correlations were with leptin and postprandial plasma glucose only. Adiponectin showed a significant positive correlation with HDL. However, leptin showed significantly positive correlation with all the parameters except for adiponectin and HDL.

In conclusion, present study revealed statistically significant alterations in values of glucose uptake, levels of fasting plasma insulin, status of insulin resistance, lipid levels, degree of obesity and levels of adipocytokines. Inter correlation between these parameters have also been found to be statistically significant in the studied population which indicates that first degree relatives exhibit many of metabolic...
abnormalities related to type-2 DM which might be crucial in management of this pre-diabetic state and more importantly, in prevention of type-2 DM.