In spite of considerable efforts around the globe for the prevention and treatment of cardiovascular diseases (CVDs), they still remain to be the leading cause of mortality. This could be attributed to the rapidly increasing incidence of obesity which is a well-known risk factor for insulin resistance, diabetes mellitus, atherogenic dyslipidemia and hypertension. Alterations in the adipose tissue mass and metabolism may also be related to insulin resistance and visceral obesity which is commonly associated with T2DM. Insulin resistance, a common defect in T2DM and obesity has been associated with higher levels of pancreatic hormones, i.e. insulin and C-peptide. In addition, deranged levels of adipocyte-derived hormones, i.e. high levels of leptin and low levels of adiponectin have also been linked to insulin resistance. Elevated levels of insulin, C-peptide, leptin and reduced levels of adiponectin are suggested to promote atherosclerosis, thus placing obese subjects at greater risk for CVD.

The present study was undertaken in the department of Biochemistry in collaboration with department of Medicine, M. M. Institute of Medical Sciences and Research, Mullana, Ambala. The study aimed at evaluating the serum levels of pancreatic hormones, adipocytokines and lipid profile in patients of T2DM with and without obesity which, in turn, may suggest that the suitable drug
development aimed at modulating the levels of these molecules might assist in better management of DM.

**In the present study:**

1. The mean age of non obese diabetic patients was 51.69 ± 9.41 years which was insignificantly (p>0.05) higher than obese, diabetics (50.68 ± 9.80 years).

2. The obese diabetics had higher body mass index (BMI) of 32.40 ± 2.84 kg/m$^2$ than non obese diabetics (23.55 ± 1.77 kg/m$^2$).

3. The fasting plasma glucose levels were 146.54 ± 56.15 mg/dl in obese diabetics while levels were 167.37 ± 69.99 mg/dl in non obese diabetics. Thus, non obese diabetics were having significantly (p<0.05) higher fasting plasma glucose levels than obese diabetics.

4. The fasting plasma insulin levels were significantly higher (p<0.001) in obese diabetics (11.94 ± 8.07 µIU/ml) than in non obese diabetics (8.2 ± 6.68 µIU/ml) thereby indicating the presence of severe hyperinsulinemia and subsequent insulin resistance in obese subjects.

5. The finding that obese patients are hyperinsulinemic, was confirmed by the elevated levels of serum C-peptide observed in obese subjects with T2DM (2.52 ± 1.60 ng/ml) in comparison to non obese diabetics (2.26 ± 1.21 ng/ml).
6. Markedly increased serum leptin levels were found in obese (32.44 ±
34.98 ng/ml) than non obese (14.13 ± 17.24 ng/ml) subjects with T2DM.
7. The obese diabetics (9.73 ± 5.71 µg/ml) had significantly lower levels of
serum adiponectin as compared to non obese diabetics (14.75±7.02
µg/ml).
8. The serum total cholesterol levels in obese diabetics were 170.62 ± 38.95
mg/dl while in non obese diabetics; the levels were 183.63 ± 55.73 mg/dl.
9. The serum triglyceride levels were found to be 184.23 ± 104.52 mg/dl in
obese diabetics which were insignificantly lower than non obese diabetics
(200.53 ± 112.41 mg/dl).
10. Diabetic patients who were obese had serum HDL-C levels 40.88 ± 11.32
mg/dl as compared to non obese diabetics with HDL-C levels 42.74 ±
10.49 mg/dl.
11. Obese diabetics had lower serum LDL-C levels (93.74 ± 25.71 mg/dl)
than non obese diabetics who showed levels of 100.78 ± 45.19 mg/dl.
12. The mean serum VLDL-C levels were 39.18 ± 22.22 mg/dl in obese
diabetics and 40.10 ± 22.48 mg/dl in non obese diabetic patients.
13. The extent of insulin resistance was calculated using Homeostasis Model
Assessment Method amongst obese and non obese type 2 diabetic
subjects. The mean insulin resistance in obese diabetics was significantly
higher (6.25 ± 10.39) than non obese diabetics (3.41 ± 3.31).
14. The mean age in obese non-diabetics was 48.17 ± 11.71 years and 48.49 ± 11.26 years in non obese non-diabetics indicating that there was not much difference in the age of subjects of the two groups.

15. Obese non-diabetics were having higher BMI (33.39 ± 5.12 kg/m$^2$) than non obese non-diabetics (23.60 ± 0.96 kg/m$^2$) enrolled for the study.

16. The fasting plasma glucose levels were 83.53 ± 9.84 mg/dl in obese non diabetics while levels were 86.75 ± 11.76 mg/dl in non obese non-diabetics. Thus, non obese non-diabetics were having significantly (p<0.05) higher fasting plasma glucose levels than obese non-diabetics.

17. The fasting plasma insulin levels were significantly higher (p<0.001) in obese non-diabetics (12.81 ± 8.60 μIU/ml) than in non obese non-diabetics (7.84 ± 4.04 μIU/ml) thereby indicating the presence of severe hyperinsulinemia and subsequent insulin resistance in obese subjects.

18. The finding that obese patients are hyperinsulinemic, was confirmed by the elevated levels of serum C-peptide observed in obese subjects without diabetes (2.71±1.57 ng/ml) in comparison to non obese non-diabetics (1.42±0.39 ng/ml).

19. Markedly increased serum leptin levels were found in obese (27.09±27.81 ng/ml) than non obese (13.53±11.83 ng/ml) subjects without diabetes.
20. The obese non-diabetics (10.89±3.74 µg/ml) had significantly lower levels of serum adiponectin as compared to non obese non-diabetics (13.96±4.87 µg/ml).

21. The serum total cholesterol levels in obese non-diabetics were 158.32±39.04 mg/dl while in non obese non-diabetics; the levels were 165.34±45.32 mg/dl.

22. The serum triglyceride levels were found to be 160.68±83.43 mg/dl in obese non-diabetics which were insignificantly lower than non obese non-diabetics (161.02±75.66 mg/dl).

23. Obese non-diabetic subjects had serum HDL-C levels 39.29±9.43 mg/dl as compared to non obese non-diabetics with HDL-C levels 41.19±10.74 mg/dl.

24. Non-diabetics who were obese had lower serum LDL-C levels (88.53±32.30 mg/dl) than non obese non-diabetics who showed levels of 91.94±27.70 mg/dl.

25. The mean serum VLDL-C levels were 34.07±16.89 mg/dl in obese non-diabetics and 32.19±15.13 mg/dl in non obese non-diabetic subjects.

26. The extent of insulin resistance was calculated using Homeostasis Model Assessment Method amongst obese and non obese non-diabetic subjects. The mean insulin resistance in obese diabetics was significantly higher (2.61 ± 1.67) than non obese diabetics (1.83±1.66).
27. There was strong positive correlation between serum total cholesterol and HDL-C levels of the subjects included in the study as revealed by Pearson’s correlation analysis (r=0.563, p=0).

28. A strong positive correlation was observed between serum total cholesterol and LDL-C levels of the subjects selected for the study with Pearson’s correlation coefficient, r=0.832 and p=0.

29. Serum total cholesterol levels exhibited a positive correlation with serum VLDL-C levels of the subjects under study with Pearson’s correlation coefficient, r=0.502 and p=0.

30. Serum triglyceride levels were strongly and positively correlated with serum VLDL-C levels of the subjects enrolled for the study (r=0.935, p=0).

31. There was a strong positive correlation between fasting plasma insulin levels and insulin resistance amongst the subjects being studied (r=0.944, p=0).

In conclusion, determination of insulin, C-peptide, leptin and adiponectin levels in obese individuals may guide in assessing the risk of developing insulin resistance and thereafter, diabetes and CVD in such individuals. This would enable suitable preventive measures to be implemented in such high-risk subjects in order to
protect them against DM and its complications. This also offers a new field for the development of novel drugs for alleviation of insulin resistance and obesity.