

Association of hemoglobin with glycated hemoglobin in type 2 diabetic patients

P-0287

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BACKGROUND

Glycated haemoglobin is a well established marker used extensively to monitor long term (3 monthly) glycemic control in diabetic patients.

Apart from blood sugar, HbA1c levels are also affected by the presence of variant hemoglobins, hemolytic, anemias, nutritional anemias, uremia, pregnancy, and acute blood loss.

In the recent past, there have been several studies reporting negative as well as positive association between HbA1c and Hb levels.

OBJECTIVE

To study the association of haemoglobin with glycated haemoglobin levels in type 2 diabetic subjects

METHODOLOGY

Data was collected from 3090 patients (1875 females and 1215 males) with type 2 diabetes attending diabetic clinic of the institute from April 2011 to March 2015

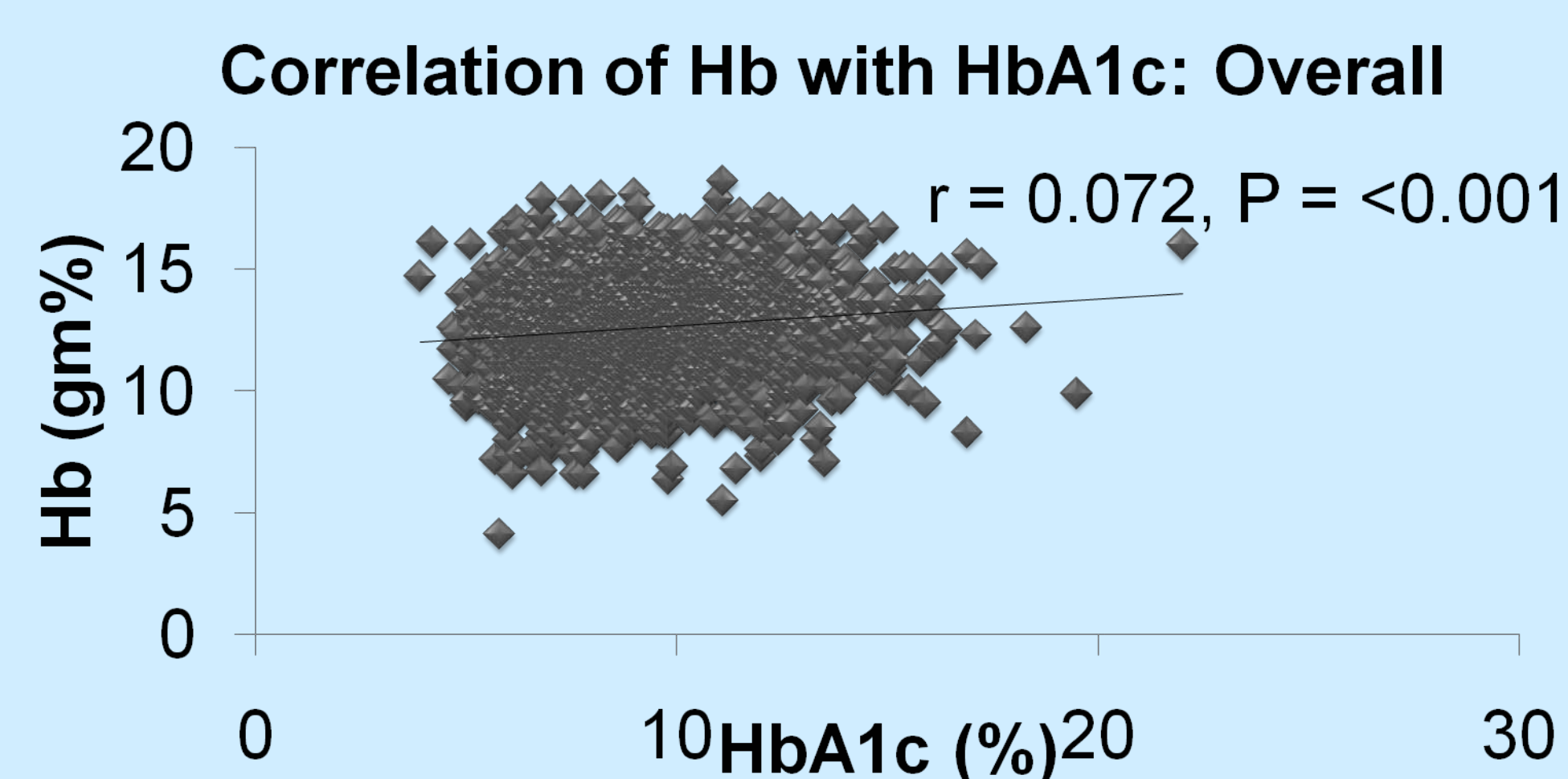
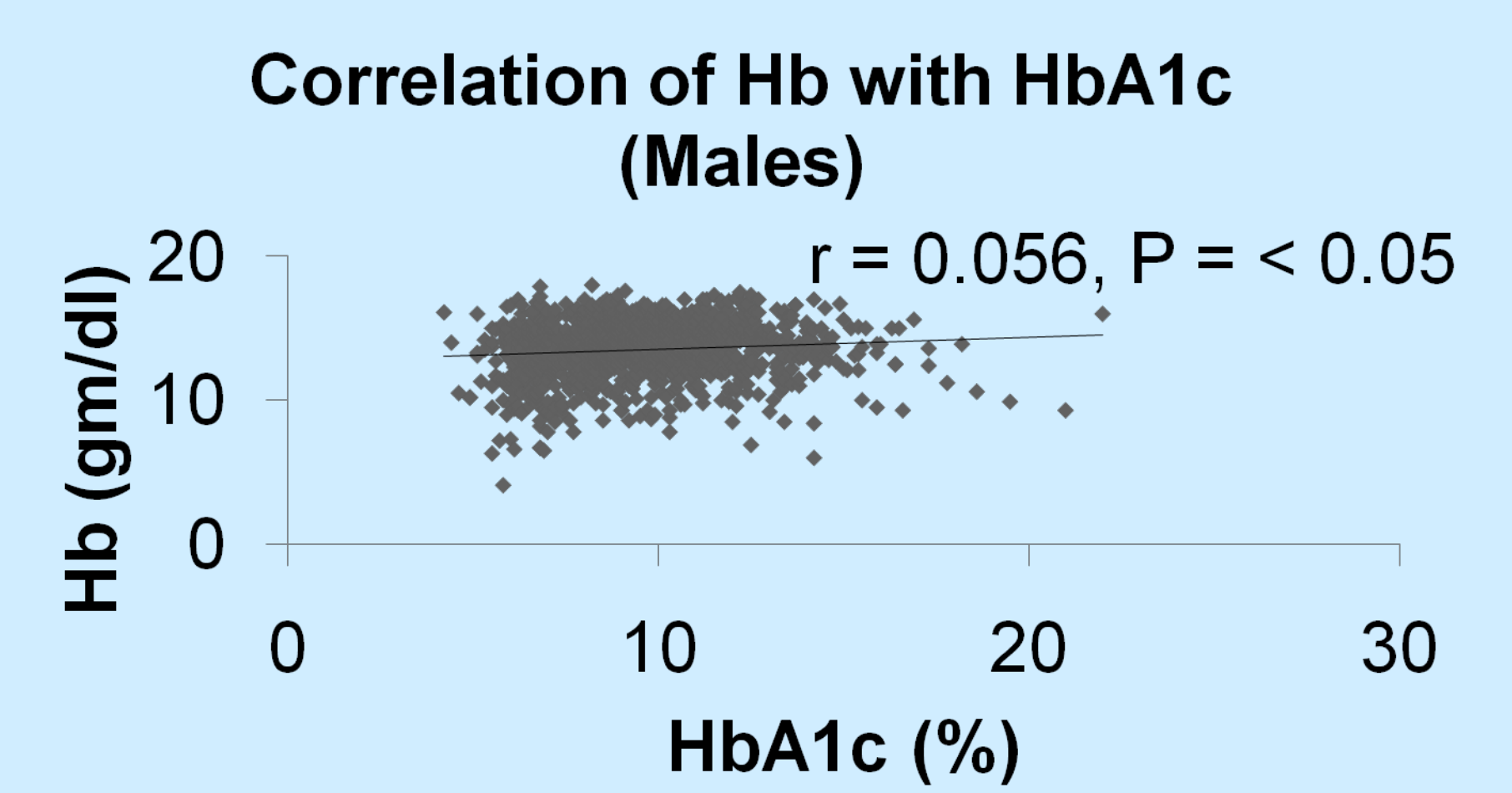
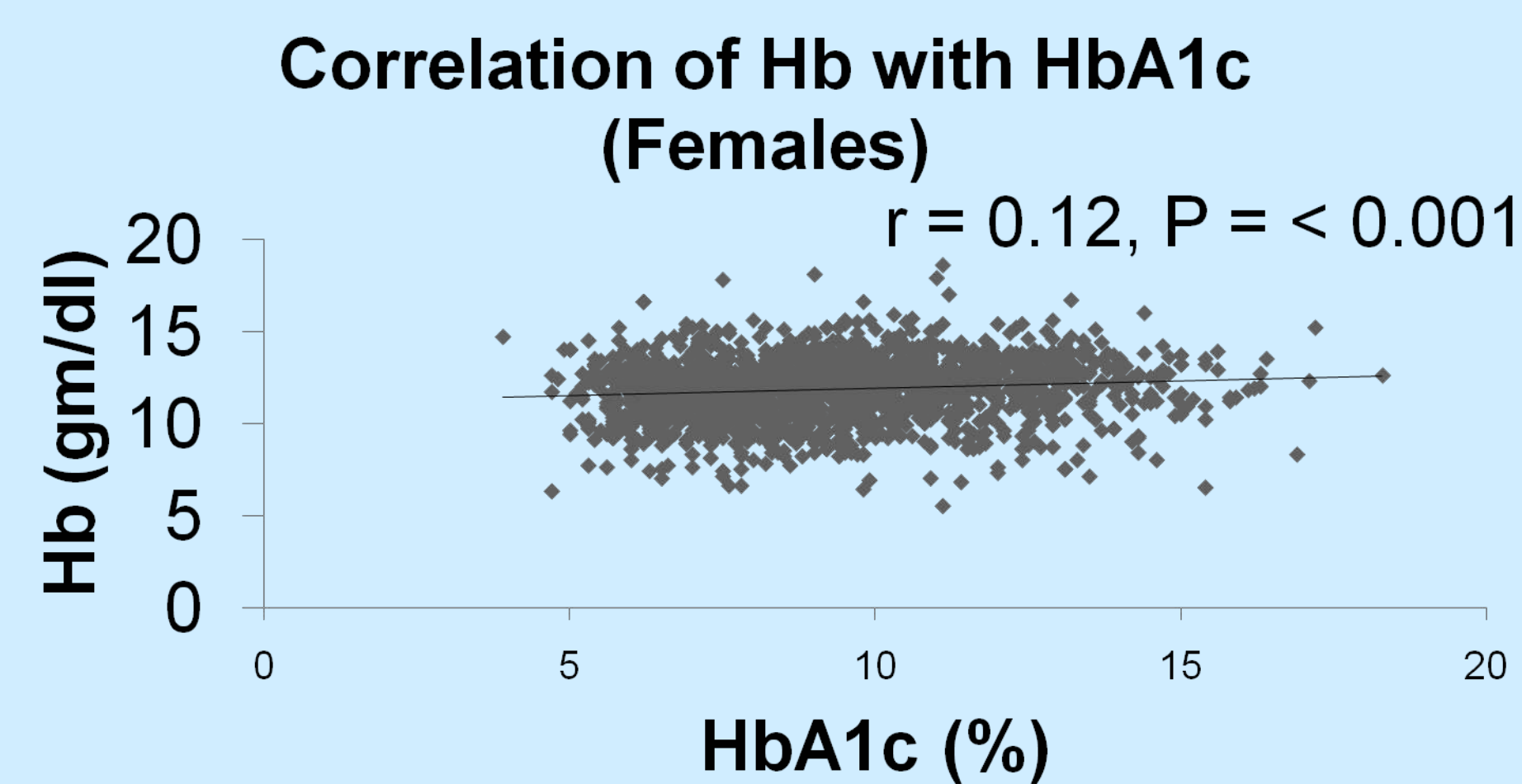
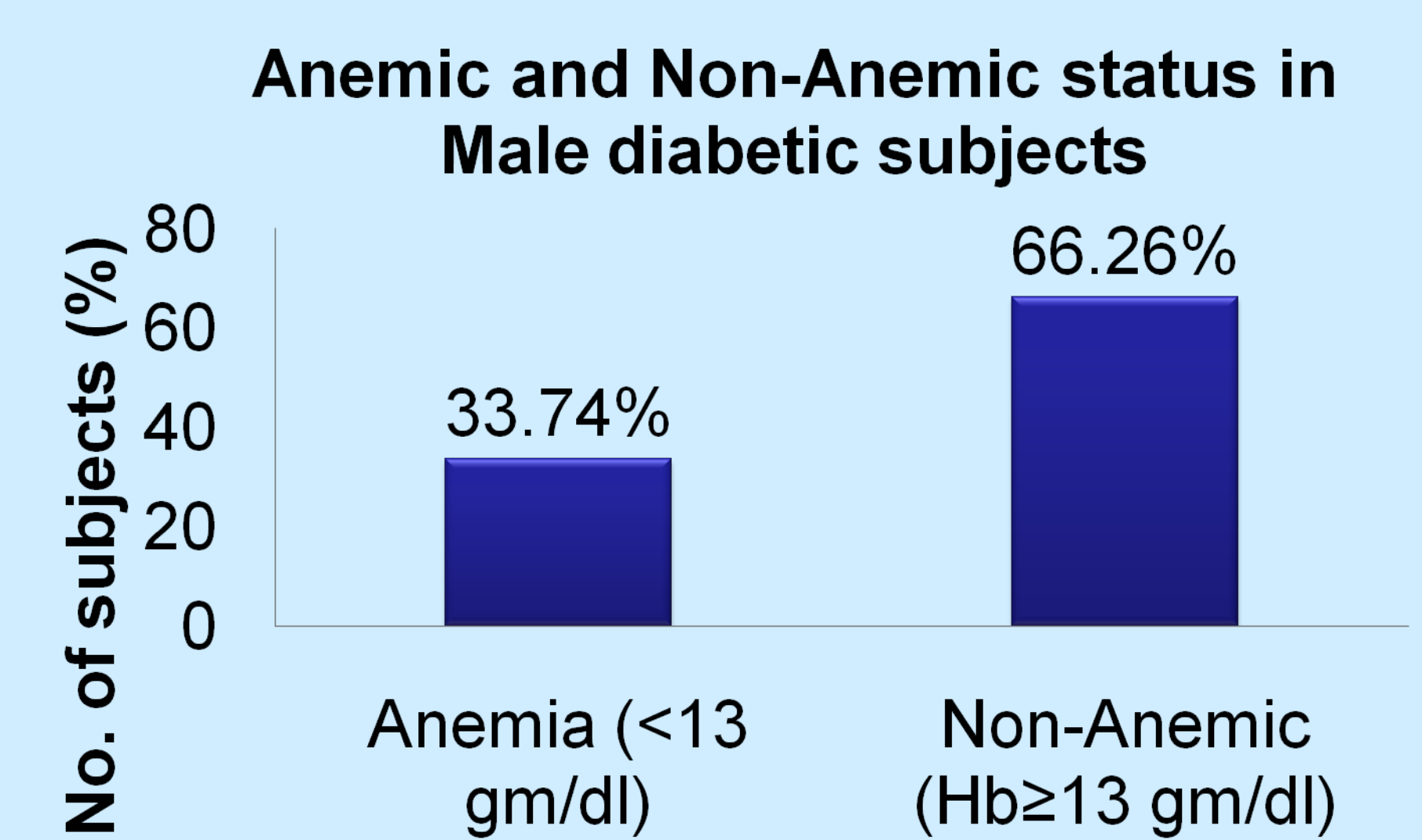
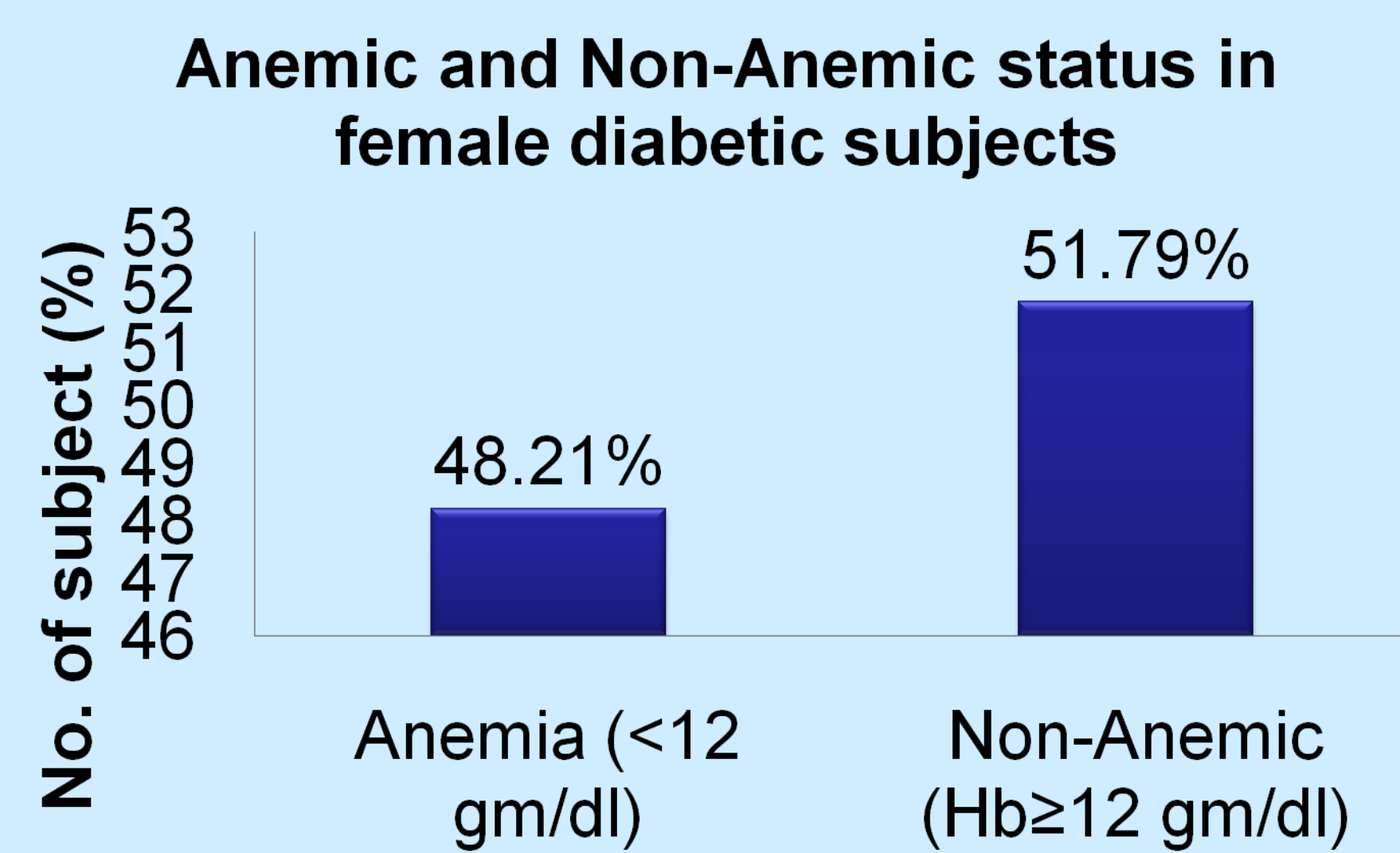
Study measures: Anthropometry, detailed history and clinical examination, fasting and 2hr post-prandial plasma glucose, haemoglobin, glycated hemoglobin, lipid profile, LFT and KFT

Statistical Analysis: MS excel and IBM SPSS 23.

RESULTS

Table 1: Background Profile

	TOTAL (N = 3090)	FEMALE (N = 1875)	MALE (N= 1215)
AGE (yrs)	50.73±10.45	50.52±10.48	51.00±10.79
BMI (kg/m ²)	25.86±5.4	26.63±7.26	24.22±4.79
WAIST (cm)	92.05±15.16	91.85±17.09	90.27±17.39
Hb (gm/dl)	12.69±3.95	11.87±1.59	13.70±5.52
HbA1c (%)	9.30±2.32	9.32±2.37	9.49±2.49
FPG (mg/dl)	180±68.58	177.38±72.28	181.08±72.82
PPPG (mg/dl)	258.20±92.48	247.11±103.61	255.06±97.89



- Multiple regression analysis was done to predict HbA1c from age, BMI, waist, FPG, PPPG and Hb. All these variables statistically significantly predicted HbA1c, $p < 0.001$, $R^2 = 0.351$. All six variables added statistically significantly to the prediction, $p < 0.05$.
- Further, stepwise multiple regression analysis showed that Hb independently affects HbA1c levels in females (adjusted R squared= 0.34) as well as males (adjusted R squared= 0.25).

SUMMARY OF RESULTS

Mean age of the study subjects was 50.73±10.45 yrs. Mean FPG was 180±68.58 and PPPG was 258.20±92.48. Mean haemoglobin was 12.69±3.95 and HbA1c was 9.30± 2.32. HbA1c levels correlated positively with haemoglobin (r=0.072, P<0.001). Significant positive correlation was also found in females as well as male patients separately. Quartile and inter-quartile analysis between various subgroups (anaemic males, non anaemic males, anaemic females and non-anaemic females) did not show any significant results. Multiple regression analysis showed that Hb independently affects HbA1c levels in females

CONCLUSION

There is a positive correlation between Hb and HbA1c levels in type 2 diabetic patients. Further Hb was found to be an independent factor affecting HbA1c levels in both the sexes.