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Medicine

CORRELATION BETWEEN DURATION OF ILLNESS, FASTING AND RANDOM BLOOD GLUCOSE AND HBA1C LEVELS IN DIABETIC PATIENTS

Dr Vijay Singh Baghel	Associate Professor, Department Of Medicine, Rkdf Medical College Bhopal.
Dr Archana Saxena*	Assistant Professor, Department Of Medicine, Rkdf Medical College Bhopal. *Corresponding Author

ABSTRACT
Introduction: Type2 diabetes mellitus is reaching epidemic proportions in the Indian subcontinent over the year. In this study we test for relationship between duration of illness, BMI and blood glucose levels with HBA1C value.
Material and Methods: 100 patients with Diabetes Mellitus were taken for this study. Their anthropometric and disease history was noted down and HbA1c and blood glucose levels were estimated biochemically and tests were applied to study correlation between various values.
Result: The duration of diabetes and BMI were not related to HbA1c levels, however FBG AND PPG were correlated significantly with HbA1c levels. Also BMI, duration of diabetes, FBG and PPG were found to be independent predictors of HbA1c levels in these patients.

KEYWORDS :

INTRODUCTION

Non communicable diseases are the leading cause of mortality which includes cardiovascular disease, cerebrovascular disease, cancer, chronic respiratory disease and diabetes. Diabetes mellitus is assuming epidemic proportion in India as non communicable disease. The prevalence of diabetes mellitus in Indian population has consistently increased from 5 % in 1982 to 9% in 2014 which has been proposed to increase futher in future. Increasing body weight and reduced physical activity are the two most important risk factor for diabetes mellitus with a prevalence rate of 21.4 % and 12.1% respectively. Among all ages, 2% of all deaths in India accounts alone for diabetes mellitus and hence posing a major public health threat.

The prevalence of diabetes is expected to differ among subgroups of the population in India because of its large socio-economic and lifestyle differences. The prevalence of type2 diabetes mellitus in urban areas is 2.1 % and in rural areas is 1.5%. In various samples in various studies on Indian population, the overall prevalence of diabetes mellitus was 12%, 5.9%, 33.5% and 4.5% hence indicating the high prevalence of diabetes mellitus in Indian population and an urgent need of intervention.

The current diagnostic criteria for diagnosis of diabetes is based on oral glucose tolerance test where the fasting plasma glucose of 126mg/dl or two hour plasma glucose of 200mg/dl. Glycosylated hemoglobin(HBa1c) has generated a lot of interest in recent times and is a modified hemoglobin molecule with stable addition of glucose that is linked covalently to the n-terminal valine of the beta chain. HBA1c has been recently proposed as a new test to diagnose diabetes with the cutoff value of 6.5%. HBa1c is independent of last meal, has less variability and is consistent in reflecting glucose level over the last 8 to 12weeks.

The aim of our study is to find correlation between body mass index(BMI), duration of illness, fasting blood glucose(FBG), postprandial blood glucose(PPG) and HBa1c level.

MATERIAL AND METHODS

After taking the ethical committee from the hospital, 100 patients who were diagnosed of type2 diabetes mellitus attending the OPD and on treatment with oral hypoglycemic agents metformin and/or glimepiride were taken. Informed consent was taken.

Detail history including all the vital parameter including age, height, weight, duration of illness, etc was taken from all the patient and duly noted down. body mass index was calculated using the formula of weight divided by square of height.

Fasting blood glucose and postprandial 2 hours glucose was estimated by glucose oxidase peroxidase method.HBa1c was estimated by modified ion-exchange high performance liquid chromatography method using an automatic calibrated chemistry analyser on blood in EDTA vial.

Data was collected by various methods on to Microsoft Excel and SPSS25.0 software was used for statistical analyses. The correlation of BMI, duration of illness, fasting blood glucose and postprandial blood glucose with HBa1c was analysed using Spearman correlation. To assess whether BMI, duration of illness, fasting blood glucose and postprandial blood glucose are predictors of HBa1c value, linear regression was applied.

RESULT

Out of hundred patients, 60 were male and 40 were female. The mean age of the study population was 55yyears with the range of 40 to 8 years. The duration of illness in the study population was 9years. The mean BMI was 29.6 kg/m^2 with range of 18 to 48 kg/m^2. Patient had a mean fasting blood glucose of 160 mg/dl and a mean postprandial glucose of 240 mg/dl. The mean HBa1c was 8.3 % with maximum value of up to 14%.

HBa1c was found to be correlated to fasting blood glucose with a correlation coefficient of 0.476 (p<0.01). HB a1c was found to be corelated to PPG with correlation coefficient of 0.456 (p<0.01) as shown in tables. BMI was found to be not correlated with HBA1c.

There was no statistically significant correlation between duration of illness and HBa1c value.

Fasting blood glucose, postprandial blood glucose, duration of illness and BMI were found to be predictor of HBa1c value when linear regression was applied to test the relationship. The predicted value of HBa1c on the basis of these variables lies close to the actual values of HB a1c on y axis and x axis respectively. We can predict the HB a1c value in the in a linear manner if if we know the FBG values and is statistically significant (p<0.05).

Table 1. Variables of Type 2 DM patients

VARIABLES	MEAN	STANDARD DEVIATION
AGE IN YEARS	55.4	15.2
DURATION IN YEARS	9.2	6.1
BMI	29.6	10.4
FBG	160	60.8
PPBG	240.2	90.2
HBA1C	8.3	1.9

Table 2. Correlation between PPG and HBA1C values.

SPEARMAN'S RATIO	HBA1C	Correlation coefficient	1.000	0.456
		Sig. (2 tailed)	.	.000
		N	100	100
	PPG	Correlation coefficient	456	1.000
		Sig. (2 tailed)	.000	.
		N	100	100

Table 3. Correlation between FBG and HBA1C values.

SPEARMAN'S RATIO	HBA1C	Correlation coefficient	1.000	0.476
		Sig. (2 tailed)	.	.000
		N	100	100
	FBG	Correlation coefficient	476	1.000
		Sig. (2 tailed)	.000	.
		N	100	100

DISCUSSION

The majority of study population I was in the middle age category of 40 to 60 years similar in pattern to the global data where 30 to 70 years of age was studied to study the majority of diabetes morbidity and mortality. Mohan V et al in his study colaborate it at National level the percentage of diagnosed diabetes in males was higher than in females. Satyawati duration range from 1 years to 13 years. Increase HB a1c values was seen with increase duration of diabetes in studies by Arnetz et al. and kilpatrick et al. Vinod study HB a1c and duration of diabetes had no correlation. Kabadi et al. in their study found no significant relationship between duration of diabetes and blood glucose. The BMI in the study group range from 23 to 31 kg per metre square and no correlation was found between BMI and HB a1c. However various studies have shown that there is increased risk of diabetes and insulin resistance with increased BMI. BMI and glucose metabolism are complex Li related and free lipids which are deposited in hepatocytes are shown to alter glucose metabolism this may be the reason behind lack of correlation between BMI and HB a1c.

in our study we found a statistical is significant correlation between fasting and postprandial glucose and HB a1c value. Gupta ET a l. confirmed our findings and reported significant correlation between FBG and Hba1c value. Gazafari et al. and Rohlfing et al. also found similar correlation between fbg and HBa1c value.

I our study be found statistical is significant relationship between BMI duration of illness fasting blood glucose and postprandial with HBA1C values. To study the relationship we applied linear regression to the study data. The results were in correlation with the study by ruffling etal. which showed a productive relationship between plasma glucose and HBa1c values. In our study we observed plasma glucose along with BMI and duration of illness action to protect the value of Hba1c.

CONCLUSION

HB a1c maybe used for monitoring type 2 diabetes mellitus in conjunction with plasma glucose. HBA1C is dependent on BMI duration of illness and blood glucose levels and therefore involved in pathogenesis and morbidity and mortality of diabetes mellitus.

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