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Incidence of Impaired Glucose Tolerance Test in Non-Diabetic Patients of Acute Coronary Syndrome and its Adverse Outcomes.

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ABSTRACT

Background: Myocardial infarction, it still continues to be a major health problem worldwide. The aim of the study is to find out incidence of impaired glucose tolerance in non-diabetic patients with acute coronary syndrome. **Methods:** The study includes 50 patients. All the cases and controls were subjected to standard 75 gms. Oral Glucose Tolerance Test (OGTT) on admission, at the time of discharge and at three months follow-up and the observations were recorded. **Results:** Post prandial blood sugar at time 3 month follow up were 6 (12%) in cases and 9 (18%) in control but not significant statistically. There were 17 (34%) cases and 7 (14%) in control with IGT values which was statistically significant p= 0.034. Post prandial blood sugar at time of admission were 131.18 ± 21.52 in cases, 121.86 ± 21.47 in controls and at the time discharge in cases and controls were 139.10 ± 21.27 and 128.88 ± 9.44 respectively with p=0.003. **Conclusion:** Patients with acute coronary syndrome who have IGT on admission have longer hospital stay and more complications related to acute MI.

Keywords: Daibetes Mellitus, Oral Glucose Tolerance Test.

INTRODUCTION

Cardiovascular disease is a major cause of death in diabetic patients. Despite impressive strides in the diagnosis and management of Myocardial infarction, it still continues to be a major health problem worldwide. Although Diabetes Mellitus has emerged as a major risk factor for coronary artery disease related morbidity and mortality, recently it has been suggested that Impaired Glucose Tolerance Test (IGT) is also an independent risk factor as concluded by Seibaek M et al.[1] Impaired Glucose Tolerance state is a dysglycemic state between normoglycemia and Diabetes Mellitus, and this asymptomatic hyperglycaemia confers an increased cardiovascular risk, independent of other classical cardiovascular risk factors according to Koichi Hashimoto et al.[2]

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Although the glucose-tolerance test is burdensome for screening in the general population, it is less so in hospitalized patients. The high frequency of newly discovered diabetes is also important because intensive glycemic control with insulin during the peri-infarction period followed by improved glycemic control as outpatients lowers the mortality from acute myocardial infarction.[2] Potential mechanisms for the association between hyperglycemia in the acute phase of MI and mortality includes induction of endothelial dysfunction, oxidative stress, inflammation, hypercoagulability, and impaired fibrinolysis.[1]
Deedwania P. et al,[3] Koichi Hashimoto et al also concluded that elevated fasting glucose is also a marker of relative insulin deficiency that reduces glucose uptake by the ischemic myocardium and promote lipolysis and increased circulating free fatty acids. These metabolic alterations may impair the energetic and functional adaptation of the heart to ischemia or hemodynamic overload.
Thus, the aim of this study was to identify the incidence of Impaired Glucose Tolerance in non-diabetic patients with acute coronary syndrome and to correlate cardiovascular morbidity and mortality in patients of acute coronary syndrome within 3 months of follow-up.

Aims and Objectives:

To find out incidence of impaired glucose tolerance in non-diabetic patients with acute coronary syndrome and to compare the relationship between

raised plasma glucose level with cardiovascular morbidity and mortality in patients with acute coronary syndrome within 3 months follow up.

MATERIALS AND METHODS

In the present study a total number of fifty cases were selected who presented to ICU of department of General Medicine, NIMS Hospital, Jaipur, with acute myocardial infarction confirmed by electrocardiography and cardiac biomarkers and fifty healthy controls. The patients with typical chest pain, ST segment elevation of at least 2 mm in chest leads or 1 mm in limb leads or new Q waves in at least in two contiguous leads, raised creatinine kinase activity at least twice the upper limit of reference range was included in the study. Patients with diabetes, recent chest trauma, renal failure, myocarditis, cardiomyopathy, pericardial diseases, valvular heart diseases, severe congestive heart failure, pulmonary embolism, stroke, rheumatoid arthritis and patients who have received a DC shock were excluded from the study.

After approval of institutional ethical committee, a written informed consent was taken from the patients. Relevant data regarding history, physical examination, vital parameters, investigations like ECG, Cardiac enzymes (troponin-T, CPK-MB), fasting blood sugar, 2-hour post-prandial blood sugar(PPBS), HbA1C, serum lipid profile, Chest X-Ray and 2D-ECHO were recorded in a fixed previously designed proforma. All the cases and controls were subjected to standard 75 gms. Oral Glucose Tolerance Test (OGTT) on admission, at the time of discharge and at three months follow-up and the observations were recorded.

The statistical analysis of the observations was done using standard 't' test and Chi-square test, multivariate analysis, unpaired 't' test, fischer test. A p-value <0.05 was significant.

RESULTS

Post prandial blood sugar at time 3 month follow up were 6 (12%) in cases and 9 (18%) in control but not significant statistically. There were 17 (34%) cases and 7 (14%) in control with IGT values which was statistically significant p= 0.034 [Table 1 & 2, Figure 1 & 2].

Table 1: Distribution of Study Participants According to PPBS at Time of Admission.

PPBS at Admission	Case		Control		Total	
	No.	%	No.	%	No.	%
IGT	17	34.00	7	14.00	24	24.00
Normal	33	66.00	43	86.00	76	76.00
Total	50	100.00	50	100.00	100	100.00

Fischer Exact test P = 0.034

Table 2: Distribution of Study Participants According to PPBS at Time of Discharge.

PPBS at discharge	Case		Control		Total	
	No.	%	No.	%	No.	%
IGT	16	32.00	5	10.00	21	21.00
Normal	34	68.00	45	90.00	79	79.00
Total	50	100.00	50	100.00	100	100.00

Fischer Exact test P = 0.013

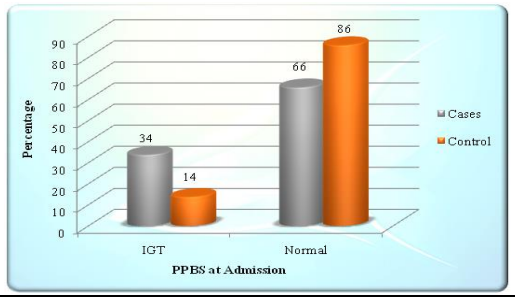

Figure 1: Distribution of Study Participants According to PPBS at Time of Admission.

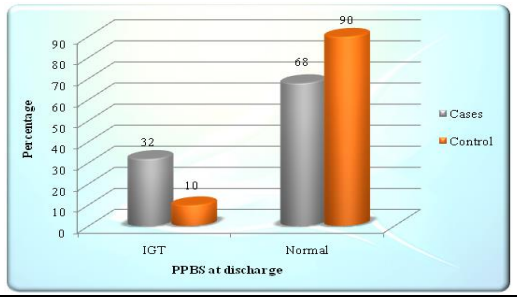

Figure 2: Distribution of Study Participants According to PPBS at Time of Discharge.

Post prandial blood sugar at time of admission were 131.18 ± 21.52 in cases, 121.86 ± 21.47 in controls and at the time discharge in cases and controls were 139.10 ± 21.27 and 128.88 ± 9.44 respectively with p=0.003. So from above study there were significant Impaired Glucose Tolerance (IGT) value both at time admission and time of discharge, but came to normal at time of 3 months follow up [Table 3 & 4, Figure 3 & 4].

Table 3: Distribution of Study Participants According to PPBS after 3 Months.

PPBS after 3 month	Case		Control		Total	
	No.	%	No.	%	No.	%
IGT	6	12.00	9	18.00	15	15.00
Normal	44	88.00	41	82.00	85	85.00
Total	50	100.00	50	100.00	100	100.00

Fischer Exact test P = 0.577

Table 4: Comparison of groups w.r.t. PPBS.

	Group	N	Mean	Std. Deviation	'p' value*
PPBS at admission	Case	50	131.18	21.52	0.033
	Control	50	121.86	21.47	
PPBS at discharge	Case	50	139.10	21.27	0.003
	Control	50	128.88	9.44	
PPBS after 3 Month	Case	50	130.20	12.15	0.207
	Control	50	133.78	15.82	

*Unpaired 't' test

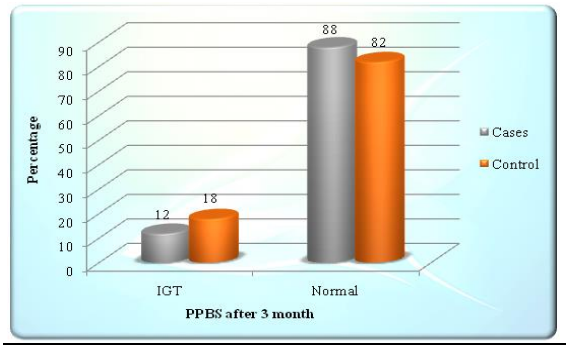

Figure 3: Distribution of Study Participants According to PPBS after 3 Months.

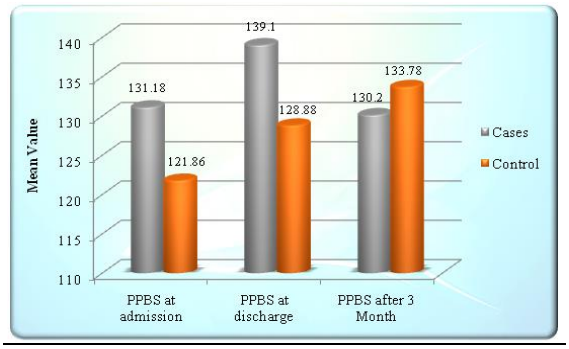

Figure 4: Comparison of groups w.r.t. PPBS.

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Table 5: Distribution of Cardiovascular System Morbidity in IGT.

IGT	Cardiovascular System Morbidity				Total
	Present		Absent		
	No.	%	No.	%	
IGT	7	53.85	6	46.15	13
Normal	5	13.51	32	86.49	37
Total	12	24.00	38	76.00	50

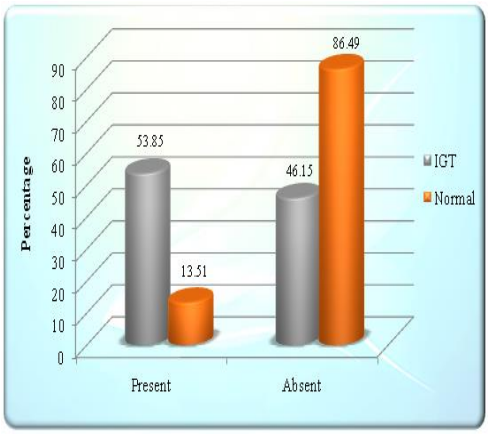

Figure 5: Distribution of Cardiovascular System Morbidity in IGT.

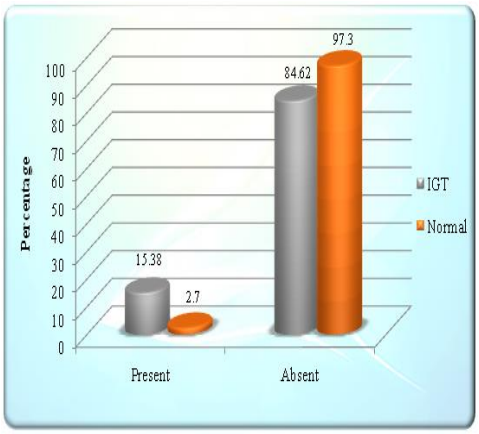

Figure 6: Distribution of Study Participants According to Cardiovascular System Mortality in IGT.

Table 6: Distribution of Study Participants According to Cardiovascular System Mortality in IGT.

IGT	Cardiovascular System Mortality				Total
	Present		Absent		
	No.	%	No.	%	
IGT	2	15.38	11	84.62	13
Normal	1	2.70	36	97.30	37
Total	3	6.00	47	94.00	50

Fischer Exact test P = 0.162

DISCUSSION

According to our study of 50 cases and 50 controls of Impaired Glucose Tolerance test was present in 34% cases and 14% of controls (P<0.034) on admission. At the time of discharge IGT was found in 32% of cases and 10% of controls (P<0.013) but at the time of three months follow-up, IGT was found in 12% of cases and 18% of controls (P=0.577). This study goes in favour of Strander et al[4], according to them the prevalence of IGT and Diabetes were 39% and 27% respectively. Hashimoto et al[2] in a study reported that in ACS patients Impaired Glucose Tolerance test and Diabetes were found in 37% and 10% patients.

Same was found by Jenette Kuhl et al[5] in a study with 1062 consecutive patient, IGT was in 299 (29%) and in follow up mortality and reinfarction was higher (p<0.001) within 30 days. During the follow-up (30 days, 1 year, 3 years), 86 patients (28%) with known diabetes had reinfarction as compared to 36 patients (12%) with IGT and 79 patients (17%) with dysglycemia (IFG, IGT and diabetes) discovered by OGTT.

Hashimoto et al[2] in a study found that the mean age, fasting glucose, and HbA1c were 60 years, 92 mg and 5.4%, respectively. Among ACS patients, impaired glucose tolerance (IGT) and diabetes were found in 50 (37%) and 13 patients (10%), respectively. Katherine Esposito et al[6] in his study found that Incidence of IGT was more significant at time of diagnosis and at time of discharge in cases as compared to control groups. Individuals with diabetes have a greater mortality from acute myocardial infarction (AMI) than non-diabetic individuals. Malmberg K et al[7] found that after an acute coronary event, hyperglycemia has been shown to be a predictor of immediate and long-term cardiovascular mortality. Furthermore, such newly diagnosed abnormalities of glucose metabolism have been shown to be associated with an excess long-term cardiovascular mortality.Van den Berghe G (N Engl J Med. 2001) et al.[8], Van den Berghe G, (Crit Care Med. 2003) et al.[9] identify IGT cases and shown a beneficial effect in critically ill patients on intensive insulin therapy. Poulson SH et al[10] found that a worse myocardial performance has been demonstrated in patients with acute MI and concomitant hyperglycemia.

Frank Pistrosch et al[11] found in their study that a 10-year post-trial observational period of the UK Prospective Diabetes Study showed a significant 15% reduction of myocardial infarction and a 17% reduction of diabetes-related deaths in patients who were initially randomized to the intensive treatment arm.

CONCLUSION

Patients with acute coronary syndrome who have IGT on admission have longer hospital stay and more complications related to acute MI.

Whether IGT increases the mortality rate in ACS patients requires further study. Intensive insulin therapy in newly diagnosed diabetic patients may have less complications thus a shorter stay in a hospital.

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