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Original Article

Effects of Diabetes Mellitus on Interventional Outcome in Patients with Non-ST-Myocardial Infarction

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ABSTRACT

Introduction: Patients with Non ST elevation myocardial infarction , the incidence of heart failure was twice in diabetic versus non diabetic ones[1,2].There is positive correlation between diabetes mellitus duration and the risk of developing acute coronary syndromes[3], An independent relation between the duration of diabetes mellitus and critically and fatal coronary artery disease has been shown in men[4], Some studies suggest that coronary artery disease and HbA1c level are predictors of cardiovascular morbidity and mortality[5]. **Aim of the study:** To study the interventional outcomes of high-risk non-ST elevation acute myocardial in diabetic and non-diabetic patients. **Patients and methods:** a prospective study was conducted in, Zagazig University Hospitals , it included 480 patients , diagnosed by ECG, cardiac biomarker and Grace Score[6] as high risk NSTE-ACS , divided into (272 Diabetic and 208 Non-diabetic).Patients were classified according to GRACE score into 3 categories high (>140), intermediate (70–140), and low (1-70), the patients underwent early emergency, or elective coronary angiography within 3 days of admission. After intervention (PCI) , followed up for 48 hours to detect complications and death. **Results:** There was no significant difference between the two groups as regard age and hypertension. Gensini and Grace scores were significantly higher in diabetes. In patients of high Gensini and syntax scores only diabetes was an independent predictor of the extent and severity of coronary artery obstruction. **Conclusion:** Diabetes Mellitus has a significant correlation with angiographic complexity and interventional outcome in patients with Non-ST elevation myocardial infarction.

Key words: Diabetes Mellitus, Non-ST elevation myocardial infarction.

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BACKGROUND

The relationship between diabetes mellitus and a higher incidence of coronary artery disease is clinically established. Diabetic patients with acute coronary syndrome appeared to have worse prognosis than non-diabetic patients[1]. During hospitalization of diabetic and non-diabetic patients with Non-ST elevation myocardial infarction, the incidence of heart failure was twice in diabetic versus nondiabetic ones[2].

There is positive correlation between diabetes mellitus duration and the risk of developing acute coronary syndromes[3].

An independent relation between the duration of diabetes mellitus and critically and fatal coronary artery disease has been shown in men[4].

Some studies suggest that coronary artery disease and HbA1c level are predictors of cardiovascular morbidity and mortality[5].

OBJECTIVES

To study the interventional outcomes of high-risk non-ST elevation acute myocardial in diabetic and non-diabetic patients

PATIENTS AND METHODS

This prospective study was conducted in Cardiology Department, Zagazig University Hospitals, during the period from January 2016 to January 2019 , it included 480 patients , admitted to the cardiac care unit, diagnosed by ECG, cardiac biomarker and Grace Score as high risk NSTE-ACS , divided into two groups: 272 Diabetic and 208 Non-diabetic , All patients underwent complete history taking, thorough clinical examination. 12-lead ECG, laboratory tests (CK-MB, Tropinin I, lipid profile & HbA1c, GRACE score was calculated. Patients were classified according to GRACE score into 3 categories high (>140), intermediate (70–140), and low (1–70), the patients underwent early emergency, or elective coronary angiography within 3 days of admission. evaluating the extent and the severity of coronary lesions were assessed by using Gensini score[6].

After intervention (PCI), followed up for 48 hours,to detect complications as malignant arrythymia (V.Tach) , re-infarction, acute heart failure, and death.

RESULTS

There was no statistically significant difference between the two groups as regard age and hypertension (p values 0.08) (Table 1). Smoking and dyslipidemia were significantly higher, in diabetics versus non-diabetics (P < 0.05 and P 0.008), LDL was significantly higher in diabetic group (Table 1,3). Peak-CKMB values are higher (204.06 ± 71.15) in the diabetics versus (119.49 ± 45.31) in non-diabetic group, while Troponin levels were lower (3.88 ± 1.65) in the diabetic group versus being (4.08 ± 1.6) in the non-diabetics (Table 2). Gensini and Grace scores were significantly higher in diabetes (228.53 ± 78.35 and p-value was 0.0009 and 167.49±57.09 and p value was 0.0001, respectively) (Tables 4,5,6 and7). In patients of high Gensini and syntax scores only diabetes was an independent predictor of the extent and severity of coronary artery obstruction (Table 8, Figure 1,2,3).

DISCUSSION

The current study attempted to pierce out risk factors, clinical presentation and coronary angiographic picture in patients with diabetes mellitus compared with other non-diabetic patients.

In this study there was no statistically significant difference between the two groups as regard age and hypertension in this result was in

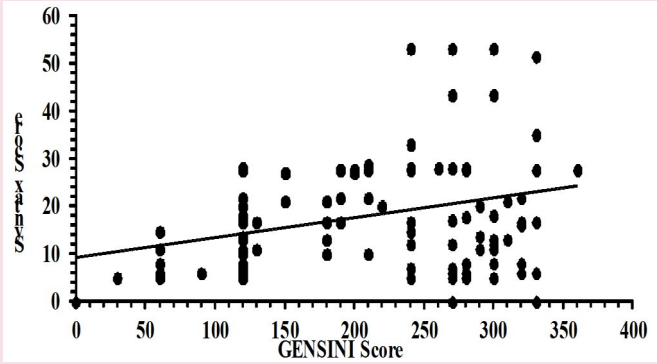

Figure 1: Gensini Score and Syntax Score Correlogram.

Table 1: Demographic data and risk factors between two groups.

		Non-diabetic (n=208)	Diabetic (n=272)	Test value	p-value
Sex	Female	40 (19.2%)	80 (29.4%)	6.52	0.01
	Male	168 (80.8%)	192(70.6%)		
Age		57.17±8.61	57.13±8.03	t=0.05 NS	0.95
HTN	HTN	100 (48.1%)	152(55.9%)	2088 NS	0.08
	N HTN	108 (51.9%)	120(44.1%)		
Smoking	Nonsmoker	112 (53.8%)	180 (66.2%)	7.52	0.006
	Smoker	96 (46.2%)	92(33.8%)		
Family history	No	180 (86.5%)	252 (92.6%)	4.89	0.027
	Yes	28 (13.5%)	20 (7.4%)		

Table 2: Comparison of angiographic scores among Diabetic and Non-diabetic patients (n=480).

	Diabetic -272	Non-diabetic -208	t-value	P-value
Gensini score	228.53±78.35	170.19±101.14	7.1**	<0.0001
Syntax score	19.29±6.79	15.08±9.13	5.5 *	<0.001
Grace Score	167.49±57.09	100.21±47.02	14.0**	< 0.0001

Table 3: Bivariate analysis of risk factors with Occurrence of Complications.

		Non-complicated (n=184)	Complicated (n=176)	OR 95%CI	P-value
Sex	Female	32 (53.3%)	28 (46.7%)	1	0.7
	Male	152 (50.7%)	148 (49.3%)	1.11 (0.62-2.01)	
HTN	NHTN	100 (53.2%)	88 (46.8%)	1	0.4
	HTN	84 (48.8%)	88 (51.2%)	1.19 (0.77-1.84)	
DM	No	116(64.4%)	64(35.6%)	1	<0.001
	Diabetic	68(37.8%)	112(62.2%)	2.99 (1.9-4.69)	
Smoking	Non-Smoker	120(55.6%)	96(44.4%)	1	0.03*
	Smoker	64(44.4%)	80(55.6%)	1.52 (1.0-2.44)	
FH	No	172(53.1%)	152(46.9%)	1	0.02*
	Yes	12(33.3%)	24(66.7%)	2.26 (1.04-4.99)	
Age		57 ± 9	57 ± 8	1.01 (0.96-1.06)	0.857
	GRACE Score	113.3 ± 53.77	137.02 ± 59.68	1.31 (1.06-1.52)	0.053
	Gensini score	184.77 ± 86.87	190.65 ± 94.31	1.44 (1.01-1.65)	0.53
	Syntax score	14.65±7.41	13.97±9.58	1.19 (1.04-1.24)	0.701

Quartiles of Gensini score:

Part I (<120): 156 patients (32.5%).

Part II (121-215): 84 patients (17.5%).

Part III (216-280): 124 patients (25.8%).

Part IV (≥ 281): 116 patients (24.2%).

Table 4: Demographic data, RF, MACE and different scores with each quartile.

		Part I ≤ 120		Part II 121-215		Part III 216-280		Part IV ≥ 281	
		No.	%	No.	%	No.	%	No.	%
Sex	Female	32	40.00%	20	25.00%	16	20.00%	12	15.00%
	Male	124	31.00%	64	16.00%	108	27.00%	104	26.00%
HTN	HTN	76	30.20%	44	17.50%	68	27.00%	64	25.40%
	NHTN	80	35.10%	40	17.50%	56	24.60%	52	22.80%
DM	Diabetic	44	16.20%	54	23.50%	84	30.90%	80	29.40%
	No	112	53.80%	20	9.60%	40	19.20%	36	17.30%
SMOKING	Non-Smoker	112	38.40%	56	19.20%	72	24.70%	52	17.80%
	Smoker	44	23.40%	28	14.90%	52	27.70%	64	34.00%
FH	No	140	32.40%	72	16.70%	116	26.90%	104	24.10%
	Yes	16	33.30%	12	25.00%	8	16.70%	12	25.00%
Mace	No	76	41.3	28	15.2	36	19.6	44	23.9
	Yes	68	38.6	36	20.5	48	27.3	24	13.6
Age		56±10		57±7		59±8		57±7	
GRACE		102.51±42.31		150.97±66.96		154.52±67.91		163.86±53.2	

Table 5: Demographic data, RF, MACE and different scores with quartile I and III.

		Part I ≤ 120		Part III 216-280		OR 95%CI	P-value
		No.	%	No.	%		
Sex	Female	32	40.0%	16	20.0%	1	0.09
	Male	124	31.00%	108	27.00%	1.74 (0.87-3.53)	
HTN	NHTN	80	35.1%	56	24.6%	1	0.3
	HTN	76	30.2%	68	27.00%	1.28 (0.77-2.11)	
DM	No	112	53.8%	40	19.2%	1	0.001**
	Diabetic	44	16.2%	84	30.9%	5.35 (3.1-9.24)	
Smoking	Non-Smoker	112	38.4%	72	24.7%	1	0.016*
	Smoker	44	23.4%	52	27.7%	1.84 (1.08-3.12)	
FH	No	16	33.3%	4	16.7%	1	0.25
	Yes	140	32.4%	116	26.9%	1.66 (0.64-4.4)	
Mace	No	76	67.9%	36	32.1%	1	0.14
	Yes	68	58.6%	48	41.4%	1.49 (0.84-2.66)	
Age		56±10		59±8		1.04 (0.99-1.11)	0.132
GRACE		102.51±42.31		154.52±67.91		1.02 (1.01-1.03)	0.001

Table 6: Demographic data, RF, MACE and different scores with quartile I and IV.

		Part I ≤ 120		Part IV ≥ 281		OR 95%CI	P-value
		No.	%	No.	%		
Sex	Female	32	40.0%	12	15.0%	1	0.02*
	Male	124	31.0%	104	26.0%	2.74 (1.047-4.89)	
HTN	NHTN	80	35.1%	52	22.8%	1	0.29
	HTN	76	30.20%	64	25.4%	1.28 (0.78-2.16)	
DM	No	112	53.8%	36	17.3%	1	5.66
	Diabetic	44	16.2%	80	29.4%	5.66 (3.24-9.92)	
Smoking	Non-Smoker	112	38.4%	52	17.8%	1	3.13
	Smoker	44	23.4%	64	34.0%	3.13 (1.83-5.37)	
FH	No	140	32.4%	104	24.1%	1	0.98
	Yes	16	33.3%	12	25.0%	1.01 (0.43-2.37)	
Mace	No	76	67.90%	4400.00%	36.70%	1	0.1
	Yes	68	58.60%	24	26.10%	0.61 (0.3-1.15)	
Age		56±10		57±7		1.15 (0.89-1.01)	0.222
GRACE		102.51±42.31		163.86±53.2		1.42 (1.06-1.65)	0.001

Table 7: Pearson correlation coefficient.

	HbA1c	CK-MB	GENSINI	Syntax
HbA1c		0.582	0.361	0.191
CK-MB	0.582		0.136	-0.022
GENSINI	0.361	0.136		0.316

Table 8: **Comparison of different angiographic scores and Grace Score.**

	Low (≤ 70) (n=80)	Medium (≤140) (n=152)	High (> 140) (n=248)	F-value	p-value
Gensini score	179±110.78b	185.53±102.5b	221.94±77.46a	10.7**	0.001
Syntax score	13.08±6.96b	14.51±10.9b	20.69±13.5a	-14.4**	0.001

agreement of Peter et al.,[7]. (Mahadeva et al.,[8] and Cakar et al.,[8,9] have mentioned higher occurrence of smoking in in diabetics versus non-diabetics, (p value 0.01), which is in agreement of our results in this study.

This study revealed that diabetics had higher pervasiveness of hyperlipidemia, similar results were described by Mahadeva et al.,[8].

As regarding cardiac enzymes (troponin, and peak CKMB), our results are concordant with Newby LK et al.,[10] who had elevated cardiac enzymes. and has illustrated that, both troponin and creatine kinase myocardial band (CK-MB) had important prognostic determinants of diabetic patients with ACS. however, Cakar et al.,[9] showed no significant difference between diabetic and non-diabetic groups.

Regarding the effects of angiographic among females and males, there was no significant differences existed between gender regarding Syntax, Gensini and Grace Score with P= 0.569, 0.141 and 0.397. These obtained our results were in concordance with the Morteza et al.,[11].

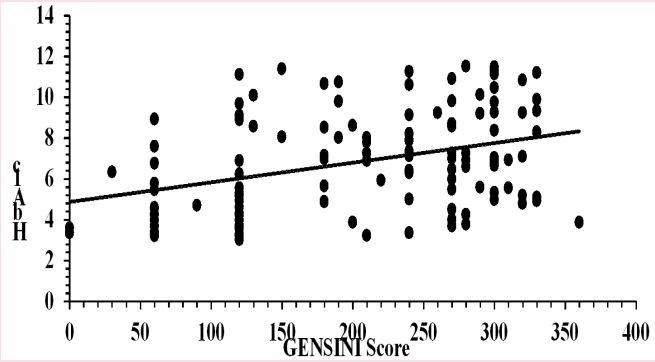

Figure 2: **Gensini Score and HbA1c Correlogram.**

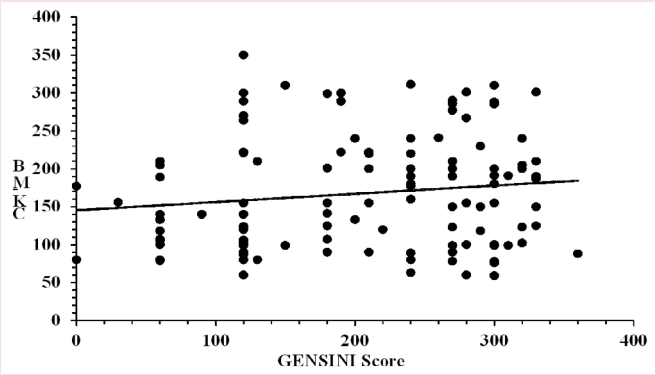

Figure 3: **Gensini Score and CKMB Correlogram.**

By making comparison for an illustration of angiographic scores among diabetic and non-diabetic patients, many statistics were carried on our cases. Diabetic group showed significantly higher mean Angiographic and clinical Scores than non-diabetic ones.This finding is consistent with higher Gensini scores in diabetics and reconfirms that diabetics in this study had more extensive coronary artery disease.

According to severity of coronary artery disease, Gensini score in this study was significantly higher in diabetics than in no-diabetics. This finding is in agreement with Mahadeva et al..,[8] and Peppes et al.,[12] who found significant association of severe coronary artery disease in patients with diabetes mellitus.

Our findings suggest that only diabetes emerged as an independent predictor of the extent of obstructive CAD burden.CASS registry. Elderman et al.,[13] have also consistently identified diabetes as an independent predictor of severity or disease progression.

In our study, diabetic patients were sicker on presentation, with a higher median GRACE risk score compared with the non-diabetic group. However, even after adjustments for the components of the GRACE risk score, diabetes was still an independent predictor of increased in-hospital mortality. This was found also by Yan et al.,[14].

This study approved that the occurrence of complication among diabetic patients was significantly higher than those which are non-diabetic.

This study has approved that diabetics group had complications after intervention, on another hand only 35.6% from non-diabetics one had complications. These data were in agreement with other Kassaian et al..,[15] and Tanjima et al.,[16].

Our study approved that diabetic patients with NSTE-ACS had more adverse outcomes during follow up. this may be related to increased Gensini and syntax sores and comorbidities. These results were in agreement with Franklin et al.,[17].

by correlating our results as regarding HA1C and Gensini score with Serruys et al., [18], we found that there was statistically significant positive correlation.

CONCLUSION

Diabetes Mellitus has a significant correlation with angiographic complexity and interventional outcome of CAD and HbA1c level increases, the severity and complexity of coronary artery disease even in patients with HbA1c levels in the upper limit of normal range (pre diabetics).

RECOMMENDATIONS

Our study recommends a good glycemic management and early cardiovascular screening of diabetic patients.

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