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Original Research Article.

Prognostic Value of Elevated Biomarkers in Diabetic and Non Diabetic Patients Admitted for Acute Coronary Syndromes

Heba Abd El Kader MD[1], Tarek Helmy Abo El Azm MD[2], Neima Ali El Melegy MD[2], Hesham Drwesh MD[3]

[1]Professor, [2]Ass. Professor, Department of Cardiology, Benha University, Banha, Al Qalyubia Governorate, Egypt.
[3]Ass. Professor, Critical Care Department, Thedoor Bilharz Research Institute (TBRI), Giza Governorate, Egypt.

ABSTRACT

Back Ground: Diabetes is not only predisposing factor for cardiovascular disease but once diabetes patients develop coronary artery disease, they have significant worse outcomes compared to other non-diabetic patients.

Methods: We studied 80 patients who were admitted for acute coronary syndrome (ACS), they were classified according to history of diabetes mellitus (DM) into 2 groups, Non diabetic group 40 patients and Diabetic group 40 patients and then the two groups were classified further into sub groups according to elevated markers indicating myocardial injury. Then were followed up for 3 months as regard morbidity and mortality.

Results: Diabetic patients had significantly higher frequencies of previous myocardial infarctions, left ventricle (LV) dysfunction, in hospital complications, and rehospitalisation for acute coronary syndrome (ACS) up to death, in comparison to non-Diabetic patients.

Conclusion: From this study, it can be concluded that elevated biomarkers of myocardial necrosis have adverse effects on patients either diabetic or non-diabetic on short term follow up. Diabetic patients with acute coronary syndrome (ACS) without elevated biomarkers have a mortality and morbidity risk similar to patients who are not diabetic but have elevated biomarkers on presentation with acute coronary syndrome (ACS), and that diabetic patients with elevated biomarkers are at highest mortality and morbidity risk.

Keywords: Diabetes Mellitus, Acute Coronary Syndrome (ACS), Biomarkers.

***Correspondence to:**

Dr. Hesham Drwesh,
Critical Care Department,
Thedoor Bilharz Research Institute (TBRI),
Giza Governorate, Egypt.

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INTRODUCTION

Acute coronary syndrome covers the spectrum of clinical conditions ranging from unstable angina to ST elevation MI and Non ST elevation myocardial infarction (MI). Coronary artery disease remains the leading cause of death in the world.[1]

People with DM have an increased risk of atherosclerosis and coronary artery disease and experience higher morbidity and mortality after ACS than people without DM.[2]

The availability of cardiac markers with enhanced sensitivity for myocardial damage enables clinician to diagnose myocardial infarction[3] as well as risk stratification of ACS patient. Abnormal levels of creatine kinase myocardial band function (CK – MB), cardiac troponin I (cTn I), Cardiac troponin T predict increased risk of complications.[4]

AIM OF THE WORK

To analyze the prognostic implications of elevated biomarkers in patients with and without Diabetes with ACS in predicting three month morbidity and mortality.

PATIENTS AND METHODS

This study included 80 patients with acute coronary syndrome .they were admitted to the coronary care unit from February to May 2008 the they were followed up through three month duration.

Patients were classified into two groups:
Group (A): Non Diabetic group.
Group (B): Diabetic group.

Then classified according to level of cardiac biomarkers to:
ND: Non diabetic with negative biomarkers.
ND +: Non diabetic with positive biomarkers.
D - : Diabetic with negative biomarkers.
D +: Diabetic with positive biomarkers.

Inclusion Criteria

1. STEMI diagnosed by typical rise and fall of biochemical markers of myocardial necrosis with at least one of:

Ischaemic symptoms, ECG changes suggestive of ischaemia or imaging evidence of new wall motion abnormality.

2. Unstable angina defined by angina pectoris with at least one of: occurring at rest and usually lasting more than 20 min., occurring with crescendo manner, or being severe and described as frank pain and new onset within one month.

Exclusion Criteria

1. Patients with first presentation with hyperglycaemia without known history of DM.
2. Patients refusing to participate in the study.

All Patients had undergone careful full history taking, general and local examination. Also 12 lead ECG, Transthoracic Echocardiography, Cardiac enzymes (CK MB, Cardiac troponin I), lipid profile, kidney function tests and Random blood sugar.

Table 1: Demographic data of the whole study group.

Parameter	Number	%
Number of patients	80	100%
Age in years	**Mean 60.48 + 13.46**	
Sex		
Male	**50**	**62.5%**
Female	**30**	**37.5%**
Risk factors:		
Diabetics	40	50%
Hypertension	46	57%
Hyperlipidemia	47	58.8%
Obesity	33	41.3%
History of prior MI	29	36.3%
History of renal impairment	8	10%
History of stroke or TIAs	6	7.5%
Presentation		
UA	40	50%
NSEMI	19	23.7%
STEMI	21	26.3%
Ischemic ECG changes		
Normal	13	16.25%
ST. Segment, T wave changes	46	57.5%
ST. Segment élévation	21	26.3%
Trans-thoracic echocardiography		
Systolic dysfunction	15	18.75%
Coronary angiography		
One-vessel disease	32	40%
Two-vessel disease	23	28.75%
Three-vessel disease	25	31.25%

Table 2: Baseline parameters of diabetic and non-diabetic groups.

Parameter	Group (A)	Group (B) (n=40)	P Value
Age (mean+ SD)	64.05 + 10.26	65.925 + 15.352	>0.05
Sex:			
Male (number, %)	27 (67.5%)	23 (57.5%)	>0.05
Female (number, %)	13 (32.5%)	17 (42%)	>0.05
Risk factors			
HTN (number, %)	19 (47.5%)	27 (67.5%)	>0.05
Dyslipidemia (number, %)	20 (50%)	27 (67.5%)	>0.05
Obesity (number, %)	15 (37.5%)	18(45%)	>0.05
Prior MI (number, %)	9 (22.5%)	20 (50%)	<0.05*
Renal impairment (number, %)	1 (2.5%)	7 (17.5%)	<0.05*
History of stroke or TIAs (number, %)	2 (5%)	4(10%)	>0.05

Table 3: Baseline parameters of diabetic and non-diabetic groups.

Parameter	Group (A) (n=40)	Group (B) (n=40)	P Value
Diagnosis on admission			
UA (number, %)	20 (50%)	20 (50%)	>0.05
NSTEMI (number, %)	8 (20%)	11 (27.5%)	>0.05
NSTEMI (number, %)	12 (30%)	9 (22.5%)	>0.05
Echo EE:			
EF	3 (7.5%)	12 (30%)	<0.05*
Coronary angiography: (number, %)			
One-vessel disease	21 (52.5%)	11 (27.5%)	>0.05
Two-vessel disease	11 (27.5%)	12 (30%)	>0.05
Three-vessel disease	8 (20%)	17 (42%)	<0.05*

Table 4: Basline parameters of diabetic and non-diabetic groups.

Parameter	Group (A) (n=40)	Group (B) (n=40)	P Value
In hospital LV dysfunction (number, %)	6 (15%)	15 (37.5%)	<0.05*
In hospital arrhythmias (number, %)	3 (7.5 %)	8 (20 %)	>0.05
In hospital re-infarction (number, %)	1 (2.5 %)	5 (12.5 %)	<0.05*
In hospital death (number, %)	1(2.5 %)	4 (10 %)	<0.05*

Table 5: Three months complication of diabetic and non-diabetic groups.

Parameter	Group (A) (n=39)	Group (B) (n=36)	P Value
3-months LV dysfunction (number %)	8 (20 %)	18 (50%)	<0.05*
3-months re-hosp. for ACS (number, %)	7 (17.9)	18 (50%)	<0.05*
3-months death (number, %)	4 (10 %)	12 33 %)	<0.05*

Table 6: Basline parameters in non-diabetic with negative biomarkers group in comparison with non-diabetic with elevated biomarkers group .

Parameter	ND - (n=20)	ND+ (n=20)	P Value
Age (mean+ SD)	55.05 + 12.31	61.05 + 13.08	>0.05
Sex			
Male (number, %)	12 (60%)	15 (75%)	>0.05
Female (number, %)	8 (40%)	5 (25%)	>0.05
Risk factors:			
HTN (number, %)	9 (45 %)	10 (50%)	>0.05
Hyperlipidemia (number, %)	10 (50%)	10 (50%)	>0.05
Obesity (number, %)	8 (40%)	7 (35 %)	>0.05
Prior MI (number, %)	3 (15 %)	6 (30%)	>0.05
Renal impairment (number, %)	1 (5 %)	0	>0.05
History of stroke or TIAs (number, %)	2 (10 %)	0	>0.05

Table 7: Clinical presentation of non-diabetic with negative biomarkers group in comparison with non-diabetic with elevated biomarkers group.

Parameter	ND - (n=20)	ND+ (n=20)	P Value
Diagnosis on admission			
UA (number, %)	20 (100%)	0	
NSTEMI (number, %)	0	12 (55%)	
STEMI (number, %)	0	8	
Echo EF:			
EF (< 05%)	1 (5%)	2 (10%)	>0.05
Coronary angiography (number, %)			
One- vessel disease	15 (75%)	6 (30 %)	<0.05*
Two-vessel disease	3 (15 %)	8 (40 %)	>0.05
Three-vessel disease	2 (10 %)	6 (30%)	>0.05

Table 8: In hospital complication of non-diabetic with negative biomarkers group in comparison with non diabetic with elevated biomarkers group.

Parameter	ND - (n=20)	ND+ (n=20)	P Value
In-hospital LV Dysfunction (number, %)	1 (5%)	5 (25%)	<0.05*
In-hospital Arrhythmias (number, %)	1 (5%)	2 (10 %)	>0.05
In-hospital re-infarction (number, %)	0	1 (5%)	>0.05
In-hospital death (number, %)	0	1 (5 %)	>0.05

Table 9: Three month complication of non-diabetic with negative biomarkers group in comparison with non-diabetic with elevated biomarkers group.

Parameter	ND - (n=20)	ND+ (n=19)	P Value
3-months LV dysfunction (number %)	1 (5 %)	7 (36 %)	<0.05*
3-months re-hosp. for ACS (number, %)	2 (10 %)	5 (26 %)	>0.05
3-months death (number, %)	0	4 (21 %)	<0.05*

Table 10: Baseline parameter of diabetic with negative markers group in comparison with diabetic with positive markers group.

Parameter	D - (n=20)	D+ (n=20)	P Value
Age (mean SD)	61.8 + 11.7	55.05 + 12.3	>0.05
Sex:			
Male (number %)	9 (45%)	14 (70%)	>0.05
Female (number %)	11 (55%)	6 (30%)	>0.05
Risk factors:			
HTN (number %)	11 (55%)	16 (80%)	>0.05
Hyperlipidemia (number %)	13 (65%)	14 (70%)	>0.05
Obesity (number %)	7 (35%)	11(55%)	>0.05
Prior MI (number %)	9 (45%)	11(55 %)	>0.05
Renal impairment (number %)	4 (20%)	3 (15%)	>0.05
History of stroke or TIAs (number %)	2 (10%)	2 (10%)	>0.05

Table 11: Clinical presentations of diabetic with negative biomarkers group in comparison with diabetic with positive biomarkers group.

Parameter	D - (n=20)	D+ (n=20)	P Value
Diagnosis in admission :			
UA (number %)	20 (100%)	0	
NSTEMI (number %)	0 (0 %)	11 (55 %)	
STEMI (number %)	0 (0 %)	9 (45 %)	
Echo FF			
EF (< 50 %)	2 (10 %)	10 (50 %)	<0.05*
Coronary Angiography (number %)			
One vessel disc	6 (30 %)	5 (25 %)	>0.05
Tw0 vessel disc	8 (40 %)	4 (20 %)	>0.05
Three vessel disc	6 (30 %)	11 (55 %)	>0.05

Table 12: In hospital complications of diabetic with negative biomarkers group in comparison with diabetic with positive biomarkers group .

Parameter	D - (n=20)	D+ (n=20)	P Value
In hospital LV Dysfunction (number %)	2 (10%)	13 (65 %)	<0.05*
In hospital Arrhythmias (number %)	3 (15 %)	5 (25 %)	>0.05
In hospital re-infarction (number %)	1 (5 %)	4 (20 %)	>0.05
In hospital Death (< 50 %)	1 (5 %)	3 (15 %)	>0.05

Table 13: Three month complications of diabetic with negative biomarkers group in comparison with diabetic with positive biomarkers group.

Parameter	D - (n=19)	D+ (n=17)	P Value
3 - month LV Dysfunction (number %)	6 (31 %)	12 (70 %)	<0.05
3–month re-hospitalization with ACS (number %)	4 (21 %)	14 (82 %)	<0.05
3-month Death (< 50 %)	2 (10.5 %)	10 (58 %)	<0.05

Table 14: In hospital complications of all subgroup.

Parameter	ND - (n=20)	ND+ (n=20)	D - (n=20)	D+ (n=20)
In hospital LV Dysfunction (number %)	1 (5%)	5 (25%)	2 (10%)	13 (65 %)
In hospital Arrhythmias (number %)	1 (5 %)	2 (10 %)	3 (15 %)	5 (25 %)
In hospital re-infarction (number %)	0 (0 %)	1 (5 %)	1 (5 %)	4 (20 %)
In hospital Death (< 50 %)	0 (0 %)	1 (5 %)	1 (5 %)	3 (15 %)

Table 15: In hospital complications of ND+ Versus D- subgroup.

Parameter	ND + (n=20)	ND- (n=20)	P Value
In hospital LV Dysfunction (number %)	5 (25%)	2 (10 %)	>0.05
In hospital Arrhythmias (number %)	2 (10 %)	3 (15 %)	>0.05
In hospital re-infarction (number %)	1 (5 %)	1 (5 %)	>0.05
In hospital Death (< 50 %)	1 (5 %)	1 (5 %)	>0.05

Table 16: Three month complications of all subgroup.

Parameter	ND - (n=120)	ND + (n=19)	D - (n=19)	D+ (n=17)
3 - month LV Dysfunction (number %)	1 (5 %)	7 (36%)	6 (31 %)	12 (70 %)
3–month re-hospitalization with ACS (number %)	2(10 %)	5(26%)	4 (21 %)	14 (82 %)
3-month Death (< 50 %)	0	4 (21%)	2(10.5%)	10 (58 %)

Table 17: Three month complications of ND+ and D- Subgroup .

Parameter	ND + (n=20)	D- (n=20)	P Value
3 - month LV Dysfunction (number %)	7 (36 %)	6 (31 %)	>0.05
3–month re-hospitalization with ACS (number %)	5 (26%)	4 (21%)	>0.05
3-month Death (< 50 %)	4 (21 %)	2 (10.5 %)	>0.05

RESULTS AND DISCUSSION

Coronary Heart Disease remains the leading cause of mortality in the developed countries.[5] Diabetes is not only a predisposing factor for cardiovascular disease but once diabetic patients develop coronary artery disease (CAD) they have significantly worse outcome compared to non-diabetic patients.[6]

The aim of the study was to analyze the prognostic implications of elevated biomarkers in patients with and without Diabetes with ACS in predicting three month morbidity and mortality. We studied 80 patients who were admitted for ACS, they were classified according to history of DM into 2 groups, Non diabetic group 40 patients and Diabetic group 40 patients, then the two groups were classified further into sub groups according to elevated markers indicating myocardial injury. Then were followed up for 3 months as regard morbidity and mortality.

The study results were matching with that Diabetic patients had significantly higher frequencies of previous myocardial infarctions, LV dysfunction, in hospital complications, and rehospitalisation for ACS up to death, in comparison to non-diabetic patients.

The results were in concordance with Chyun D et al.[7] who studied the outcome after myocardial infarction in patients with DM in 1698 patients among them 476 patients (28%) were diabetics, in this study there was statistically significant increased incidence of chronic renal insufficiency in diabetic than non-diabetic patients.

Also these results were in agreement with those reported by Alvaro M et al.[8] As they found that diabetic patients had lower ejection fraction at time of presentation tan those who are not diabetics. Also in agreement with the finding of Norhammer A et al.[9] Who studied 2158 patients without diabetes and 299 patients with diabetes who were randomized to early invasive and non-invasive strategy. Three vessel disease was diagnosed in 42% of diabetic patients and only in 31% of non-diabetic patients.

The results in present study which found that mortality in acute hospitalization for ACS was significantly higher in the diabetic group than non-diabetic group. Matched with what was reported by Kristin Franklin et al.[10] and also with Marlberg K et al.[11] Also three month mortality was higher with the diabetic group in our study and this was similar to what reported by Sean M et al.[12]

In the present study, the LV dysfunction during three months follow up was significantly increased with non-diabetic group with positive cardiac biomarkers and that was matched with what was reported by Spertus A et al.[13] Also it was found that incidence of death through three month follow up was significantly increased in diabetic patients with positive cardiac biomarkers than Diabetic patients with negative cardiac biomarkers, and that also was in agreement with what was reported by Janion M et al.[14]

SUMMARY & CONCLUSION

From this study, it can be concluded that elevated biomarkers of myocardial necrosis have adverse effects on patients either diabetic or non-diabetic on short term follow up. Diabetic patients with ACS without elevated biomarkers have a mortality and morbidity risk similar to patients who are not diabetic but have elevated biomarkers on presentation with ACS, and that diabetic patients with elevated biomarkers are at highest mortality and morbidity risk.

REFERENCES

1. Appleyard M: acute coronary syndrome. Circulation, Journal of the American heart association, 2008.
2. Malberg K, Yusuf S, Gerstein HC et al: Impact of diabetes on long term prognosis in patients with unstable angina and non Q wave myocardial infarction: results of OASIS. Circulation 102:1014, 2000.
3. Ravkilde J, Horder M, Gerhardt W, et al: Diagnostic performance and prognostic value of serum troponin – T in suspected myocardial infarction. Scand, J Clin Lab Invest 53:677, 1993.
4. Westerhout CM, Fu Y, Lauer MS et al: Short and long term stratification in acute coronary syndrome: the added value of quantitative ST segment depression and multiple biomarkers. AM J Coll Cardiol 48:939-947, 2006.
5. Labarthe DR. Epidemiology and prevention of cardiovascular diseases: A Global Challenge. Gaithersburg, Md: Aspen Publishers: 1998.
6. Yudkin JS, Oswold GA: Determinants of hospital admission and case fatality in diabetic patients with myocardial infarction. Diabetes care 11:351-8, 2000.
7. Chyun D, Vaccarino V, M urillo et al: Cardiac outcomes after myocardial infarction in patients with diabetes mellitus. American journal of critical care: 11:504-519, 2002.
8. Alvaro M, Charles H, Gervasio A et al: Impact of diabetes on mortality in patients with myocardial infarction and left ventricular dysfunction. Arch Intern Med.164:2273-79, 2004.
9. Norhammer A, Malberg K, Diderholm E et al: Diabetes mellitus: the major risk factor in unstable coronary artery disease even after consideration of the extent of CAD and benefits of revascularization. J Am Coll Cardiol 43:585-91, 2004.
10. Kristin Franklin, Robert J, Fredrick Spenser et al: Implications of diabetes in patients with acute coronary syndrome. Arch interna. Med.164:1457-63, 2004.
11. Malberg K, Yusuf S Hertezel C et al: Impact of diabetes mellitus on long term prognosis in patients with acute coronary syndrome. Results of Organisation to assess strategies for ischaemic syndrome (OASIS) study. Circulation 102:1014-19, 2002.
12. Sean M, Garrick C, Carolyn H et al: Diabetes and mortality following acute coronary syndromes. JAMA: 298:765-75, 2007.
13. Spertus A, Rumsfield S, Kimberly J, et al: One year health status outcome of unstable angina versus myocardial infarction: a prospective observational cohort study of acute coronary syndrome survivors. BMC cardiovascular disorders 7:28, 2007.
14. Janion M, Kurzawiski J: Difference of clinical course and prognosis of diabetes with myocardial infarction. Pol Arch Med Wewn 105(1)51-8, 2001.

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