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D DIMER IN MYOCARDIAL INFARCTION

Pontea Niaki, MD, MPH*[1], Imran Kalam, MD[2], Kashmala Shoaib, MD[3] and Chaitanya Patel[4]

[1]Clinical Documentation Specialist.
[2]Documentation Specialist.
[3]Rex Medical Care.
[4]Medical Officer, Sterling Hospital.

***Corresponding Author: Pontea Niaki, MD, MPH**
Clinical Documentation Specialist.

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ABSTRACT
We measured D-dimer levels in 40 STEMI and 40 NSTEMI patients. All patients of STEMI had increase in D-dimer, while significant amount of increase in D-dimer was seen in NSTEMI patients. Between the two groups, elevation was more in STEMI group. Mean D-dimer values of STEMI group were 461.37, and for NSTEMI, it was 412.28; standard deviation for both the groupswas 122.16 and 127.04, respectively. The standard error of difference between the two means was 4.40, while the actual difference between the two means was 49.08, which is twice the standard error of difference between the two means, which is highly significant. Applying unpaired Student's t test, the value comes to 0.00057 ($p < 0.05$), which is highly significant. In STEMI, 3 patients with D-dimer levels 650–750 and 1 patientwith D-dimer level of 550–650 had no resolution of ST elevation. Thus, high D-dimer levels have worse outcomes on ST segment elevation resolution. There were 7 deaths in STEMI group, out of which 5 had their D-dimer in more than 550 range (significantly raised), while there were 4 deaths in non-STEMI group, which had their D-dimer in 450–550 range (highest levels among non- STEMI group). Thus, high levels of D-dimer were associated with high levels of mortality. STEMI has worse outcome than NSTEMI. Also, in STEMI, high D-dimers levels have worse outcome on ST segment elevation resolution and carry high levels of mortality. Thus, D-dimer is significant marker for severity of MI.

BACKGROUND
D-dimer is considered a valuable marker of turnover of crosslinked fibrin. In contrast to several other markers of hemostasis, D-dimer assays are more stable and easy to measure and therefore suitable for clinical purposes

METHODS
The present study was performed in 80 patients (40 STEMI and 40 NSTEMI) who presented to Medicine Department, S.S.G. Hospital, Vadodara during March 2012–September 2013. Patients were divided in two groups of ST-elevation MI and non-ST-elevation MI, 40 each. Blood samples for D-dimer were taken 3–4 h after onset of chest pain. Patients aged between 40 and 75 years with ECG confirmatory of myocardial infarction were included in the study. Patients aged <40 and >70 years, pregnant women, malignancy, DIC, evidence of sepsis in body, evidence of pulmonary embolism and deep venous thrombosis, recent surgery, recent major trauma, and chronic liver and renal disease were excluded. Written informed consent was obtained from all patients. Complete history including age, sex, occupational history, redisposing factors, medication history, lifestyle history including smoking and alcohol consumption, chief complaints and risk factors, and family history were evaluated. Twelve lead ECG at speed of 25 mm/s was recorded at the time of admission and as and when required and then once daily. Diagnosis of acute myocardial infarction was put in all patients who presented with the typical chest pain of >30min duration with positive ECG. All patients with ST segment elevation of 1 mm in limb leads or 2 mm in chest leads in two contagious leads are considered to be diagnostic of ST elevation myocardial infarction on ECG basis. Cardiac markers CPK-MB and Troponin I of all patients were sent. STEMI patients underwent thrombolysis by Streptokinase, as Cardiac Cath Lab is not available at this facility. Those patients who had ST segment depression and or T wave inversion with elevated cardiac biomarkers were considered to have NSTEMI. D-dimer levels in both the groups were compared. Echocardiography was performed as a routine investigation after patient stabilizes within a week of indoor hospitalization with two-dimensional and color Doppler study. Patients were evaluated for resolution of clinical features, resolution of ECG changes, and 2D-Echo parameters, and finally, mortality in hospital was assessed. All data were analyzed statistically.

RESULTS AND DATA ANALYSIS

Table 1: D-Dimer Levels in ST and Non-STEMI.

D-dimer	ST (%)	Non-ST (%)	Total (%)
<250	0	15	7.5
250–350	20	17.5	18.75
350–450	37.5	55	46.25
450–550	22.5	10	16.25
550–650	12.5	2.5	7.5
650–750	7.5	0	3.75
Total	100	100	100

Table 2: Dimer Levels and Mortality.

D-dimer	STEMI Patients	STEMI patients Died	STEMI Mortality	NSTEMI Patients	NSTEMI patients died	NSTEMI Mortality	Total mortality
<250	0	0	0	6	0	0	0
250–350	8	0		7			0
350–450	15	0		22			0
450–550	9	2	22%	4	4	100%	46%
550–650	5	2	40%	1	0		33%
650–750	3	3	100%	0	0		100%
Total	40	7	17.5%	40	4	10%	13.75%

In the present study, mortality rate was 13.75%, while it was9.7% in USA and 6.0% in non-US hospitals.2 Mortality rates are 48–49% in men and 54% in women.3 Thus, high levels of D-dimer were associated with higher mortality. Moreover, complicated causes of death like free wall rupture & arrhythmias were present in STEMI patients with high D-dimer levels (550–750), while causes of death like pump failure & reinfarction were present in patients with D-dimer levels of 450–550. In NSTEMI patients, cause of death with 550–650 D-dimer level was arrhythmias, while causes of death like pump failure and REINFARCTION were present in patients with 350–550 Ddimer levels.

DISCUSSION

All patients of STEMI had increase in D-dimer, while significant amount of increase in D-dimer was seen in NSTEMI patients. Between the two groups, elevation was more in STEMI group. Mean D-dimer values of STEMI group were 461.37, and for NSTEMI, it was 412.28; standard deviation for both the groups was 122.16 and 127.04, respectively. The standard error of difference between the two means was 4.40, while the actual difference between the two means was 49.08, which is twice the standard error of difference between the two means, which is highly significant. Applying the unpaired Student's t test, the value comes to 0.00057 ($p < 0.05$), which is highly significant, thus, concluding that D-dimer levels are significantly raised in STEMI group and the difference is highly significant. In STEMI, there is full thickness infarction of heart wall, while in NSTEMI, there is partial thickness infarction of heart wall; so complications like cardiogenic shock, left ventricular failure, papillary muscle rupture leading to mitral regurgitation, and ventricular wall rupture leading to cardiac tamponade are more common in STEMI as compared to NSTEMI. In STEMI, 3 patients with D-dimer levels 650–750 and 1 patient with D-dimer level of 550–650 had no resolution of ST elevation. 3 patients with D-dimer levels of 550–650 and 2 patients with D-dimer levels of 450–550 had partial resolution of ST elevation and rest had complete resolution of STsegment elevation. Thus, it signifies that high D-dimer levels have worse outcome on ST segment elevation resolution and worse prognosis on MI outcome. Patients with complete resolution of ST-segment elevation have low mortality rate when compared to those with partial or no resolution of STsegment elevation.1 In our study, there were 7 deaths in STEMI group out of which 5 had their D-dimer in more than 550 range (significantly raised), while there were 4 deaths in non-STEMI group, which had their D-dimer in 450–550 range (highest levels among non-STEMI group). Thus high levels of D-dimer were associated with high levels of mortality. Thus, high D-dimer levels have worse prognosis of MI outcome and have increased mortality rates.

CONCLUSION

D-dimer levels were raised in significant proportion of NSTEMI; however, they were raised in all patients of STEMI. STEMI has worse outcome than NSTEMI. Also, in STEMI, high.

D-dimer levels have worse outcome on ST segment elevation resolution and have high levels of mortality, which thus signify as a marker for severity of MI.

Conflicts of interest

The authors have none to declare.

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