

Diagnostic Role of D-Dimer Test in the Patients Suffering from Disseminated Intravascular Coagulation (DIC), attending in Tertiary Care Hospital at, SKMCH, Muzaffarpur, Bihar

Sanjeev Kamal¹, Manoj Kumar²

ABSTRACT

Introduction: D- dimer test has recently been introduced as a diagnostic test for acute disseminated intravascular coagulation (DIC) and venous thrombosis. The aim of present study was undertaken to evaluate the sensitivity and specificity of D- dimer test for the diagnosis of acute disseminated intravascular coagulation and its role in the diagnosis of sub-clinical disseminated intravascular coagulation.

Material and methods: A total of 36 patients, out of which 21 patients of clinically diagnosed as acute disseminated intravascular coagulation and 15 patients with sub-clinical disseminated intravascular coagulation were included in the study.

Result: All the patients had positive D-dimer test, and markedly prolonged prothrombin time, activated partial thromboplastin time and thrombin time were seen in 26 (72.22%) patients. D- dimer test was seeming to be highly specific and less sensitive for the diagnosis of acute disseminated intravascular coagulation. Out of 15 patients predisposed to sub-clinical disseminated intravascular coagulation D-dimer was positive in 03 (20%) patients and prothrombin time, activated partial thromboplastin time and thrombin time were mildly prolonged in 02 (13.34%) patients.

Conclusion: It is suggested that D-dimer positivity for the diagnoses of sub-clinical disseminated intravascular coagulation need to be considered with caution and to be supplemented by other coagulation test including regular monitoring of d- dimer and coagulation tests.

Keywords: D-dimer, Disseminated Intravascular Coagulation.

INTRODUCTION

D- dimer test interpretation in the above conditions largely depends on the clinical profile of the patients, which consists predominantly of bleeding manifestations in acute DIC and thrombotic manifestations in the latter condition¹⁻³ due to abnormal, excessive generation of thrombin and fibrin in the circulating blood.

During the process, increased platelet aggregation and coagulation factor consumption occur. DIC that occurs slowly in weeks or months causes venous thrombo-embolic manifestations and rapidly over the hours or days causes bleeding as a common symptom.^{2,3}

Obstetrical Complications like abruptio placentae, saline-induced therapeutic abortion, retained dead fetus or products of conception, amniotic fluid embolism, Gram-negative bacterial Infections and their endotoxin causes generation of tissue factor activity in phagocytic, endothelial cells, mucin-

secreting adenocarcinomas of the pancreas, adenocarcinoma of the prostate, and acute promyelocytic leukemia, tumor cells express and release of tissue factor.⁴ Shock that causes ischemic tissue injury and severe tissue damage due to head trauma, burns, frostbite, gunshot wounds, snake venoms are major causes of disseminated intravascular coagulation.^{5,6} Despite its wide usage there is limited data on the sensitivity and specificity in the diagnosis of Acute DIC. The latter may be seen in a large number of conditions like disseminated tuberculosis, malignancies, post-operative states, septic shock and possesses a diagnostic problem since it is largely asymptomatic and of term has borderline normal screening coagulation tests.^{6,7} In the management or prophylaxis of venous thromboembolism heparin is used.

Thus, in the present study, the specificity and sensitivity of D- dimer test in acute DIC and its role in diagnosis of sub clinical DIC was evaluated in patients presenting to the laboratory of Hematology Department for the diagnosis of DIC.

MATERIAL AND METHODS

The present study was conducted in Department of Pathology, Sri Krishna Medical College, Muzaffarpur, with the help of Surgery, Obstetrics & gynecology and Medicine Department, during the period of January 2019 to March 2020.

A total of 36 patients, out of which 21 patients of clinically diagnosed as acute DIC and 15 patients with sub-clinical DIC, suffering from clinically acute DIC (disseminated tuberculosis, post-operative states, malignancy, septic shock, head injury and pneumonitis) with bleeding manifestation from at least three sites, and patients with conditions predisposing to DIC without clinical evidence of bleeding from any site were included in the study.

Healthy individuals of same age group and sex were taken as control group. The platelet count (PC), prothrombin time

¹Tutor, Department of Pathology, Sri Krishna Medical College, Muzaffarpur, ²Professor and H.O.D., Department of Pathology, Sri Krishna Medical College, Muzaffarpur, India

Corresponding author: Dr. Sanjeev Kamal, Address-Alka Colony, Sandalpur road, Mahendru, Patna, pin-800006, India

How to cite this article: Kamal S, Kumar M. Diagnostic role of D-dimer test in the patients suffering from disseminated intravascular coagulation (DIC), attending in tertiary care hospital at, SKMCH, Muzaffarpur, Bihar. International Journal of Contemporary Medical Research 2021;8(3):C9-C11.

DOI: <http://dx.doi.org/10.21276/ijcmr.2021.8.3.24>



(PT), activated partial thromboplastin time (aPTT), thrombin time (TT), D-dimer test and peripheral blood smear (PBS) examination were performed in all patients. PT, aPTT, TT was done by fully automated machine supplied by Rosch pharma and CBC was done by Mindray 6200 five part.

RESULT

Out of the 21 patients suspected to have clinically acute DIC, D-dimer test was positive in all cases. Markedly prolonged PT(>18_s), aPTT(>50_s) and TT(>20_s) were seen in 14 (66.67%) of patients. In 01(4.76%) patient PT was prolonged. Thrombocytopenia was seen in 05 (23.80%) patients. In 01 patient, PT, APTT and TT were normal. Peripheral smear examinations revealed microangiopathic hemolysis in all the above cases.

Out of 15 patients predisposed to sub-clinical DIC, D-dimer was positive in 03 (20%) patients and PT, aPTT and TT were mildly prolonged in 02(13.34%) patients.

The specificity and sensitivity of D-dimer test for acute DIC was calculated to be 83% and 100% respectively. The positive predictive value and negative predictive value was calculated to be 88% and 100% respectively.

DISCUSSION

Disseminated intravascular coagulation (DIC) is characterized by systemic activation of blood coagulation, which occurs under a variety of clinical conditions including sepsis, trauma, malignancy and obstetric disorders.^{1,2} The diagnosis of DIC is very difficult due to any gold standard tests. A scoring system for DIC in critically ill patients has been revised by the International Society of Thrombosis and Haemostasis (ISTH).^{2,3}

This scoring system is based on an underlying disorder known to be associated with DIC, a diminished platelet count, a prolonged prothrombin time (PT), a low fibrinogen level, and the presence of a fibrin-related marker. Routinely, a D-dimer assay is used as a fibrin-related marker. Various D-dimer assays are commercially available and used examination. It is possible that they might have had false positive D-dimer test or they may have been cases of an early form of sub-clinical DIC not affecting any coagulation parameter or peripheral smear.^{6,8}

Routinely in clinical practice due to its performance, costs and efficacy. The use of these D-dimer assays in routine clinical practice may be hampered by the long turnaround time or the specially required equipment.^{4,5} New rapid assays have been developed in order to increase the efficacy for the emergency situations. uses whole blood instead of plasma and is measured on a reflectometer device producing a quantitative result in ten minutes.⁹

The performance of D-dimer assays for the diagnosis of DIC has not been so thoroughly evaluated. As many current D-dimer assays are optimized for exclusion of venous thromboembolism, their measuring range may be too narrow for the diagnosis of DIC. In addition, the recommendations of the ISTH do not specify the fibrin-related marker. So, that, fibrin or fibrinogen degradation products or soluble

fibrin may be used as fibrin-related markers for the diagnosis of DIC. More specialized tests measure the generation of thrombin and have a high sensitivity and specificity for DIC, but they are not generally available for the routine clinical practice.^{1,3,11} The presence of DIC in severe illness has important therapeutic and prognostic value.

The management of DIC requires the treatment of the underlying disorder and supportive measures for the coagulopathy. there were no therapeutic options in the presented cases, the management of other malignancies, such as acute promyelocytic leukemia, benefits from rapid and reliable diagnosis of paraneoplastic DIC. Because D-dimer is routinely used as a fibrin-related marker, clinicians should be aware of the heterogeneity of the assays that measure D-dimer. Intensive collaboration between clinicians and clinical chemists is required when a clinical suspicion of DIC is not confirmed by a D-dimer test,

In the present study, D-dimer test was observed to be a highly sensitive (100%) test for diagnosing acute DIC, although its specificity was lower since it was also positive in normal individuals.^{9,10,11}

Thus, although its negative predictive value is high, its positive predictive value is low signifying that only in an appropriate clinical setting, D-dimer test positivity suggests DIC.¹² However, it may serve as a good screening test. Out of 15 patients predisposed to sub-clinical DIC, based on D-dimer tests positivity, abnormality in coagulation tests and presence of microangiopathic hemolytic anemia was seen in 01 patients.

In 03 patients, however, the coagulation parameters were normal and no microangiopathic hemolytic anemia blood picture was seen on peripheral smear

CONCLUSION

It is thus suggested that D-dimer test positivity for the diagnosis of sub-clinical DIC, needs to be considered with caution, and, the diagnosis may be conclusively made only if supplemented by other coagulation tests, peripheral smear examination for microangiopathic hemolytic anemia. In cases where the coagulation tests are normal and only D-dimer is positive, serial follow-up with D-dimer test and coagulation tests, may be helpful in diagnosis.

REFERENCES

1. Carr JM, McKinney M, McDonagh J. Diagnosis of disseminated intravascular coagulation. Role of D-dimer. *Am J Clin Pathol* 1989; 91:280.
2. EG. Disseminated intravascular coagulation: pathophysiology and laboratory diagnosis. *Fibrinol* 1993; 7:17.
3. Bernardi E, Prandoni P, Lensing AW et al. D-dimer testing as an adjunct to ultrasonography in patients with clinically suspected deep vein thrombosis: prospective cohort study. *BMJ* 1998; 317:1037.
4. Deykin D. The clinical challenge of disseminated intravascular coagulation. *N Engl J Med* 1970; 283:636-44.
5. Ott P, Astrup L, Jensen RH et al. Assessment of D-

- dimer in plasma: diagnostic value in suspected deep vein thrombosis of the leg. *Acta Med Scand* 1988; 224:263-7.
6. Butler E, Lichtman MA, Collar BS et al. *Williams Hematology*. 6th ed., 2001.
 7. Colman RW, Robboy SJ, Minna JD. Disseminated intravascular coagulation: a reappraisal. *Annu Rev Med* 1979; 30:359-74.
 8. Muller - Berghaus G. Pathophysiologic and biochemical events in disseminated intravascular coagulation: dysregulation of procoagulant and anticoagulant pathways. *Semin Thromb Hemost* 1989; 15:58-87.
 9. Baglin T. Disseminated intravascular coagulation: diagnosis and treatment. *BMJ* 1996; 312:683-7.
 10. Carr J, McKinney M, McDonagh J. Diagnosis of disseminated intravascular coagulation. Role of D-dimer. *Am J Clin Pathol* 1989; 91:280-7.
 11. Prisco D, Paniccia R, Bonechi F et al. Evaluation of new method for the selective measurement of fibrin and fibrinogen products. *Thromb Res* 1989; 56:547-51.
 12. Urano T, Kamiya T, Sakaguchi S et al. Fibrinogenolysis and fibrinolysis in normal volunteers and patients with thrombosis after infusion of urokinase. *Thromb Res* 1985; 39:145-55.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 29-01-2021; **Accepted:** 21-02-2021; **Published:** 26-03-2021