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Pathology

EVALUATION OF D-DIMER AND CRP LEVEL IN COVID-19 AND CAP(COMMUNITY ACQUIRED PNEUMONIA) PATIENTS AND THEIR CORRELATION WITH VTE SCORE(VENOUS THROMBOEMBOLISM SCORE)

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ABSTRACT

BACKGROUND: In recent outbreak of COVID-19 infection,the risk of thrombosis should be concerned.We observed dynamic changes of D-Dimer level,C-Reactive Protein(CRP) level and Venous Thromboembolism risk assessment score(VTE score) during active disease.We included patients of confirmed covid-19 patients who were RT-PCR positive and patients of community acquired pneumonia(CAP) who were confirmed by CT-SCAN findings.We observed correlation of D-dimer level with both CRP level & VTE score.

METHOD: We examined the clinical laboratory result of 50 patients with confirmed COVID-19 positive patients and 50 patients with community acquired pneumonia(CAP).We analysed D-dimer level of this patients by Automated Coagulometer-STAGO in our hematological laboratory and CRP level by latex method.We use pauda prediction score to identify patients at high risk for venous thrombo embolism.We observed D-dimer level of all patients with their correlation to CRP level & VTE score.S

RESULT: On admission,Both COVID-19 and CAP patients,D-dimer level were increased,more increased in COVID-19 patient compare to CAP patient. D-dimer level were related to inflammatory marker,mainly with CRP level.There was low correlation between VTE score & D-dimer levels weakened the role of D-dimer in the prediction of thrombosis.

CONCLUSION: Elevated baseline D-dimer levels are associated with inflammation but not with VTE score in COVID patients,So we can't judge whether anticoagulation is needed only according to D-dimer levels. Abnormal D-dimer level with inflammatory factors suggest that anticoagulant therapy might be needed.

KEYWORDS :COVID-19,D-Dimer,CRP,VTE score(Venous thromboembolism score)

INTRODUCTION

Since December 2019, a novel member of human corona virus which newly identified in wuhan,china,is officially named as severe acute respiratory syndrome coronavirus by international committee on Taxonomy of viruses(ICTV)[1]COVID-19 is usually characterized by lower respiratory tract symptoms with fever,dry cough,dyspnoea.The reported overall case fatality rate for COVID-19 by now was 2.3%,but case in those aged 70 to 79 years had an 8.0% and cases in those aged 80 years and older had a 14.8%[2].In some patients,severe pulmonary and extrapulmonary complications may lead to respiratory failure and life threatening events.It has been reported that about 50% of the patients had increased D-dimer levels and abnormal D-dimer levels are associated with poor prognosis.The incidence of deep vein thrombosis(DVT) and pulmonary embolism(PE) was 20.5% and 11.4% respectively in SARS cases.[10]Conventional anticoagulantion may need to be considered carefully,as there is an increased risk of bleeding in patients with COVID-19.Therefore,biomarkers,which can identified thrombus formation at early stages,might be used to evaluate the formation of thrombus and response to treatment.D-dimers are fibrin degradation products which have been shown to be useful in a clinical decision to rule out pulmonary embolism.[3]However,the relationship between D-dimer & COVID-19 patients with that of bacterial pneumonia,assessed the use of consecutive D-dimer level after admission to hospital,and explored its association with markers of inflammation.

MATERIAL AND METHOD

This was a retrospective study done at SMIMER hospital,Surat.50 Patients with confirmed COVID-19 Pneumonia who were admitted in SMIMER and 50 Patients with confirmed community acquired bacterial pneumonia who were also admitted in SMIMER,were included in our study.The diagnosis of COVID-19 was confirmed a positive result of real time reverse transcriptase polymerase chain reaction(RT-PCR).The COVID-19 Pneumonia has been classified into 4 types by National Health Commission.

(1)Mild: symptoms very mild, no pneumonia manifestationin CT scan (2) Ordinary: fever, respiratory tract symptoms, and pneumonia manifestation in CT scan, (3) Severe: respiratory distress (respiratory rate > 30/min), oxygen saturation ≤ 93% at rest,and PaO2/FiO2 ≤ 300 mmHg, (4) Critical:respiratory failure need mechanic ventilation,shock and multiorgan failure.We included patient who were clinically classified as severe at the time of admission.The Pauda prediction score is a risk assessment model used to identify medical patients at high risk for venous thromboembolism(VTE).On the basis of clinical characteristic including medical history,exposure history,comorbidities,sign- symptoms, and CT Scan.

INCLUSION CRIETERIA:

1)Hospitalized RTPCR positive patients
2)RTPCR negative,but CT finding positive for Pneumonia in hospitalized patients

EXCLUSION CRIETERIA:

1) Paediatric positive Patients
2) Positive Patients who were home quarantine
3) Positive Patients who get vaccinated

RESULT:

Our study population included 50 patients with COVID-19 and 50 patients with community acquired pneumonia (CAP). For COVID-19 patient,Median age was 62 years, and 21 were men and 29 were women. For CAP patients, the median age was 60 years, and 31 were men and 19 were women. Both of the COVID-19 patients and CAP patients had 1 or more coexisting medical Conditions. On admission, no matter in COVID-19 patients or CAP patients, most patients had fever, cough, breathlessness,myalgia, chest distress, diarrhea and fatigue. D-dimer levels were positively correlated with infection related biomarkers levels including CRP in both patients.we also note the correlations between these indicators after treatments in COVID-19 patients, and found that there were still great correlations between D-dimer and the same biomarkers. In COVID-19 patients with good clinical prognosis, CRP levels decreased after treatment, while D-dimer levels decreased synchronously with CRP level, D-dimer levels were truly related with CRP. there were 44 patients were cured or turned into mild cases, whereas 6 patients were died in our study. More important, we found that in deceased patients, both the untreated CRP or D-dimer levels and treated CRP or D-dimer levels were still abnormally high , conversely, both CRP and D-dimer levels significantly decreased in patients with a good clinical prognosis after therapy. the synchronous decline of D-dimer and CRP suggests that the elevated D-dimer levels in COVID-19 patients is related to inflammation, which limits its role in the prediction of thrombosis. Further analysis showing low correlation between Padua VTE score and D-dimer weakened the role of D-dimer in the prediction of thrombosis.

Table no.1 D-dimer and CRP level in Covid-19 positive patients and CAP patients

	COVID POSITIVE patient(n=50)	CAP(community acquired pneumonia) patient(n=50)
D-Dimer Level	09.00 ug/ml± 1.5 ug/ml	07.00ug/ml ± 1.5 ug/ml
CRP level	40.0 ± 10.0 mg/dl	35.5 ± 10.0 mg/dl

Table no.2 High D-dimer level and high VTE score in Covid-19 positive patients & CAP patients

	≥4 VTE score(n=50)	≥ 4 D-dimer level(n=50)
COVID patients	24	38
CAP patients	23	35

Table no.3 Baseline characteristic of patients on admission

Variable	COVID-19	CAP
Age	62 ± 10	60 ± 10
Sex		
Men Women	29 21	31 19
Cardiovascular disease	02	01
Pulmonary disease	04	02
Hypertension	18	15
Diabetes	22	12
Carcinoma	01	00
Smoking	12	15
Obesity	20	22
Recent trauma/surgery	01	02

DISCUSSION:

Elevated D-dimer levels have been reported in our study. As demonstrated in our study, similar to SARS and CAP patients, the D-dimer levels of COVID-19 patients was also elevated.It is well known that D-dimer are produced during fibrin breakdown and serve as a marker of fibrinolytic activity. A relationship between proinflammatory cytokines and markers of activation of the coagulation cascade, including D-dimer, has been demonstrated in critical patients or patients with sepsis.[5] There is also evidence that under inflammatory conditions, the alveolar haemostatic balance is shifted towards a predominance of prothrombotic activity.[6] In addition, pro-inflammatory cytokines may be involved in endothelial injury, and may activate coagulation and inhibit fibrinolysis in patients with severe sepsis.[7] In this, the relationship between D-dimer levels and the markers of inflammation were also analysed in both COVID and CAP patients. Although we lost the post-treatment data for CAP patients, all the data reported in our analysis showed that D-dimer levels were significantly correlated with inflammation and tended to normalize as the inflammation subsided in most of the patients, highlighting the point that inflammation is one of the causes of coagulation activation in patients with both COVID and bacterial pneumonia. However, one problem that could not be ignored is that patients with COVID-19 have higher levels of D-dimer when their CRP levels are lower than that of CAP patients. This highly suggests that there are other factors besides inflammation that responsible for activation of the coagulation system in patients with COVID-19.

VTE risk assessment(Pauda Prediction Score)	
Active cancer	3
Previous VTE (excluding superficial thrombophlebitis)	3
Known thrombophilic condition	3
Reduced Mobility	3
Recent trauma and/or surgery (<1 mo)	2
Elderly age (ie, >70 y)	1
Heart and/or respiratory failure	1
Acute myocardial infarction or ischemic stroke	1
Ongoing hormonal treatment	1
Obesity (body mass index >30)	1
Acute infection and/or rheumatologic disorder	1

If ≥4 points,it suggesting High risk of VTE

CONCLUSION:

Baseline D-dimer levels elevation are associated with inflammation in COVID-19 patients.D-dimer level have limited predictive value for thrombosis. We observed the change of D-dimer levels and CRP level during treatment of COVID-19 patients.Anticoagulant therapy is decided on the basis of abnormal changes of D-dimer level and Inflammatory markers.but in Covid-19 patients,predictive value of VTE score need to be further studied, it might be useful than baseline D-dimer levels for prophylaxis for venous thromboembolism in COVID-19 patients.

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