Section: Miscellaneous

Original Research Article

A COMPARATIVE STUDY OF COAGULATION PROFILE AND CRP IN COVID-19 INFECTED PATIENTS AND BACTERIAL PNEUMONIA PATIENTS

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ABSTRACT

Background: In this outbreak of Covid-19, there are concerns about thrombosis due to Covid 19 infection, hence, D-dimer levels became an important marker. This study compares the coagulation profile and C.R.P. between Covid-19 pneumonia and bacterial pneumonia patients. Additionally, we analyze the correlation between D-dimer and C.R.P. **Case Details:** Patients diagnosed with Covid-19 infection and bacterial pneumonia, 66 patients in each group, were referred to the haematology and biochemistry laboratory of BLDE(DU), Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura. **Result:** Patients with Covid-19 pneumonia and bacterial pneumonia were compared. It was noted that D-dimer and C.R.P. correlated in the majority of patients in both groups before treatment.The D-dimer levels were directly proportional to the C.R.P. levels in all covid patients and all bacterial pneumonia patients. Follow-up after 14 days was available for about 44 covid patients, out of which, 19 had elevated D-dimer even after reduction in C.R.P. following treatment. Out of those 19 patients, 14 had elevated P.T., aPTT and PT-INR. D-dimer and C.R.P. weredirectly proportional in a follow-up of 30 patients with bacterial pneumonia. **Conclusion:** D-dimer was directly proportional to C.R.P. in the majority of patients in both groups. Upon following up with 44 covid patients, 19 patients with highD-dimer levels, even after reduced C.R.P. following treatment, were found. Out of them, 14 had prolonged P.T., aPTT and PT-INR. Therefore, anticoagulant therapy can be consideredin these patients.

INTRODUCTION

Coronavirus disease 2019 was first discovered in Wuhan, China, in December 2019. Coronavirus disease 2019 is a single-stranded R.N.A. virus with a nuclear capsid and is spherical in shape. It mainly affects the lung by binding to the angiotensin-converting enzyme 2 receptors (ACE2). These Angiotensin Converting enzyme 2 receptors are mainly expressed in the apical part of the airway rather than the basolateral part; hence, the coronavirus mainly affects the apical part.[1]

After binding to the receptor, the virus releases the R.N.A., and virus-specific translation starts the production of mRNA; this mRNA codes for a virus-specific protein, leading to its production and subsequent formation of new virions, which are released via cell secretory mechanisms.

A severe acute respiratory syndrome due to Coronavirus disease 2019 was termed a pandemic by WHO on March 11, 2020. This outbreak raised concerns of thrombosis due to Coronavirus disease 2019 infection when the disease progresses. Therefore, FDP levels became a marker for Coronavirus disease 2019 as it is an important and proven marker for thrombosis and mainly, pulmonary embolism, which is a consequence of thrombosis. FDP and other acute-phase reactants, especially the C.R.P., are interlinked in the progression of the disease. This correlation is also seen in patients with community-acquired pneumonia. Hence, in this study, we compare levels of FDP and other acute-phase reactants (such as C.R.P.) between two groups— patients with Covid-19 infection and bacterial pneumonia.[2]

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MATERIALS AND METHODS

Blood samples of Coronavirus Disease 2019 infected patients and patients diagnosed with bacterial pneumonia were referred to the haematology and biochemistry laboratory of the Pathology and Biochemistry departments, respectively, at B.L.D.E. (Deemedtobe University), Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura. The study involved a total of 132 patients with 66 patients in each group.

Consent: Informed consent was obtained from all patients.

Group 1- Covid-19 positive patients (RT-PCR positive). Group 2- Bacterial pneumonia patients. D-dimer and C.R.P. will be quantified using an automated machine.

Type of Study: Cross-sectional study.

Inclusion criteria:

1. Patients with Covid-19 infection and patients with bacterial pneumonia in B.L.D.E. (Deemed to be University), Shri BM Patil medical college were included.
2. Cases that lacked a C.T. report werenot excluded.
3. Patients with bacterial pneumonia with culture positivity were included.

Exclusion criteria:

1. Patients with Negative RT-PCR for Covid-19 were excluded.
2. Patients on aspirin therapy were excluded.
3. Patients with suspected bacterial pneumonia but without culture positivity were excluded.

Covid-19 positive patients were detected by RT-PCR. Bacterial pneumonia patients were taken into account through clinical confirmation and reports supporting the presence of pneumonia; additionally, these patients tested negative on RT-PCRs. Further, the patients were ensured to be not positive for both IgG and IgM, specifically for the Covid-19 group. D-dimer was measured in Mini-Vidas, and it detects values up to 5000ng/ml. C.R.P. values can be detected in Vitros 5.1. Other coagulation parameters, such as PT and aPTT, can be detected in A.C.L. pro elite.

The results were entered in a Microsoft Excel sheet and the data was analyzed.

RESULTS

A total of 132 cases were included in the study, out of which 66 cases each were grouped in both COVID-19 and bacterial pneumonia patients. The follow-up was available in 44 patients of Group1 (Covid-19 Pneumonia) and 30 patients of Group 2 (Bacterial Pneumonia) as shown in [Figure 1]

The D-dimer and CRP levels correlated in both groups before the follow-up was done. That is, in both groups, there was an increase in D-dimer (The mean value of D-dimer in Group 1 was 1913.2ng/ml, and the mean in Group 2 was 643.7ng/ml) and CRP before follow-up. There were no changes in PT and aPTT in both of the groups before the follow-up.

Out of the 66 patients included in the COVID-19 group, 44 cases were available for follow-up. Out of which, 19 cases had elevated D-dimer (Mean: 916.2ng/ml) even after falling in CRP after 14 days of follow-up as shown in [Figure 2].

There were 19 COVID-19 Patients who had elevated D-dimer and were tested for other entities in the coagulation profile such as the PT and aPTT and it was found that 14 patients out of the 19 had elevated or abnormal PT and aPTT levels as shown in [Figure 3].

This trend was not followed in bacterial pneumonia cases.

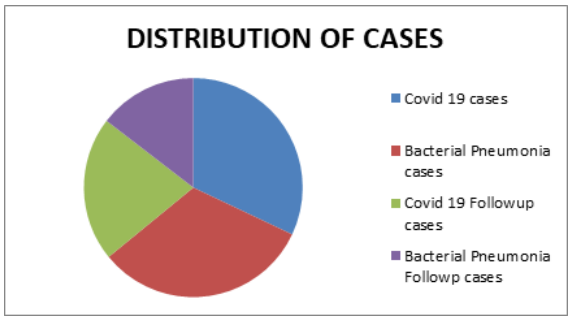

Figure 1: A total of 132 cases were included in the study, out of which, 66 cases were included in each group of COVID-19 and bacterial pneumonia patients. The follow-up was available in 44 patients of Group1(Covid-19 Pneumonia) and 30 patients of Group 2 (Bacterial Pneumonia)

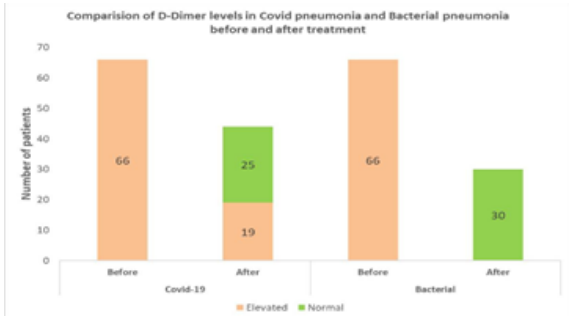

Figure 2: Out of the 66 patients included in the COVID-19 group, 44 cases were available for follow-up, out of which, 19 cases had elevated D-dimer even after a fall in CRP after 14 days of follow-up.

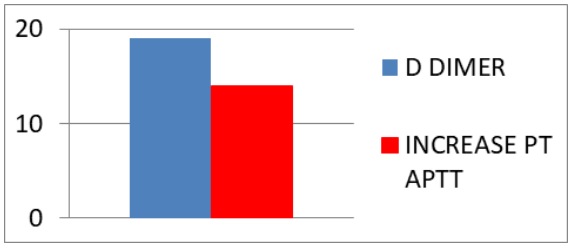

Figure 3: 19 COVID-19 patients had elevated D-dimer and were tested for other entities in coagulation profile, such as the PT and APTT. 14 patients out of the 19 patients had elevated or abnormal PT and APTT levels.

DISCUSSION

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Coronavirus disease 2019 was a viral disease first discovered in Wuhan, China, in December 2019. Coronavirus disease 2019 can cause similar effects like SARS-Cov. Coronavirus disease 2019 affected a large amount of the population, it was termed a global illness, and thus World Health Organization declared Coronavirus disease 2019 a pandemic.[3] The wide belief about the pathogenesis is that the virus uses the angiotensin-converting enzyme 2 receptors for its entry, mainly into the respiratory tract. Viral origins are said to be zoonotic with minimal evidence of genomic similarity to the bat coronaviruses but without an intermediate animal reservoir.[4] D-dimer is a very important marker of pulmonary embolism. Studies were conducted to assess the association of D-dimer and CRP with Covid-19 and bacterial pneumonia patients. A positive correlation was obtained, but the investigators did not follow up on the cases.[5-12] Researchers have conducted many studies on Covid-19 patients during their hospital stay, and it was concluded that coagulation profile played a major role in assessing the severity of the disease. Elevation of aPTT and PT contributed to poor prognosis but the investigators have not studied the follow-up cases.[13-18] During the Covid-19 pandemic, there was a rationale use of anticoagulant therapy citing their positive effects towards better prognosis and avoiding late complications such as DIC and pulmonary embolism as evidenced in many studies, but these studies have not included follow-up cases as it would have established a correlation between D- Dimer, P.T, APTT and need for anticoagulant therapy.[19-25] The role of follow-up cases becomes important because the use of anticoagulant therapy based on the initial reports of elevated D-dimer can be misleading because both D-dimer and CRP can be elevated during the initial stages of infections. Moreover, this trend is also seen in bacterial pneumonia patients as evidenced by many studies.[5] Thus, the present study was done to compare the trend of D- dimer and CRP in both Covid-19 related pneumonia and bacterial pneumonia patients both during the initial stages of the disease and its follow-up after 14 days of treatment. The study yielded a positive correlation between D-dimer and CRP during the initial stages of the disease. Follow-up cases of Covid-19 pneumonia showed elevated D-dimer in 19 patients of the 44 available follow-up cases, out of which, 14 had elevated PT, aPTT and PT-INR levels.

CONCLUSION

To conclude, D-dimer was directly proportional to C.R.P. in most patients in both groups. Even though the D-dimer before follow-up in both groups increased, the mean D-dimer value of Covid-19 was higher compared to bacterial pneumonia before follow-up. However, there were many cases of Covid-19 pneumonia patients where D-dimer and CRP levels similar to that of bacterial pneumonia were noted, so follow-up becomes necessary. Upon follow-up in 44 Covid-19 patients, 19 patients were found with high D-dimer levels even after reduced CRP following treatment; 14 of them had prolonged P.T., aPTT, and PT-INR. Anticoagulant therapy can be considered in these 14 patients who had elevated D-dimer following treatment and a fall in CRP.

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