CLINICAL LABORATORY PARAMETERS AND COMORBIDITIES ASSOCIATED WITH SEVERITY OF CORONAVIRUS DISEASE 2019(COVID-19) IN PULWAMA REGION JAMMU AND KASHMIR

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 Abstract

 The COVID-19 pandemic, caused by the coronavirus, rapidly spread worldwide. Assessing the severity of the illness can be facilitated by considering various laboratory markers and comorbidities. Early detection of disease progression in severe COVID-19 cases is crucial for effective patient triaging. Our research focused on examining the characteristics, significance, and purpose of laboratory results and comorbidities regarding the severity and progression of COVID-19 in individuals. The study was conducted between early January and mid-April 2022, involving 31 individuals who provided blood samples and clinical information at the District Hospital in Pulwama, Jammu, and Kashmir. Various biological indicators, including total blood count, ESR, CBC, D-dimer, CRP, serum ferritin, SpO2, blood sugar, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP), were analyzedin this experiment.

KEY –TERMS In the realm of analyzing patient data related to the unique coronavirus in India, various terms come into play, such as data science, data analysis, predictions, trend analysis, forecasting, data mining, network analysis, pattern mining, rule mining, classification, cluster analysis, lockdown, social Distancing, and degree centrality

INTRODUCTION.

The global impact of the novel coronavirus disease (COVID-19) has been significant, affecting over 230 countries, territories, and regions. By January 2022, more than 630 million people had contracted the illness, losing nearly 6.1 million lives. Patientsare categorized as mild, moderate, orsevere based on their clinical symptoms and laboratory test outcomes. Moderate cases involve symptoms like fever, exhaustion,dry cough, myalgia, dyspnea, and pneumonia. Severe cases may experience respiratory failure, sepsis, septic shock, multiorgan dysfunction, and systemic dysfunctions, which can be fatal. Evaluating the disease course is aided by using biomarkers, allowing for better risk stratification, differentiation between severity levels, patient monitoring, and guidance for therapeutic interventions.

While many studies have explored laboratory changes in confirmed COVID-19 patients, there needs to be more focus on the correlation between routine laboratory tests and disease severity. Various laboratory alterations, including complete blood count (CBC) variables, coagulation parameters, and inflammation- related markers, have been observed in many confirmed COVID-19 patients. Additional test results may show lymphopenia, elevated white blood cell (WBC) and erythrocyte sedimentation rate (ESR) levels, increased D-dimer, C-reactive protein (CRP), and ferritin levels. This article examines the role of several biomarkers in predicting the prognosis of COVID-19, analyzing their fluctuations based on illness severity. These biomarkers, such as WBCs, lymphocytes, granulocytes, platelets, RBCs, CRP, D-dimers, ESR, serum ferritin, and SpO2, serve as tools for patient categorization and mortality prediction.

Older patients were more susceptible to COVID-19 compared to younger individuals. Diabetes mellitus was considered the most significant risk factor for developing comorbidities. The severity of COVID-19 symptoms and indications canbe assessed using biological markers such as CBC, WBC, granulocytes, and ESR.

While lymphocytes and SpO2 levels remained within the normal range, the levels offerritin, CRP,and D-dimer significantly increased with the severity of the illness. Factors such as gender, age, and diabetes mellitus substantially impact the severity and mortality of COVID-19. Unstable COVID-19 cases exhibit elevated levels of mostbiological markers, distinguishing them from non- severe cases. These indicators canbe utilized to monitor the clinical progression of COVID-19 and identify severe cases.

MATERIAL AND METHODS.

A cross-sectional study was conducted from June to August 2021, collecting patients' clinical information and blood samples. To test for SARS-CoV-2 infection, reverse transcription- polymerase

chain reaction (RT-PCR) was employed. Nasopharyngeal swab samples were taken to gather viral RNA, which was then automatically extracted using the Qiagen EZ1 Advanced XLapparatus within 45 minutes of collection. USING POWER CHEK, Real-time RT-PCR was utilized to amplify portions of the SARS-CoV-2 envelope (E) and open reading frame one ab (ORF1ab) genes.

The study examined various biological markers, including CBC, D-dimer, ESR, serum ferritin, blood sugar, and CRP. CBC analysis was performed using the Medonic M- Series hematological analyzer, while biochemistry tests were conducted using the Cobas C111 multiparametric automated analyzer.

The Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia of the People's Republic of China [22] was the primary reference for clinically grading the patients. The categories were defined based on the following traits, with minimal clinical symptoms being oneof them.

Mild type: There is no evidence of pneumonia in cases with relatively moderate imaging characteristics and clinical symptoms.

Moderate type: Respiratory symptoms, fever, and imaging features indicate pneumonia.

Complex: Severe respiratory problems can be identified by one or more of the following criteria: breathing at a rate of 30 breaths per minute, resting mean oxygen saturation of 93% or below or an arterial partial pressure to inspired oxygen ratio of300 mmHg or less.

Statistical investigation: Pearson correlations, polynomial regressions, and ANOVA tests were conducted.

RESULTS

The study included a diverse population of confirmed COVID-19 patients, with an average age range of 17 to 75. Men exhibited a higher likelihood of experiencing severe symptoms compared to women. Patients under 16 had the fewest cases, and no severe cases were observed in this age group. Most cases occurred in patients between the ages of 18 and 34. Patients aged 75 and above tended to have more severe cases than younger ones. The prevalence of smoking among the patientswas relatively low.

Notably, the study revealed that COVID-19 cases were more common amongnonsmokers than smokers across all severity levels. While patients with

hypothyroidism did not show a higher risk of severe symptoms, those with diabetes were more likely to experience severe symptoms. The presence of both diabetes and hypertension further exacerbated the intensity of symptoms. Around half of the individuals reported mild symptoms andno underlying health conditions.

Irrespective of disease severity, a significant positive correlation was observed between the total number of white blood cells (WBC) and the number of granulocyte cells in all COVID-19 patients. Additionally, there was a significant correlation between the hematocrit level and the total number of red blood cells (RBC), with higher R2 values observed in mild (0.77), moderate (0.61), and severe (0.76) cases.

A statistically significant correlation (R2 = 0.67) was found among patients with moderate symptoms between the total WBC and lymphocytes. Furthermore, an increase in C-reactive protein (CRP) levels positively correlated with an increase in erythrocyte sedimentation rate (ESR) in patients with mild symptoms (R2 = 0.66). While lymphocyte counts decreased in the severe group (1.5 x 109 cells/liter) compared to the soft (2.0) and moderate (1.8) groups (p = 0.01),the study observeda significant increase in WBC count, including granulocytes, with increasing illness severity (p < 0.001). The essential metrics were monitored and compared among mild, moderate, and severe COVID-19 symptomatic patients.
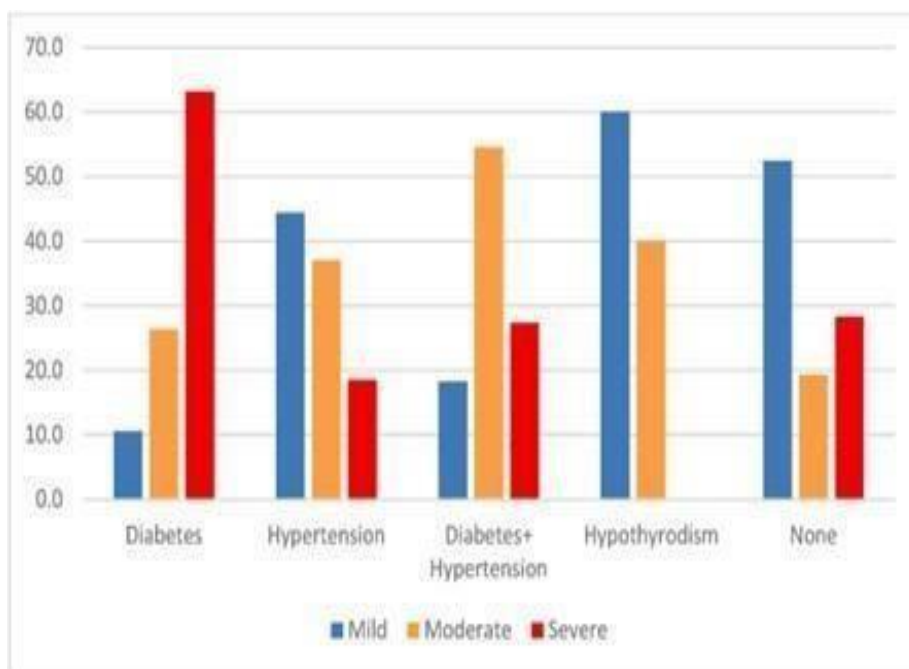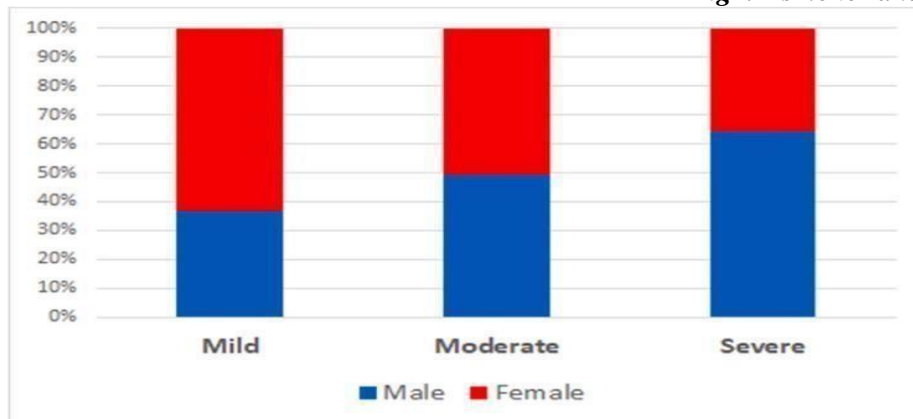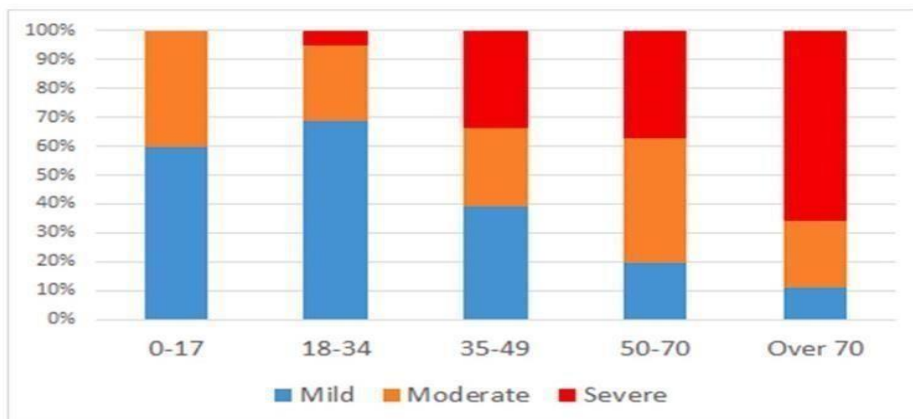

Fig 1.1 Mild,Moderate and Severe patients
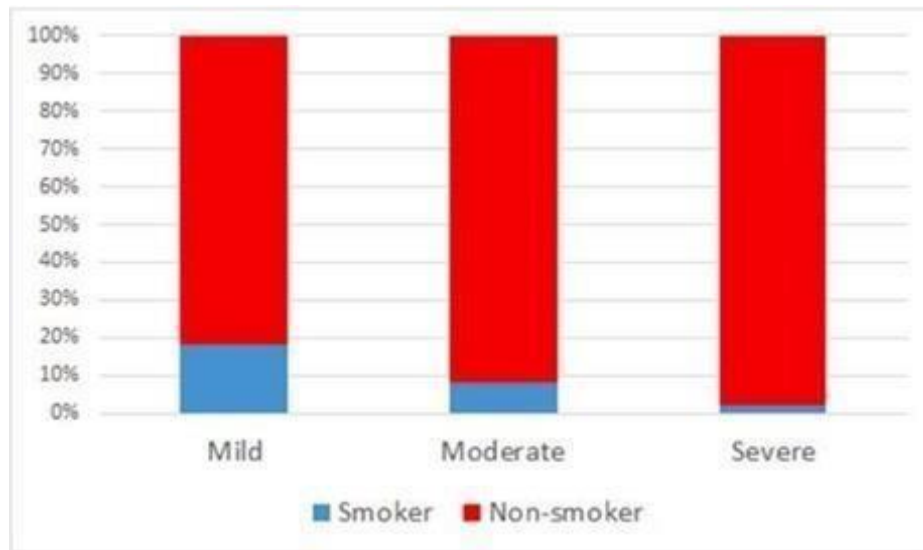
Fig1.2 smoker and non-somker patients

Fig 1.3 in males and females mild,moderate and severe.

Conclusion.

Male patients had a higher likelihood of experiencing severe symptoms, while male and female patients above 70 were more prone to severe symptoms. Additionally, a lower proportion of patients with smoking history were observed in extreme cases. The severity of the condition was associated with elevated levels of hematological indicators such as WBC, granulocyte, ESR, ferritin, CRP, and D-dimer. As the disease's severity increased, SpO2 and lymphocytes decreased. It is crucial to monitor and assess these parameters for tracking and determining the progression of the illness.

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