Estimation of variations in the Erythrocyte Sedimentation rate in Covid Recovered Patients.

*Running title***:** Erythrocyte Sedimentation Rate in Covid Recovered Patients. Control Patients

Abstract:

Background:

A cluster of patients with pneumonia of unclear cause developed in Wuhan, China in December 2019, and infection with a novel coronavirus virus called severe acute respiratory syndrome coronavirus was later verified. Although fever and cough were the most common early signs and symptoms of coronavirus illness, extrapulmonary symptoms have also been reported. Many studies demonstrate that Covid 19 swiftly progress to acute respiratory distress syndrome and even multiple organ dysfunction .

Aim:

The study aims to evaluate the erythrocyte sedimentation rate count in Covid recovered individuals and compare it with healthy controls.

Materials & Methods:

A cross-sectional pilot study in 5 healthy covid uninfected and 5 Covid recovered individuals was conducted, the blood samples were collected and the erythrocyte sedimentation rate was calculated for each set of controls and samples. Statistical analysis was performed using SPSS software. An independent t-test was done to compare the results.

Results:

The mean value of the control participants was found to be 8.08 ± 4.38 and the mean value of Covid recovered patients was 20.60 ± 1.81. The difference in Erythrocyte Sedimentation Rate (ESR) values between control individuals and Covid recovered patients was statistically significant with the p value of less than 0.005.

Conclusion :

Within the limitations of the study, we conclude that the majority of the study population are between 18-21 years of age and the most of the Covid recovered patients have higher ESR values compared to the healthy uninfected individuals .

Keywords: COVID recovered, Erythrocyte Sedimentation Rate, innovative technique, Uninfected .

INTRODUCTION:

The pandemic global outbreak Covid19 is a new human infecting beta coronavirus is likely to be originated from the chrysanthemum bats.(1) The novel virus SARS- CoV- 2 is found to cause a type of pneumonia associated problem termed Severe Acute Respiratory Syndrome.(2) The virus appears to be spherical and have proteins called spikes protruding from their surface.(3) The pandemic outbreak COVID-19 spreads mainly by droplets produced as a result of coughing or sneezing of a COVID-19 infected person. (4)The spread of novel coronavirus occurs through direct close contact with COVID-19 patients within one metre of the infected person and the rate of spread is enhanced especially if they do not cover their face when coughing or sneezing.(5) The novel virus also spreads by the droplets surviving on surfaces and clothes for many days.(6) Therefore, touching any such infected surface or cloth and then touching one's mouth, nose or eyes can transmit the disease(7).The Hydroxychloroquine,(8) an old drug used for the treatment of malaria, has demonstrated marked efficacy and it is acceptable globally in treating COVID-19 associated pneumonia .

Erythrocyte Sedimentation Rate is a test that can indirectly measure the degree of inflammation that is present in the body.(9) The test actually measures the rate of fall of erythrocytes in a sample of blood. COVID-19 has been demonstrated in other researches to swiftly progress to acute respiratory distress syndrome and even multiple organ dysfunction , the clue to which can be obtained by the levels of ESR in blood . Because most research has focused on changes in the respiratory system, our knowledge of COVID-19 is still limited and the characteristics of other organ involvement and prognosis in COVID-19 patients are unknown.

Erythrocyte sedimentation rate (ESR) increased during COVID recovery. The high level of ESR is sustained for an extended time even after the patient recovers from COVID-19 which results in risk of tumor, tuberculosis, rheumatic diseases, anemia, etc.Although the increased ESR can not be explained without any existing evidence, it may links with the abnormal pathologic changes in some of COVID-recovered patients and show the negative prognosis which provides the clue to reduce the mechanism of illness progressing in COVID recovered patients.Our team has extensive knowledge and research experience that has translate into high quality publications (10).(11–24) ,(25–29) The study aims to evaluate the erythrocyte sedimentation rate count in covid recovered individuals and compare it with healthy controls.

MATERIALS AND METHOD:

The present cross sectional study was conducted in Saveetha Dental College & Hospitals in AUGUST 2021 and involved normal uninfected healthy individuals and patients affected with covid and recovered three months ago. The study and sample collection were approved by the Institutional ethical committee with an approval number of IHEC/SDC/UG/-1900/21/211.

Demographic data

The study included a total of n=10 participants who were divided into two groups. The mean age of the participants was 18-21 years. Among the participants 6 were males and 4 were females. Group I consists of control individuals, Group II is Covid recovered patients who recovered uneventfully three months before the initiation of the study.

Patients Selection and Recruitment:

The samples were recruited from the COVID recovered patients. Clinical history was taken from COVID recovered patients. It was also ensured that patients with systemic comorbidities or terminally ill patients were not included for the study. All the patients included in the study belonged to the same ethnic group of Tamil Nadu. Informed consent was obtained from the patients for inclusion into the study and it was also ensured that the patients anonymity was maintained. All the patients completed a questionnaire covering medical, residential, and occupational history.

Variables

Dependent variables were the age and Erythrocyte sedimentation rate whereas the independent variable was gender. The erythrocyte sedimentation rate was expressed as mm/hr.

Statistical analysis

The sampling method followed in this comparative study is random sampling . The mean values of each parameter were tabulated along with the significant values and plotted in the form of bar graphs using SPSS. Independent t-test analysis was used to compare the results that were obtained.

RESULT :

Correlation of erythrocyte sedimentation rate and the groups

The mean value of the erythrocyte sedimentation rate of control participants was found to be 8.08 ± 4.38 and the mean value for the COVID recovered patients was found to be 20.60 ± 1.81. The Erythrocytes Sedimentation Rate (ESR) count difference between control and COVID recovered patients was observed with a p value of less than 0.005 which is considered to be statistically significant.

Table 1: Table showing Mean ± SD. significance at the levels of $p<0.005$

Group	Mean	Std. Deviation	Std. Error	Sig.
Control	8.8	4.38	1.95	<0.005
Covid Recovered	19.8	1.81	0.81	

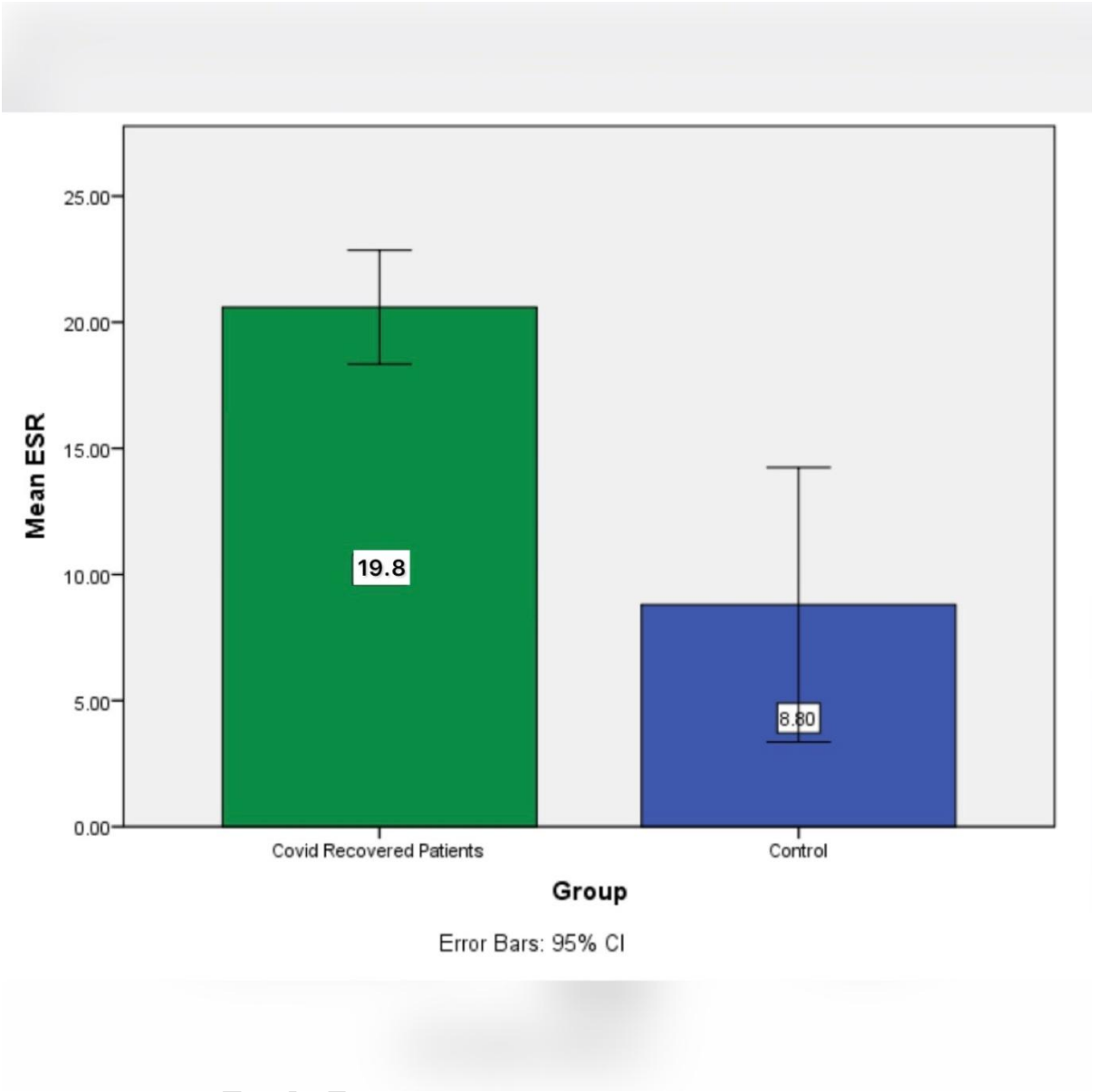

Figure 1: Bar graph depicts the association between the group of patients and Mean ESR Value. The X axis represents the group of patients included in the study and Y axis represents the mean ESR value. Blue colour denotes the control group and Green colour denotes the COVID recovered patients. The COVID recovered group of patients have shown an increase in the ESR value when compared to the control group , with a p value <0.005, which is considered to be statistically significant.The above Error bar graph shows 95%Cl value .

DISCUSSION

In our study, we were able to find that there is a significant rise in the level of the ESR value in the COVID recovered patients even after three months of uneventful recovery of these patients when compared to the control group. The individuals who were considered as

samples for the recovered group were all home quarantined and did not have any serious ailments during the entire duration of the infection. In spite of a full recovery, we were able to observe that the ESR values of these patients were high and abnormal when compared to the healthy control group who were age and sex matched to give a more comparative result.

Klinck et al discovered that the ESR began to rapidly increase about 2 weeks after COVID-19 infection ((30) indicating that even though the signs of fever and dry cough faded and the alteration in chest CT symptoms improved, the ESR remained elevated for a long period.(31) Brouillard et al mentioned in his study that increased level of ESR cannot be explained by all existing data, it may be associated with abnormal pathologic change in some COVID-19 patients with poor outcomes, which gives a good idea to decode the mechanism of COVID-19 illness severity and prognosis.(32) A previous study by Sheng et al found that there is an aberrant lymphopenia presented after COVID–19 and returned to normal level after recovery from viral infection, which is consistent with typical characteristics of viral infection.(33)
Hess CT et al. found that the COVID–19 such as pneumonia could be associated with bacterial infection as the illness progressed, as the research indicates that inflammatory markers such as leukocyte and neutrophil counts, IL–6, and CRP levels elevated.

The present study is in concordance with study by Klinck et al who quoted that ESR dramatically increase around two weeks after COVID–19 infection, and the high level of ESR persisted for a long period despite the absence of fever and dry cough.((30)In support with these findings, the ESR rate in the present study is found to be increased in the Covid recovered population in spite of recovering from the infection for three months
So the relationship between the control individuals and COVID recovered patients is specially demonstrated in special study.The present study possesses limitations such as parameter.Further studies with large sample,size, focus on detail concerned with many parameters like Age ,Gender should be done to significantly demonstrate the ESR value is more in COVID recovered patients than controlled individual.(34)

CONCLUSION:

Within the limitations of the study we conclude that the Erythrocytes sedimentation rate of the COVID Recovered patients was found to be more when compared to the normal control group providing insight into the illness progression and long-term impact of COVID-19 on patients.. These individuals did not have any serious ailments during the entire duration of the infection and in spite of a full recovery, we were able to observe that the ESR values of

these patients were high and abnormal when compared to the healthy control group who were age and sex matched to give a more comparative result.

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