



## COVID-19 IN CHILDREN- PROGNOSTIC INDICATORS AND OUTCOME

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## KEYWORDS :

## INTRODUCTION

Since December 2019, an increasing number of pneumonia cases of unknown reason emerged in Wuhan, China<sup>1</sup>. Deep-sequencing analysis from nasopharyngeal swabs, sputum, lower respiratory tract samples, and blood indicated a novel coronavirus, known as 2019-nCoV or COVID-19<sup>2</sup>. COVID-19 is a zoonotic virus known to be notorious to cause a wide spectrum of diseases, ranging from mild common flu to severe acute respiratory distress syndrome, this new virus engulfed the entire world in its havoc and was ultimately declared as a pandemic disease by WHO ON 11<sup>th</sup> of March, 2020.<sup>3</sup>

Even with millions of deaths across the globe and billions of people in its grip, little is known about its blood picture and prognostic indicators. Among the various debates, it has been proved that inflammation plays an important role in the pathogenesis of COVID-19<sup>4,5</sup>. Changes in blood pictures in COVID-19 infected adults could be traced in literature. But being a novel virus, very few studies could be traced in literature with respect to paediatrics age group. And the few studies that could be traced, did not mention about its prognostic significance.

It is believed that leukocytes amongst all the blood parameters play the pivot role in body's defence mechanism. Moreover, investigations encompassing the leukocytic count and the differential leukocytic picture is a cheap, easily available and not a time-consuming manoeuvre. As COVID-19 manifests with respiratory and gastrointestinal tract related symptoms,<sup>1,2</sup> A study was undertaken to observe the leukocytic presentation and difference between COVID-19 positive and COVID-19 negative population, within a specified time period presenting with similar symptoms. We tried to deduce a prognostic indicator as well from the study.

## AIM

To compare the leukocytic presentation in COVID-19 positive and COVID-19 negative paediatrics population.

## OBJECTIVE

1. To study the leukocytic presentation in COVID-19 positive and COVID-19 negative population.
2. To determine prognostic indicator of COVID-19 severity.

## METHOD

A comparative observational study was conducted on 54 COVID-19 positive and 54 COVID-19 negative paediatrics population of age more than one month and less than twelve years from the period of 21<sup>st</sup> of May, 2020 to 30<sup>th</sup> of November, 2020 at Assam Medical College and Hospital. Ethical committee clearance was taken for the same purpose.

Inpatients of the above-mentioned age group with symptoms of respiratory tract infection; viz, cough, rhinorrhoea, breathing difficulty, fever or with gastrointestinal tract infection; viz loose stool, vomiting were included in the study. Patients with similar symptoms but age less than a month, or more than twelve years or expiring within half an hour of admissions were excluded from the study.

They were tested for COVID-19 by quantitative real-time reverse transcription-polymerase chain reaction from nasal and oropharyngeal swab samples or by rapid antigen test for COVID-19 from nasal swab. They were further divided into two groups; viz COVID-19 positive study group and the COVID-19 negative, comparative group. There were 57 COVID-19 positive patients of the mentioned age group. But 3 of the positive patients expired within half an hour of admission and hence excluded from the study. Thus, we had 54 COVID-19 positive study group and 54 patients in COVID-19 negative comparative group.

Complete blood count (CBC) and peripheral smear (Siemens ADVIA 2120i hematology analyzer with auto slide) were done on admission. CBC values were recorded and assessed according to age-specific intervals.<sup>7</sup> Peripheral blood smears were evaluated blindly, and differential counts were formulated by manual counting.

**Neutrophil:** lymphocytic (NL) ratio was also calculated manually. The severity of the disease was classified according to mild and severe COVID based on COVID-19 positivity status and clinically. They were followed up till being discharged.

The data were collected and tabulated on Microsoft excel. The data were expressed as mean  $\pm$  SD. Student's *t*-test was used to compare the means, and Chi-square test was used to distribute the percentage of categorical data between groups.  $P < 0.05$  was considered significant.

## RESULTS

Total 54 patients were enrolled in the study group with COVID-19 positive status and 54 patients were enrolled in the comparing group with COVID-19 negative status.

In both the groups the mean age group was  $8 \pm 2$  years and the male: female ratio was 1.67:1. No age and sex difference was found ( $p = .8$  and 1, respectively) making both the groups comparable.

The total leukocyte count along with differential leukocyte picture of both the groups were studied at the time of admission. In the study group lymphocytopenia was the predominant deranged blood parameter accounting for 34.4%, followed by neutropenia accounting for 25.5%, followed by a normal blood picture, accounting for 24% and leucocytosis for 12% of the population., whereas in the comparing COVID-19 negative group, a normal blood picture accounted for 56% of the population, followed by leucocytosis for 32% of the population, followed by neutrophilia for 11% of the population and lymphocytopenia for 1.3 % of the population.

The study populations were further divided into mild and severe COVID. It was found that 81.48% had mild COVID and 18.5% had severe COVID. The neutrophil: lymphocyte ratio was also calculated manually for them. It was deduced that

patients with mild COVID had neutrophil: lymphocyte ratio <1.5 and patients with severe COVID had neutrophil: lymphocyte ratio > 1.5.

Severity	Number of patients
Mild	44(81.48%)
Severe	10(18.52%)

The outcome was also studied in both the groups. It was found that 50 patients could be discharged successfully in both the groups, whereas 4 patients succumbed to death in both the groups.

The differential leukocyte picture of patients expiring in both the groups was studied. It was found that in COVID-19 positive mortality group, 100% of the population had neutropenia, whereas in the comparing COVID-19 negative group had 25% neutrophilia and 75% as normal blood picture.

## DISCUSSION

COVID-19 is a novel human infectious virus. Haematological abnormality is not rare in it. While haematological parameters in adults could be traced abundantly, there were few studies in paediatrics populations.

Our study concluded that COVID-19 infection in paediatrics population occurs with prominent haematological findings. The leukocytic picture can be used as a mirror to assess the disease progression. It was found in our study that lymphocytopenia is the most prominent deranged blood parameter found in COVID-19 infected paediatrics population. The same finding was reported in adult population as well by Li Q et al<sup>1</sup> and in paediatrics population by Xia et al and Pari et al<sup>11</sup>

Out of 54 study populations, (50) 92.5% could be discharged successfully, whereas 8% (4) succumbed to death. Our study also noted that all the mortalities of COVID-19 had neutropenia as the sole deranged leukocytic parameter. This finding could not be traced in any literature let it be in adults or in paediatrics population. It can be thus inferred that neutropenia is a poor prognostic indicator in COVID-19.

We tried to evaluate the neutrophil to lymphocyte ratio in COVID-19 positive group as well. It was thus observed that patients with mild COVID had a NLC ratio of less than 1.5 whereas patients with severe COVID had a high NLC ratio. This finding is comparable to those done in adults where a high NLC ratio is associated with poor prognosis as mentioned by Liu y et al<sup>12</sup> and W. Xue et al<sup>13</sup>. but no such studies could be traced in literature with paediatrics population.

Our study had certain limitations as well. The COVID-19 positive mortalities which occurred in less than half an hour could not be studied. Moreover radiological evaluation of the patients could not be done to grade the severity of COVID-19 infection.

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## CONCLUSION

COVID-19 is a novel human infectious virus. It has prominent haematological findings. The leukocytic picture in both adults and pediatrics populations is comparable and lymphocytopenia is the most common deranged leukocytic parameter. Differential leukocytic count is a cheap and easily available blood investigation which can be used as a mirror to disease progression. It has been found that neutropenia and a high

neutrophil: lymphocyte ratio is always found in severe COVID and hence can be used as a prognostic indicator.

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