

# Neutrophils - to - Lymphocytes Ratio and Clinical Outcomes in Patients with Kidney Diseases in COVID 19

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## ABSTRACT

### Introduction

Kidney Disease is structural and functional abnormality of Nephrons, where abrupt deterioration to progressive decline in Kidney function leads to acute to chronic Kidney Disease, respectively. The objective of this research was to find the Neutrophil-to-Lymphocyte ratio and Clinical outcomes of patients with Kidney Diseases in COVID-19.

### Methods

A descriptive cross-sectional study was conducted in the Department of Nephrology of College of Medical Sciences and Teaching Hospital, Bharatpur-10, Chitwan from 2021-04-01 to 2021-06-29 in among 31 Covid-19 positive cases. Collected data was entered and analyzed by using SPSS 20.

### Results

In this study 58% were male while 42% were female. Among the total cases 35.48% cases had NRL ratio <8 while 65.52% cases had NRL ratio ≥8. Among total cases 48.38% were discharged whereas 51.62% were declared dead. Also, among those cases whose NRL ratio <8, 27.27% were declared dead while in NRL≥8, 65% cases were declared dead during treatment.

### Conclusions

In Covid-19 cases early diagnosis and supportive treatment, prognosis could be good.

Regular follow-up could give insight about kidney function whereas in case Covid-19 various awareness programme and practice to prevent should be implied.

**Keywords:** Neutrophils-to-Lymphocytes ratio, NRL, Nephrology, Clinical outcomes, Kidney Diseases, COVID 19, Nepal

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## INTRODUCTION

Coronavirus disease-2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 presents with a wide range of symptoms. The spectrum of disease is variable, with majority cases being mild and self-limiting. However, the disease can be fatal with development of severe pneumonia progressing to acute respiratory distress syndrome (ARDS) and multi-organ failure.<sup>1</sup> Globally till 31 May 2023, there have been 767,364,883 confirmed cases of COVID-19, including 6,938,353 deaths, reported to WHO.<sup>2</sup> Kidney disease (KD) is defined as a heterogeneous group of disorders affecting kidney structure and function. It is recognized now that even mild abnormalities in measures of kidney structure and function are associated with increased risk for developing complications in other organ systems as well as mortality, all of which occur far more frequently than kidney failure.<sup>3</sup> It includes both acute kidney injury (AKI) and chronic kidney disease (CKD). AKI is defined as an abrupt (within hours) decrease in kidney function, which encompasses both injury (structural damage) and impairment (loss of function). CKD is defined based on the presence of either kidney damage or decreased kidney function for three or more months, irrespective of cause.<sup>4</sup> With the aging of the population, chronic kidney disease (CKD) has become one of most common non-communicable diseases in the world as well as a leading cause of mortality. Half of the people in the United States are expected to develop CKD during their lifetime.<sup>5</sup> The prevalence of chronic kidney disease among high-risk cohorts in Nepal was significant among risk group with hypertension and diabetes being the most common risk factors.<sup>6</sup> Patients with KD are vulnerable to COVID 19 infections and their morbidity and mortality.<sup>7</sup> Inflammation plays a major role in

development and progression of COVID-19. People infected with COVID-19 are known to have an immune system that is dysregulated and can cause abnormal immune response.<sup>8</sup> Those patients who land up in septicemia timely identification and early intervention is necessary to prevent morbidity and mortality. Biomarkers are necessary in those cases to assess diseases severity and prognosis. One biomarker which can be easily obtained from simple complete blood count test, known as neutrophil to lymphocyte ratio (NLR) can be used to assess diseases severity and prognosis. This ratio has been used historically as predictor of morbidity and mortality in cancer, cardiac and septic patients. Some studies have been published internationally regarding the use of NLR as a short term prognostic marker in patients with COVID-19. But, there is no studies regarding role of NLR and its outcome in patients of CKD with COVID 19 in Nepal. As COVID-19 is a huge pandemic necessitating maximal research, we decided to conduct this study in our hospital. The objective of this research is to study the Neutrophil to lymphocyte ratio as short term prognostic marker and its outcome in CKD with COVID 19.

## METHODS

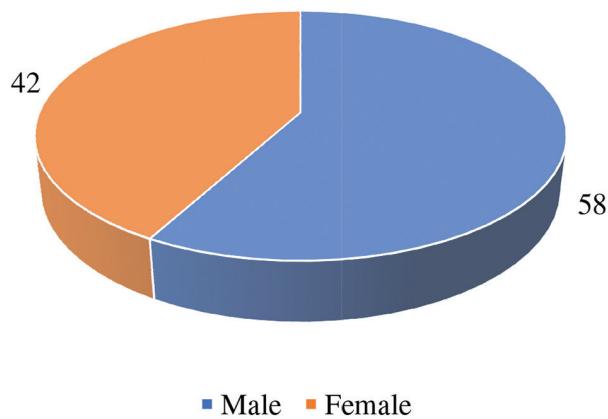
A descriptive cross-sectional study was conducted in the department of Nephrology, College of Medical Sciences, Bharatpur-10, Chitwan from 2021/04/01 to 2021/06/29. This study was conducted among Kidney disease patients admitted with confirmed COVID-19 positive test with at least one nasopharyngeal swab positive for Reverse transcription polymerase chain reaction (RT-PCR) were included in the study. Ethical approval was taken from Institutional review committee (Ref No. COMSTH-IRC-). Informed and written consent was taken from all the patients before data collection. Data was collected by using

non probability sampling technique. First of all, the data was collected using pre-defined questionnaire. And then collected data was checked for completeness, accuracy and then entered and analyzed using SPSS 20. Data was analyzed using descriptive and inferential statistics. In the descriptive statistics for categorical variables frequency and percentage will be calculate. While for continuous variable mean and standard deviation was calculated.

**RESULTS**

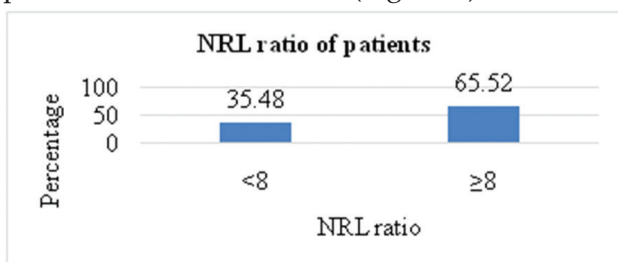
Among the total patients admitted, randomly 31 patients were chosen with kidney diseases and proven COVID 19 infections for this study purpose. Majority of the patients were male i.e 58 % with only 42 % being female (Figure 1).

**Gender distribution of patients**



**Figure 1.** Gender distribution of patients.

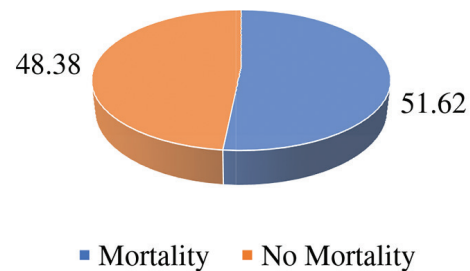
Among the total study patients 11(35.48%) patients had NRL ratio <8 while 20(65.52%) patients had NRL ratio ≥ 8 (Figure 2).



**Figure 2.** NRL ratio of patients.

Out of total patients admitted 48.38% gets relieved from the treatment and gets discharged while 51.62% declared dead during treatment (Leave against medical advice was also counted as mortality group) (Figure 3).

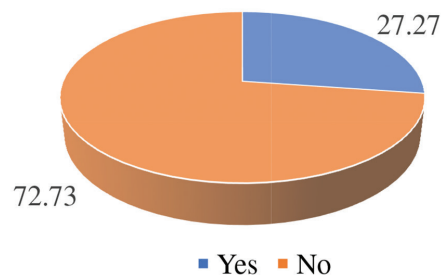
**Outcome of Patients**



**Figure 3.** Outcome of Patients during hospital stay.

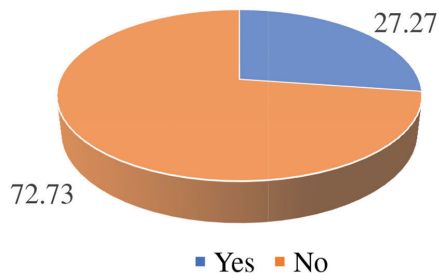
Among total patients 11 patients with NRL ratio <8, 3patients (27.27%) declared dead during treatment and 8 patients (72.73%) gets relieved and discharged (Figure 4).

**Mortality of patients with NRL ratio <8**



**Figure 4.** Showing mortality and discharged among patients having NRL <8

Above pie chart revealed, among 20 patients with NRL≥8, 13(65%) patients declared dead during treatment & 7(35%) patients gets relieved from treatment and discharged (Figure 5).

**Mortality of patients with NRL ratio <8**

**Figure 4.** Mortality and discharged among patients with NRL  $\geq 8$ .

The mean NRL of patients who recovered from COVID-19 compared with those who died are presented in table below.

**Table 1.** Mean NRL value of patients according to outcome

Outcome	Mean NRL	Minimum	Maximum
Discharged	6.23	1.18	12.71
Mortality	11.8	4	31.6

## DISCUSSION

COVID-19 is highly infectious disease which has been immense threat to global public health. Even though majority of patients have self limiting and mild illness & patients who develop severe illness have bad prognosis. Relationship between NRL and its prognosis in COVID-19 has gained lots of attention. Recent meta-analysis showed increase in NRL ratio is predictor of

all cause mortality in patients with COVID-19. Our analysis revealed whether kidney diseases with COVID-19 patients would show increased risk of all cause mortality affected by NLR ratio. Our study has shown that increase in NLR ratio associated with increased risk of mortality. Our results are also consistent with Italian study.<sup>1</sup> This research established a link between high NLR and mortality as well in our study. Patients who gets cured and discharged have mean NLR of 6.23 and patients who wants to discontinue the treatment and declared dead during treatment of mean NLR ratio 11.8. This study results are consistent with above mentioned studies supporting theory that NLR is cheap and easily available short term predictor of prognosis in patients with kidney diseases & COVID-19.

## CONCLUSIONS

This study highlights the importance of NLR in Kidney diseases patients with COVID-19 in predicting disease severity. In developing country where resource are limited, NLR can be used as effective marker of disease severity and prognosis. In Covid-19 cases early diagnosis and supportive treatment, prognosis could be good. Regular follow-up could give insight about kidney function whereas in case Covid-19 various awareness programme and practice to prevent should be implied.

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