



EVALUATION OF TEAR SAMPLES IN SEVERE CASES OF CONFIRMED SARS-COV-2 INFECTED PATIENTS ADMITTED IN INTENSIVE CARE UNIT, ZORAM MEDICAL COLLEGE, MIZORAM.

Ophthalmology

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ABSTRACT

Objective: This study aimed to assess the presence of Novel Coronavirus in the tears of severe cases of confirmed SARS-COV-2 infected patients. **Methods:** A cross sectional quantitative study was performed. 50 confirmed novel coronavirus pneumonia (NCP) admitted in Intensive Care Unit (ICU), State Referral Hospital (SRHF) affiliated hospital of Zoram Medical College were selected from 1st September 2021 to 1st October 2021. Tear samples were collected with a disposable sampling swabs for SARS-COV-2 antigen test kit (SD Biosensor).

Results: 50 severe-type NCP patients were enrolled. Out of 50 patients, 3 samples of tears yielded positive results and 47 samples of tears yielded negative results.

Conclusion: We speculate that SARS-CoV-2 may be detected in the tears in severe cases of NCP patients even after a week in the course of the disease.

KEYWORDS

coronavirus; horizontal transmission; infection.

INTRODUCTION

An outbreak of SARS-CoV-2 occurred in Wuhan, China in December 2019. It is a highly infectious disease with severe respiratory symptoms in many cases that may lead to death. The World Health Organization (WHO) considered it a pandemic and published guidelines for all countries for protection and treatment with a changeable protocol according to the situation.^{1,2}

Coronaviruses are zoonotic pathogens that can infect human beings by undergoing mutations.³ Airborne respiratory droplet transmission is well recognized; however, its transmission through the conjunctiva is still under investigation, though its presence in the conjunctiva enforces the possibility of its transmission through the eye, especially to ophthalmologists.⁴

Few previous studies have evaluated ophthalmological signs and symptoms in patients infected with SARS-CoV-1 and SARS-CoV-2. A few studies have evaluated the presence of SARS-CoV-2 in tear fluid.⁵

Many ophthalmologists worldwide are infected during routine or emergency practice, as recorded by their health authorities. The infection may be due to eye route, droplets, breath or others.⁶ The presence of SARS-CoV-2 virus in patients' tears with or without ocular symptoms suggests contamination through the conjunctiva; however, the possibility of transmission by other routes is still present.^{7,8}

The aim of this study was to assess the presence of SARS-CoV-2 virus in the tears of severe positive COVID-19 patients admitted in Intensive Care Unit.

MATERIALS AND METHODS

METHODS-

The study was conducted on COVID-19 confirmed patients admitted in Intensive Care Unit, State Referral Hospital, affiliated hospital of Zoram Medical College, Falkawn, Mizoram, India.

The tear sample analysis was performed by SARS-Cov2 Antigen test kit.

It was a cross-sectional quantitative study conducted from September 2021 to October 2021. Since participants enrolled in the study were on mechanical ventilation, participants family were fully informed about the study and gave their consent to participate in the study. Approval from Institutional Research Committee of Zoram Medical College was obtained before starting the study.

Tear samples were collected using conjunctival swabs wearing full personal protective equipment (PPE kit) by a single person to avoid interpersonal bias and was analysed with Rapid Antigen Test Kit.

RESULTS

A total of 50 RT-PCR positive patients having severe pneumonia were enrolled in the study. Age of the patients ranged from 20 to 98 years with a mean age being 57.5 ± 19.5 years.

Table 1. Distribution of Age in groups

Age in years	Frequency	Percentage
20-30	5	10
31-40	7	14
41-50	5	10
51-60	12	24
61-70	9	18
71-80	6	12
81-90	3	6
91-100	3	6
Total	50	100

Maximum number of patients (n= 12, 24.0%) were in the age group of 51-60 years followed by 61-70 years (n=9, 18%).

A total of 50 confirmed COVID patients admitted in Intensive care unit were included in the study. 30 patients (60%) were men and 20 patients (40%) were women with a mean age of 57.5 ± 19.5 years. All patients enrolled in the study suffered from severe COVID pneumonia based on CT score and were all on mechanical ventilation. None of the patients had conjunctivitis or any other ocular manifestations. So, this confirmed the possibility of transmission via tears even in the absence of conjunctivitis or any other ocular manifestations.

DISCUSSION

The most effective technique for detecting viral nucleic acid is RT-PCR which is very simple, convenient and efficient because of its high sensitivity and specificity.^{9,10} Researchers in 2004 AD found that tear sample tested positive in patients with SARS.¹¹ As the chromosome of SARS-CoV-2 is 82.0% similar to that of SARS-CoV, it is assumed that tear fluid could be one of the mode for transmission of the disease.¹²

It was a cross-sectional quantitative study conducted in Zoram Medical College Teaching Hospital, State Referral Hospital Falkawn, Mizoram designated as COVID dedicated hospital by Government of

Mizoram. We enrolled 50 confirmed RT-PCR positive patients admitted in Intensive Care Unit. Conjunctival swabs were used for collection of tear sample. In our study, age ranged from 20 to 98 years with mean age of 57.5 years which is somehow in accordance with similar studies conducted by Ping WU et al and Xia J et al showed mean age of 65.8 years and 54.5 years respectively.^{13,14}

Tear sample by Rapid Antigen Test was found to be positive in 3 (6%) cases which is in accordance with another study conducted at China by Ping WU et al which yielded positive results in 5.2% of patients.¹³ Similarly, another study conducted at Hangzhou, China showed positive result in only 1 case out of 30 patients.¹⁴ However, in contrast to these studies, researchers from Singapore also conducted RT-PCR in tear sample and found none of the samples had positive results (0.0%).¹⁵

All 50 patients enrolled in our study were admitted in Intensive Care Unit on Mechanical Ventilation, categorized as severe pneumonia based on their CT score. We had done Schirmers test with Schirmer's strips (Whatmann filter paper no. 41) on all the patients to know their dry eyes status since ICU patients are more susceptible for dry eyes. 30 patients (60%) had severe dry eye, 10 patients (20%) had moderate dry eye, 6 patients (18%) had mild dry eye and only 4 patients (8%) had normal tear production, 3 out of 4 patients having normal tear production were found to be positive for Rapid Antigen Test in our study. We believed that status of tear production might also play a role in the results of Rapid Antigen test.

Tear samples were collected on the day of their admission to ICU but their dates of detection by Nasopharyngeal swab varies. Among the 3 positive cases seen in our study, 1 tested positive after 12 days of detection, 1 tested positive after 2 days of detection and 1 tested positive after 8 days of detection. Similar studies conducted at Nepal shows tear sample positivity for SARS-COV2 RNA when tear sample was collected after first day of detection by Nasopharyngeal swab whereas in our study tear sample is positive for SARS-COV2 even after 12 days of detection by Nasopharyngeal swab, this maybe due to the higher viral load in severe NCP.¹⁶

The likely drawbacks of our study can be the small sample size and uncertainty of the exact day of infectivity of the patient. In addition to this, tear sample analysis by RT PCR could not be done due to increased case of COVID and lack of manpower for RT PCR analysis.

In conclusion, our study shows that there are chances of detecting SARS-CoV-2 RNA in severe cases of NCP even if tear sample were collected and analysed after a week in the course of the disease. COVID-19 can be transmitted through the tear film in the early phase of the disease.

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