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Clinical and Epidemiological profile of SARS-CoV-2 in patients with Severe Acute Respiratory Illness (SARI) at a tertiary care hospital of North India.

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Abstract

Background: Severe acute respiratory illness due to SARS-CoV-2 represents great global public health concern. The spectrum of disease ranges from mild to life-threatening. Surveillance of hospitalized patients with severe acute respiratory infections (SARI) is an important public health tool used to identify etiologies to understand the disease, track changes in circulating viruses and as an alert mechanism for potential pandemic viruses. We aim to find out the rate of SARS-CoV-2 positivity in SARI cases and further study the epidemiological and clinical characteristics of patients. **Material & Methods:** A Prospective study was conducted on 200 Severe Acute Respiratory Illness patients admitted at tertiary care hospital. The clinical, demographic, epidemiological, risk factors / co-morbidities of all the patients were recorded. Oropharyngeal and nasopharyngeal samples were collected and tested for SARS-CoV-2 by real time reverse transcriptase (RT-PCR) test. **Results:** Out of 200 SARI patients, 51 (25.5%) were tested positive for SARS-CoV-2. Maximum cases (54.90%) were in the age group of 41-60 years; males were infected predominantly (52.94%). The most common symptoms of presentation were fever (100%), cough (86.27%), dyspnoea (82.35%) and sore throat (56.86%). Comorbidities associated with COVID-19 were Hypertension (56.86%), Diabetes Mellitus (33.33%), Chronic Obstructive Pulmonary Disease (13.72%) and Coronary Artery disease (9.8%). More than 30% of the patients were admitted in ICU and 9.80% received mechanical ventilation. **Conclusions:** Evaluation of clinical and epidemiological profiles of SARI patients can help in understanding and managing the outbreak more efficiently. Close monitoring and quarantine will be required to prevent extensive transmission within the community.

Keywords:- SARS-CoV-2, SARI.

INTRODUCTION

Acute respiratory infections are a group of diseases that are caused by different microorganisms where viral etiologies are responsible for 80% of cases.[1] Some of the emerging viral pathogens cause pandemic or fatal respiratory infections in the last two decades.[2] SARS-CoV 2 is a novel coronavirus identified as a cause of COVID-19 that began in Wuhan China in late 2019 and spread

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extensively worldwide and has become a serious global public health crises. Given the alarming levels of spread, severity of disease and a number of affected countries, the World Health Organization (WHO) declared COVID-19 as a pandemic on March 11th, 2020.[3] Since its emergence in 2019, SARS-CoV-2 has caused over 504 million cases of coronavirus disease and over 6 million deaths globally.[3] One of the most affected countries during the coronavirus disease (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is India. To date, the country reports over 43 million cases and more than 5 lakh deaths.[3] Transmissibility of SARS-CoV-2 is primarily via respiratory droplets or fomites and viral shedding is thought to peak on or just before the onset of symptoms, with viral loads decreasing thereafter.[4] The mean incubation period of SARS-CoV-2 is five days with the most common symptoms being fever, cough, sore throat, lethargy, dysguesia and anosmia. Organ dysfunction and death can occur in very severe cases, yet severity seems to be associated with comorbidities and reported fatality rates vary from 0.7% to 5%.[4] SARS-CoV-2, like all viruses accumulate mutations, changes in its genetic code over time as it replicates. The mutation in coronavirus genetic code is well known for source of multiple waves. Several variants have been identified more recently that appear to increase transmissibility and have an impact on disease severity.[5]

As the pandemic continues to unfold, it is important to analyze the epidemiological and clinical characteristics of the patients infected with SARS-CoV-2 and identification of variants of concern (VOC) particularly in the presence of new selection pressures such as vaccination. Our study was done to find out the rate of SARS-CoV-2 positivity among Severe Acute Respiratory Illness patients admitted to the tertiary care hospital and to evaluate their epidemiological, demographic and clinical profile.

MATERIAL AND METHODS

This prospective study was conducted on patients admitted to tertiary care hospital with severe acute respiratory illness (SARI) over a period of eight months i.e February to September 2021. Demographic details, medical history including comorbidities, symptoms, vital signs, baseline laboratory parameters and clinical details were collected. Patients admitted as SARI were defined as hospitalized patients with acute onset of fever of 38°C or higher in the previous 10 days and atleast one sign or symptoms of acute respiratory illness, including cough, shortness of breath, tachypnea, abnormal breath sounds on auscultation, sputum production, hemoptysis, chest pain, or chest radiograph consistent with pneumonia.[6]

The oropharyngeal and nasopharyngeal samples collected from patients were transported in viral transport medium under a proper cold chain to the Viral Research and diagnostic laboratory. The samples were handled and processed in a biosafety level 2 facility as per the WHO protocol.[4] Viral Ribonucleic acid was extracted, purified and was reverse transcribed to cDNA and subsequently amplified by using ICMR approved qRT-PCR kits on real-time PCR instruments. The results were analyzed by reading the cycle threshold values and graphs

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of amplification for E,N, RdRP& ORF 1b genes. To ensure the integrity of RT-PCR assay results, internal control was analyzed for each patient samples, as well as testing of the positive and negative control in each batch.

RESULTS

During the study period (February 2021 to September 2021), the study population included 200 SARI patients; 51 (25.50%) of them were found to be SARS-CoV-2 positive on RT-PCR. Maximum positivity of SARS-CoV-2 was reported from the months of April and May 2021 (60.77%) and then gradual decline was seen from June 2021 to September 2021. Among the positives, maximum cases were reported from age group 41 to 60 years (54.90%); females were found to be 24 (47.06%) and males were 27 (52.94%) [Table 1].

Most common presenting complaints were fever (100%) and cough (86.27%) followed by dyspnoea (82.35%), sore throat (56.86%), myalgia (45.09%) and anosmia (27.45%). [Table 2]. More than 70% SARS CoV-2 positive cases had underlying diseases/ risk factors/ comorbidities. Hypertension (56.86%), Diabetes Mellitus (33.33%) and Chronic Obstructive Pulmonary disease [COPD] (13.72%) were the most common co-existing illness among SARS-CoV-2 cases. (Table.2). Out of 51, 17 (33.33%) patients were admitted to ICU; amongst them 5 (9.80%) were mechanically ventilated while 2 (3.92%) required non-invasive ventilation.

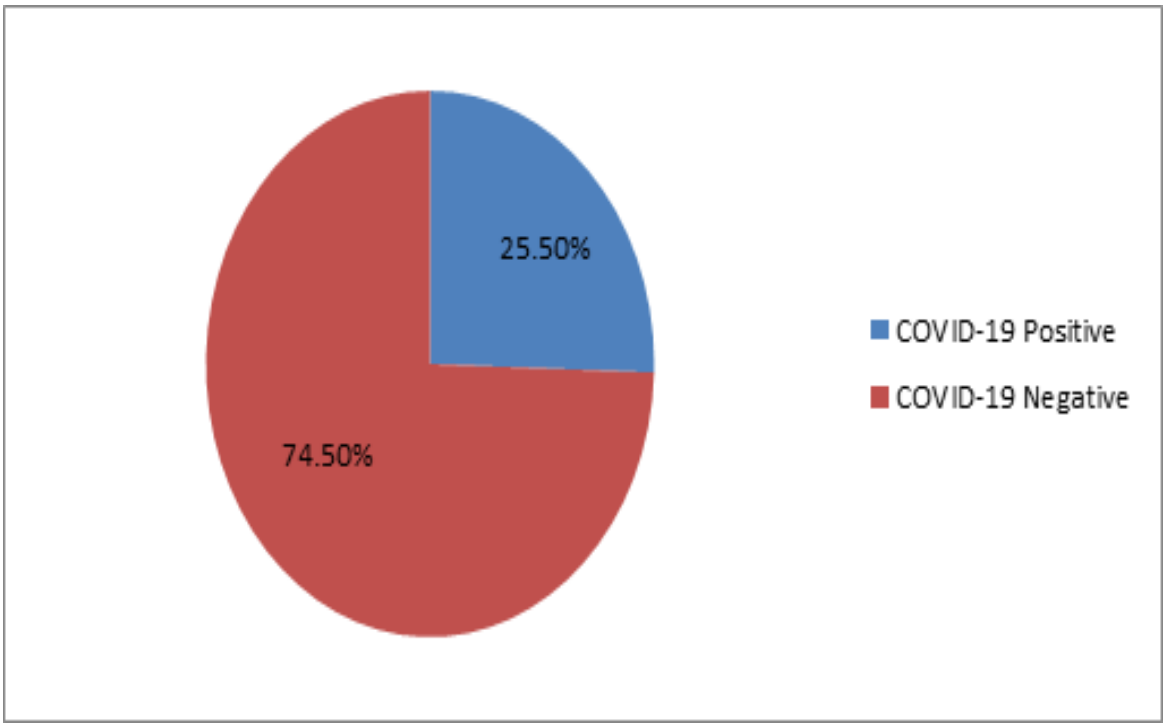

Figure 1: Prevalence of COVID-19 amongst SARI patients

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Table 1: Age and gender wise distribution of SARI patients (n=200)

Age (years)	Total samples received	COVID-19 positive(n=51)	COVID-19 negative(n=149)
≤ 20	8	0 (0%)	8 (5.36%)
21 to 40	63	11 (21.56%)	52 (34.89%)
41 to 60	78	28 (54.90%)	50 (33.55%)
≥61	51	12 (23.52%)	39 (26.17%)
Gender			
Male	117	27 (52.94%)	56 (37.58%)
Female	83	24 (47.06%)	93 (62.41%)

Table 2: Clinical parameters & co-morbidities among COVID-19 positive patients (n=51)

Clinical features	COVID-19 positive patients (n=51)
Fever	51 (100%)
Cough	44 (86.27%)
Dyspnoea	42 (82.35%)
Sore throat	29 (56.86%)
Bodyaches/ Myalgia	23 (45.09%)
Anosmia	14 (27.45%)
Nausea / Vomiting	10 (19.60%)
Chest pain	8 (15.68%)
Nasal discharge	8 (15.68%)
Diarrhoea	5 (9.80%)
Hemoptysis	4 (7.84%)
Pain abdomen	4 (7.84%)
Comorbidities	
Hypertension	29 (56.86%)
Diabetes Mellitus	17 (33.33%)
COPD	7 (13.72%)
Coronary Artery disease	5 (9.8%)
Chronic Kidney disease	2 (3.92%)
Hypothyroidism	1 (1.96%)
Hyperthyroidism	1 (1.96%)
Admission in ICU	17 (33.33%)
Clinical Parameters	
Respiratory rate (>16 breaths/min)	28 (54.9%)
Oxygen Saturation (<92%)	8 (15.68%)
On ventilator support (mechanical)	5 (9.80%)
On ventilator support (non-invasive)	2 (3.92%)

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Page no- 20-26 | Section- Research Article (Microbiology)

DISCUSSION

Our prospective study demonstrated the clinical, epidemiological and demographic profile of patients admitted with severe acute respiratory illness. A total of 200 admitted SARI patients were included in the study from the month of February 2021 to September 2021, out of which 51 (25.5%) were SARS CoV-2 positive by real-time PCR. In a similar study conducted by Aggarwal et al, 39% of SARI patients were found to be SARS-CoV-2 positive.[6] Another study done by Sharma et al on SARI cases reported 17.6% SARS CoV-2 positivity in patients.[7] Aggarwal et al also found 33.8% SARS-CoV-2 positivity among SARI patients.[8]

In our study, patients in the age group of 41 to 60 years were having highest positivity rate (54.90%) of SARS-CoV-2. This finding co-relates with a study by Gupta et al where the median age of COVID-19 positive SARI patients was 54 year (interquartile range : 44-63).[9] Sharma et al also reported maximum cases of SARS-CoV-2 with mean age of 55.31 years among SARI patients.[7] A study done by Khan et al reported that the median age of SARS-CoV-2 positive patients was 47 years.[10]Tambe et al also found maximum positivity (55.4%) in age group of 31-60 years.[11] Several existing literature reports have documented the increased rate of prevalence of COVID-19 among male patients. In our study also there was a slight male preponderance showing positivity of 52.94% which was relatively higher than that of female positivity (47.05%). In the study by Khan et al also, mainly male (70.25%) population was infected by COVID-19.[10] Our results are also in concordance with studies done by Aggarwal et al which showed similar results and reported that 59.3 % positive cases were males.[6] Another study done by Sharma et al showed male preponderance of positivity of 63.6%.[7] The higher incidence in male patients can possibly be explained by more exposure by the males of the family for outside homestays and partly by higher concentration of angiotensin-converting enzyme-2 in males than in females. ACE-2 is expressed in multiple organ systems which enables binding of SARS-CoV-2 into the cell membranes and its subsequent entry.[6] Furthermore, a genetic component like X chromosome and sex hormones like oestrogens, both predominantly found in females provide significant level of protection against SARS-CoV-2 by playing an important role in innate and adaptive immunity.[4]

In present study, the most common symptoms of presentation were fever (100%) and cough (86.27%) followed by dyspnoea (82.35%), sore throat (56.86%) and myalgia (45.09%). Less common symptoms were anosmia (27.45%), nausea/vomiting (19.60%) and pain abdomen (7.84%). A study done by Gupta et al showed similar results with fever being the most common symptom (54.5%), followed by cough (47%), sore throat (33.33%) and myalgia (27.21%).[9] Yang et al also reported fever (85.5%) as the most common symptom followed by cough (58.0%). However, in a study done by Aggarwal et al on SARI patients, dyspnoea (90.6%) was the most common symptom, followed by cough (84.4%) and fever (68%).[6] Similarly, Sharma et al reported dyspnoea (80.7%) as the most common presenting complaint followed by fever (78.4%), cough/sore throat (30.7%).[7]

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Although nasopharynx is theoretically the first organ infected with COVID-19, a recent study showed that infected individuals rarely show upper respiratory symptoms at the onset of the infection. This suggests that virus mostly targets the cells of the lower respiratory tract cells.[13] In reference to a study by Huang et al, increased amounts of proinflammatory cytokines in serum were associated with pulmonary inflammation and extensive lung damage.[14]

Another observation in our study was an increased incidence of COVID-19 disease manifestations in patients with underlying chronic diseases. Various risk factors have been seen to be associated with COVID-19. Hypertension (56.86%) and Diabetes Mellitus (33.33%) were the top two co-morbidities among the positive COVID-19 patients. The same trend of increased prevalence of COVID-19 in patients with comorbid conditions was seen in a study done by Tambe et al who reported 47.2% with one or the other comorbidity; Hypertension (30.5%) being the most common one followed by Diabetes (21.3%).[11] A study by Agarwal et al also showed that patients with 2 or more co-existing comorbidities are more likely to have poorer baseline well-being which contribute to their relatively poor outcome.[8] Sharma et al reported Hypertension (25.4%) and Diabetes (15.8%) as the two common comorbidities in patients with SARI.[7] This association of COVID-19 with co-morbidities could be due to lowered immune status because of impairment of macrophage and lymphocyte function.[4]

In present study, 33.33% (17) patients required ICU care. Out of them, 07 received mechanical ventilation while 02 were on non-invasive ventilation. Study done by Aggarwal et al reported 37.5% patients who required ICU care and amongst them 28.25% required mechanical ventilation.[6] A study done by Yang et al reported 48.3% patients who were on mechanical ventilation and 9.9% patients were on non-invasive ventilation.[12] This can be explained by more chances of progression of disease to multiple organ dysfunction syndrome because of the comorbidities, which necessitated ventilator requirements in these patients.[7]

CONCLUSIONS

Severe acute respiratory illness due to respiratory viruses like SARS-CoV-2 represents great global public health concern. This observational study provide insights into the clinical and epidemiological profile of COVID-19 patients with severe acute respiratory illness.SARS-CoV-2 infection was encountered in 25.50% of SARI patients. Fever, cough, sore throat and dyspnoea were the common presenting symptoms. More than 70% of patients were having underlying risk factors or comorbidities including Hypertension, Diabetes Mellitus, Chronic Obstructive Pulmonary disease and Coronary Artery disease. The disease had shown a wide range of severity in various studies published so far. Timely and early detection of such viral infections can help healthcare workers to use preventive measures and specific precautions to reduce transmission, appropriate treatments and supportive care of patients.

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Page no- 20-26 | Section- Research Article (Microbiology)

REFERENCES

1. Al Amad MA, Al Mahaqri AA, Al Serouri AA, Khader YS. Severe Acute Respiratory Infections With Influenza and Noninfluenza Respiratory Viruses: Yemen, 2011-2016. Inquiry. 2019;56:46958019850731. doi:10.1177/0046958019850731
2. Zhang S, Zhang W, Tang YW. Molecular diagnosis of viral respiratory infections. Curr Infect Dis Rep. 2011;13(2):149-158. doi:10.1007/s11908-011-0168-x
3. CucinottaD, Vanelli M. WHO Declares COVID-19 a Pandemic. Acta Biomed. 2020;91(1):157-160. doi: 10.23750/abm.v91i1.9397.
4. Khan M, Khan H, Khan S, Nawaz M. Epidemiological and clinical characteristics of coronavirus disease (COVID-19) cases at a screening clinic during the early outbreak period: a single-centre study. J Med Microbiol. 2020;69(8):1114-1123. doi:10.1099/jmm.0.001231
5. Sidhu SK, Dhingra KS, Sharma M. Epidemiological, Clinical and Virological characteristics of SARS-CoV 2 patients at tertiary care hospital of North India. Eur J Mol Clin Med. 2021; 8(4): 2525-8260.
6. Aggarwal A, Shrivastava A, Kumar A, Ali A. Clinical and Epidemiological Features of SARS-CoV-2 Patients in SARI Ward of a Tertiary Care Centre in New Delhi. J Assoc Physicians India. 2020;68(7):19-26.
7. Sharma A, Kothari N, Goel AD, Narayanan B, Goyal S, Bhatia P, et al. Clinical features and mortality in COVID-19 SARI versus non COVID-19 SARI cases from Western Rajasthan, India. J Family Med Prim Care. 2021;10(9):3240-3246. doi: 10.4103/jfmpc.jfmpc_14_21.
8. Agarwal N, Biswas B, Lohani P. Epidemiological determinants of COVID-19 infection and mortality: A study among patients presenting with severe acute respiratory illness during the pandemic in Bihar, India. Niger Postgrad Med J. 2020;27(4):293-301. doi: 10.4103/npmj.npmj_301_20.
9. Gupta N, Praharaj I, Bhatnagar T, Vivian Thangaraj JW, Giri S, Chauhan H, rt al; ICMR COVID Team. Severe acute respiratory illness surveillance for coronavirus disease 2019, India, 2020. Indian J Med Res. 2020;151(2 & 3):236-240. doi: 10.4103/ijmr.IJMR_1035_20.
10. Khan M, Khan H, Khan S, Nawaz M. Epidemiological and clinical characteristics of coronavirus disease (COVID-19) cases at a screening clinic during the early outbreak period: a single-centre study. J Med Microbiol. 2020;69(8):1114-1123. doi: 10.1099/jmm.0.001231.
11. TambeMP, Parande MA, Tapare VS, Borle PS, Lakde RN, Shelke SC; BJMC COVID Epidemiology group. An epidemiological study of laboratory confirmed COVID-19 cases admitted in a tertiary care hospital of Pune, Maharashtra. Indian J Public Health. 2020;64(Supplement):S183-S187. doi: 10.4103/ijph.IJPH_522_20.
12. Yang L, Liu J, Zhang R, et al. Epidemiological and clinical features of 200 hospitalized patients with corona virus disease 2019 outside Wuhan, China: A descriptive study. J Clin Virol. 2020;129:104475. doi:10.1016/j.jcv.2020.104475
13. AlimohamadiY, Sepandi M, Taghdir M, Hosamirudsari H. Determine the most common clinical symptoms in COVID-19 patients: a systematic review and meta-analysis. J Prev Med Hyg. 2020;61(3):E304-E312. doi: 10.15167/2421-4248/jpmh2020.61.3.1530.
14. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China [published correction appears in Lancet. 2020 Jan 30;:]. Lancet. 2020;395(10223):497-506. doi:10.1016/S0140-6736(20)30183-5
15. Zhang S, Zhang W, Tang YW. Molecular diagnosis of viral respiratory infections. Curr Infect Dis Rep. 2011;13(2):149-158. doi:10.1007/s11908-011-0168-x

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