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A retrospective analysis of COVID-19 positive patients admitted in a tertiary care hospital wards in Mizoram, India

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2. It primarily presents with respiratory symptoms and can result in damage to the digestive, nervous, and cardiovascular systems. The clinical profile of COVID-19 positive patients and factors associated with mortality has not been studied in patients admitted in wards in Mizoram. **Aims and Objectives:** The aim of the study was to determine the clinical profiles and outcome of the COVID-19 positive patients admitted in wards of Zoram Medical College, Mizoram. **Materials and Methods:** A descriptive record based cross-sectional study was conducted in Zoram Medical College, Mizoram among 742 COVID-19 positive patients admitted between March 27, 2020, and April 19, 2021. Individuals with confirmed COVID-19 positive by reverse transcriptionpolymerase chain reaction test from nasopharyngeal swabs were included in the study. Patient's information was collected from the hospital medical record consisting of demographic details, exposure history, comorbidities, etc. Data were analyzed using SPSS 22 version. $P<0.05$ was taken as statistically significant. **Results:** The mean age was 40 years and 59.4% were males. Most of the patients (31.40%) had a history of travel and 52.4% were symptomatic. The common symptoms reported were fever (63.75%), cough (49.10%), sore throat (23.39%), and shortness of breath (18.77%). Among those with comorbidities nearly 66.9% had diabetes mellitus, hypertension (48.6%), chronic heart disease (14.2%), and chronic lung disease in (8.1%). The mortality was only 1.8%. In univariate logistic regression analysis, mortality was associated with increased age >60 years (46.15%) [odds ratio [OR]: 21.56; $P=0.005$], patients having fever (76.92%) [OR: 6.8; $P=0.004$], and comorbidities (76.92%) [OR: 21.56; $P=0.005$] as risk factors. **Conclusions:** Mortality in COVID 19 positive patients admitted in Zoram Medical College, Mizoram was associated with increased age, comorbidities, and patients who were symptomatics.

Key words: Comorbidity; Inflammation; Mortality; Old age; Symptomatic

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It primarily presents with respiratory symptoms caused by inflammatory lesions of the lungs and can result in damage to the digestive, nervous, and cardiovascular systems. Because the disease progresses rapidly, it can lead to multiple organ failure and even death.[1] The World Health Organization (WHO) declared COVID 19 pandemic on March 11, 2020. The disease has now engulfed the globe affecting 216 countries, areas, and territories. Many of the countries globally are facing second surge in COVID-19 cases.[2] Globally, the numbers of daily rise in cases have reached a peak of over 800,000 and daily death as high as 10000.[3]

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In India, the first case of COVID-19 was detected on January 30, 2020, in Kerala. Following its initial detection, COVID-19 had become prevalent throughout India.[4] Vulnerability of Mizoram to the notorious COVID-19 pandemic increased as Mizoram shares its border with neighboring countries such as Myanmar and Bangladesh. The number of total COVID-19 active cases and recovered cases in Mizoram as of November 26, 2020, was 3765 and 3352, respectively.[4,5]

First scientific documentation of COVID-19 in Mizoram showed high incidence of COVID-19 in males than in females and the youngest and oldest infected age was 1 and 64, respectively. There is still no community transmission although this could occur at any moment.[6] The previous study by Sinha et al.,[7] in North East part of India Patients with coexisting comorbidities is at higher risk and need more utilization of health-care resources. As this virus is spreading globally, all countries have to join hands and prepare at all levels of human resources, infrastructure, and facilities to combat the COVID-19 disease.

As of November 26, 2020, the fatality rate of COVID-19 in Mizoram is 0.13%. Mizoram has a population of approximately 1.2 million. So far, it had recorded five deaths due to COVID-19 as of November 26, 2020.[4] The exact reason for the very low fatality rate of COVID-19 in Mizoram cannot be pinpointed. There could be several factors associated with it. Factors such as race, environment, nutrition, lifestyle, status of immunity, or other previous vaccinations can all contribute to the very less fatality rate. In one way, it is also possible a very low fatality rate was observed due to the obedience of the people of Mizoram, the selfless volunteers, the contributions from the non-government organizations, and the government's decision to act at an early stage. However, no conclusive statement could be made regarding this matter. Thus, further studies may be conducted regarding the very low fatality rate of COVID-19.[6]

Since the detection of the first COVID-19 case in Mizoram, there is still no scientific record describing clinical characteristics, risk factors for deterioration, and outcomes of hospitalized COVID-19 patients in wards. This information is crucial for estimating patient morbidity and mortality and need for hospital resource allocation which can support strategic decisions in Mizoram. Therefore, the purpose of this study was to determine the clinical profiles of the COVID-19 positive patients admitted in the wards of Zoram Medical College, Mizoram a tertiary care center in the North- East part of India.

Aims and objectives

The aim of the study was to determine the clinical profiles and outcome of the COVID-19 positive patients admitted in the wards of Zoram Medical College, Mizoram.

MATERIALS AND METHODS

This retrospective descriptive study was conducted among COVID-19 positive patients admitted in Isolation ward of Zoram Medical College, Mizoram. The data were collected from patients admitted between March 27, 2020, and April 19, 2021. A total of 742 admitted patients were selected using convenient sampling method. The study was approved by the Zoram Medical College Ethics committee. The Ethical Committee Number - No. F.20016/1/18-ZMC/IEC/20. The requirement for written informed consent was not taken, as data were collected from medical records. Among the inclusion criteria, both male and female adult patients (≥18 years) with a confirmed SARS-CoV-2 infection**,** inpatients admitted in COVID-19 wards, inpatients with respiratory distress, high fever, or relevant clinical deterioration, and asymptomatic SARS-CoV-2 positive patients were included in the study. Pregnant women and children were not included in the study. For patients, who met eligibility criteria variables such as age, gender, presenting symptoms, comorbid conditions, disease outcome, and transfer into intensive care unit (ICU), were collected from the medical records department. All symptoms reported at time of presentation were documented, including COVID-19 symptoms as outlined by the CDC10: Fever (subjective or temperature ≥38°C), cough, shortness of breath, chills, muscle pain, new loss of taste or smell, vomiting or diarrhea, and/or sore throat.

Operational definitions

A confirmed COVID-19 infection was typical clinical symptoms (e.g., respiratory symptoms with or without fever, and/or pulmonary infiltrates, and/or anosmia/dysgeusia) together with a positive real-time reverse transcription polymerase chain reaction test taken from nasopharyngeal swabs or lower respiratory tract specimens, according to the WHO guidance.[8]

Statistical analysis

Discrete variables are expressed as frequency (percentage) and continuous variables as medians with interquartile ranges or means with standard deviations. In addition to descriptive statistics, association of baseline risk factors was analyzed using univariate logistic regression analysis reporting odds ratios (ORs) with corresponding 95% confidence intervals (CIs) and P-values as a measure of association. Comparison between age groups and comorbidities and presenting symptoms was calculated using Chi-square tests. $P<0.05$ was considered significant. Statistical analysis was performed using SPSS 22 version.

RESULTS

A total of 742 patients with a confirmed SARS-CoV-2 infection were included in this analysis (mean age 40.06±14.41, range 18–92 years, median 38 and 59.4% males). Almost 98.2% patients recovered and only 13 (1.8%) died due to COVID-19 complications. A total of 32 (71.11%) patients were transferred from wards after 6.97±7.33 days for ICU admission. More than half 52.4% of patients presented with high clinical severity, out of which 63.75% had fever, 49.10% had cough, 23.39% had sore throat, 18.77% had shortness of breath, 11.57% had headache, and 12.85% had body aches and pain. Most common comorbidities included diabetes 99 (66.9%), hypertension 72 (48.6%), chronic heart disease 21 (14.2%), and chronic lung disease 12 (8.1%) (Table 1).

The difference between outcome, clinical symptoms such as fever, tiredness, and shortness of breath was statistically significant when compared across age groups (Table 2). The difference between comorbidities such as diabetes, hypertension, and chronic heart disease was statistically significant when compared across age groups (Table 2).

In univariate logistic regression analysis, mortality was associated with increased age > 60 years (46.15%) [OR: 21.56; P=0.005], ICU admission [OR-68.13 (17.925–259.010): P=0.001], patients having fever (76.92%) [OR: 6.8; P=0.004], and comorbidities such as diabetes, hypertension, and chronic lung disease (76.92%) [OR: 21.56; P=0.005] (Table 3).

Table 1: Baseline characteristics (n=742)

Parameters	Summary n/%
Age	40.06±14.41 (range 18–92, median 38)
Gender	
Male	441 (59.4)
Female	301 (40.6)
Outcome	
Dead	13 (1.8)
Recovered	729 (98.2)
ICU admission (Transfer in from wards)	32 (4.31)
if transferred, after how many days (n=32)	6.97±7.33 (range 1–42, median 6)
History of travel	233 (31.4)
Signs and symptoms at the time of admission	389 (52.4)
Fever	248 (63.75)
Cough	191 (49.10)
Sore throat	91 (23.39)
Shortness of breath	73 (18.77)
Aches and pain	50 (12.85)
Headache	45 (11.57)
Tiredness	43 (11.05)
Diarrhea	41 (10.54)
Loss of taste or smell	37 (9.51)
Rash on skin or discoloration of fingers or toes	5 (1.29)

DISCUSSION

Many previous studies and case reports in India have examined different epidemiological and clinical aspects of patients infected with SARS-CoV-2. However, according to authors knowledge, the current study is first that documented clinical profile of COVID-19 patients admitted in the wards of Zoram Medical College, Mizoram. The mean age was 40.06±14.41 years (range 18–92, median 38 and 59.4% males). The mortality was only 1.8%. In univariate logistic regression analysis, mortality was associated with increased age >60 years, ICU admission, fever, tiredness, and pre-existing comorbidities such as diabetes, hypertension, chronic lung, and heart disease.

In the present study, the mean age was 40.06±14.41 years. A similar age pattern (mean age of 40.3 year) was observed in a study by Gupta et al.,[9] at a tertiary care hospital from northern India. Patients in a study by Lal et al.,[10] done in North India were younger (median age–33 year) compared to the present study. Majority 59.4% were males in the present study. Vargese et al.,[11] reported 87.7% females infected healthcare workers which is in contrast to the present study. The possible reason can be the healthcare workers being the primary contacts to a COVID-19 case. The common symptoms seen were fever, cough, sore throat, shortness of breath headache, aches and pain, diarrhea, etc., in the current study. The findings are in consistent with Li et al.,[12] who reported fever, cough, and fatigue, followed by dyspnea, myalgia, dizziness, headache, and diarrhea at the initial onset of COVID-19 infection.

The ICU admission rate transferred from the wards to ICU in the current study was only 4.31%. Zhou et al.,[13] reported 26% ICU admission rate in Wuhan contrary to the present study. Another study in US by Richardson et al.,[14] reported ICU admission rate of only 14% which is comparatively higher to the current study, because the current study looked only into the transferred in patients from wards to ICU, not the overall ICU admission rates. The severity of illness in hospitalized patient population was low in US study due to stricter criteria for ICU admission followed. It is difficult to draw any strong conclusions from these data, as there are huge differences in patient selection and healthcare systems based on country. The mortality was only 1.8% in the present study. On contrary to this Gregoriano et al.,[15] in his Swiss cohort reported a mortality rate of 18%. The difference can be due to disease severity

Table 2: Comparison of clinical outcome, symptoms, and comorbidities across the age group (n=742)

Parameters	Age			Chi-square	P-value
	Upto 30 (n=231) (%)	31–60 (n=441) (%)	>60 (n=70) (%)		
Outcome					
Dead	1 (0.43)	6 (1.36)	6 (8.57)	21.639	<0.001
Recovered	230 (99.57)	435 (98.64)	64 (91.43)		
Signs and symptoms the time of admission					
Yes	114 (49.35)	228 (51.7)	47 (67.14)	7.048	0.029
No	117 (50.65)	213 (48.3)	23 (32.86)		
Fever					
Yes	77 (33.33)	138 (31.29)	33 (47.14)	6.822	0.033
No	154 (66.67)	303 (68.71)	37 (52.86)		
Cough					
Yes	53 (22.94)	116 (26.3)	22 (31.43)	2.203	0.332
No	178 (77.06)	325 (73.7)	48 (68.57)		
Tiredness					
Yes	7 (3.03)	29 (6.58)	7 (10)	5.994	0.050
No	224 (96.97)	412 (93.42)	63 (90)		
Headache					
Yes	17 (7.36)	24 (5.44)	4 (5.71)	0.995	0.608
No	214 (92.64)	417 (94.56)	66 (94.29)		
Loss of taste or smell					
Yes	18 (7.79)	16 (3.63)	3 (4.29)	5.628	0.060
No	213 (92.21)	425 (96.37)	67 (95.71)		
Aches and pain					
Yes	12 (5.19)	32 (7.26)	6 (8.57)	1.438	0.487
No	219 (94.81)	409 (92.74)	64 (91.43)		
Sore throat					
Yes	34 (14.72)	50 (11.34)	7 (10)	1.978	0.372
No	197 (85.28)	391 (88.66)	63 (90)		
Diarrhea					
Yes	15 (6.49)	19 (4.31)	7 (10)	4.351	0.114
No	216 (93.51)	422 (95.69)	63 (90)		
Shortness of breath					
Yes	15 (6.49)	40 (9.07)	18 (25.71)	23.097	<0.001
No	216 (93.51)	401 (90.93)	52 (74.29)		
Comorbidities					
Yes	6 (2.6)	102 (23.13)	40 (57.14)	106.995	<0.001
No	225 (97.4)	339 (76.87)	30 (42.86)		
Diabetes mellitus					
Yes	4 (1.73)	62 (14.06)	33 (47.14)	96.298	<0.001
No	227 (98.27)	379 (85.94)	37 (52.86)		
Hypertension					
Yes	3 (1.3)	44 (9.98)	25 (35.71)	72.713	<0.001
No	228 (98.7)	397 (90.02)	45 (64.29)		
Chronic Heart Disease					
Yes	1 (0.43)	11 (2.49)	9 (12.86)	30.599	<0.001
No	230 (99.57)	430 (97.51)	61 (87.14)		
Chronic lung Disease					
Yes	0 (0)	9 (2.04)	3 (4.29)	*	*
No	231 (100)	432 (97.96)	67 (95.71)		
Human Immunodeficiency Virus					
Yes	0 (0)	1 (0.23)	0 (0)	*	*
No	231 (100)	440 (99.77)	70 (100)		
Chronic Kidney Disease					
Yes	1 (0.43)	4 (0.91)	2 (2.86)	3.394	0.183
No	230 (99.57)	437 (99.09)	68 (97.14)		
Cancer					
Yes	0 (0)	5 (1.83)	1 (1.69)	*	*
No	160 (100)	268 (98.17)	58 (98.31)		

*Unable to do Chi-square test since the value of some cell is zero

and treatment considered. At present, there are no effective therapies for COVID-19 supported by high-level evidence. The current treatment options include Remdesivir, Lopinavir/Ritonavir, Ivermectin, Interleukin-6 blockers, Ruxitinib, Anti-tumor necrosis factor, convalescent plasma, and finally Corticosteroids.[16]

Table 3: Univariate logistic regression analysis of factors associated with mortality in study population

Factor	Outcome		Un adjusted odds ratio (95% CI)	P-value
	Dead (n=13) (%)	Recovered (n=729) (%)		
Age (in years)				
Age group				
Upto 30 (baseline)	1 (7.69)	230 (31.55)	1.067 (1.033–1.103)	<0.001
31–60	6 (46.15)	435 (59.67)	3.172 (0.380–26.510)	0.287
>60	6 (46.15)	64 (8.78)	21.562 (2.550–182.364)	0.005
Gender				
Female (Baseline)	2 (15.38)	299 (41.02)	3.824 (0.842–17.379)	0.082
Male	11 (84.62)	430 (58.98)		
ICU admission				
Yes	10 (76.92)	34 (4.66)	68.137 (17.925–259.010)	<0.001
No (Baseline)	3 (23.08)	695 (95.34)		
History of travel				
Yes	1 (7.69)	232 (31.82)	0.179 (0.023–1.381)	0.099
No (Baseline)	12 (92.31)	497 (68.18)		
Fever				
Yes	10 (76.92)	238 (32.65)	6.877 (1.875–25.219)	0.004
No (Baseline)	3 (23.08)	491 (67.35)		
Cough				
Yes	3 (23.08)	188 (25.79)	0.863 (0.235–3.170)	0.825
No (Baseline)	10 (76.92)	541 (74.21)		
Tiredness				
Yes	4 (30.77)	39 (5.35)	7.863 (2.319–26.666)	0.001
No (Baseline)	9 (69.23)	690 (94.65)		
Headache				
Yes	2 (15.38)	43 (5.9)	2.901 (0.623–13.501)	0.175
No (Baseline)	11 (84.62)	686 (94.1)		
Loss of taste or smell				
Yes	1 (7.69)	36 (4.94)	1.604 (0.203–12.679)	0.654
No (Baseline)	12 (92.31)	693 (95.06)		
Aches and pain				
Yes	3 (23.08)	47 (6.45)	4.353 (1.159-16.355)	0.029
No (Baseline)	10 (76.92)	682 (93.55)		
Sore throat				
Yes	1 (7.69)	90 (12.35)	0.592 (0.076–4.605)	0.616
No (Baseline)	12 (92.31)	639 (87.65)		
Diarrhea				
Yes	1 (7.69)	40 (5.49)	1.435 (0.182–11.316)	0.732
No (Baseline)	12 (92.31)	689 (94.51)		
Comorbidities				
Yes	10 (76.92)	138 (18.93)	14.275 (3.877–52.561)	<0.001
No (Baseline)	3 (23.08)	591 (81.07)		
Diabetes mellitus				
Yes	6 (46.15)	93 (12.76)	5.862 (1.928–17.821)	0.002
No (Baseline)	7 (53.85)	636 (87.24)		
Hypertension				
Yes	2 (15.38)	70 (9.6)	1.712 (0.372–7.878)	0.490
No (Baseline)	11 (84.62)	659 (90.4)		
Chronic heart disease				
Yes	2 (15.38)	19 (2.61)	6.794 (1.408–32.789)	0.017
No (Baseline)	11 (84.62)	710 (97.39)		
Chronic lung disease COPD				
Yes	2 (15.38)	10 (1.37)	13.073 (2.559–66.774)	0.002
No (Baseline)	11 (84.62)	719 (98.63)		
Organ trans plant recipient				
Yes	1 (7.69)	3 (0.41)	20.167 (1.954–208.094)	0.012
No (Baseline)	12 (92.31)	726 (99.59)		
Chronic kidney disease				
Yes	1 (7.69)	6 (0.82)	10.042 (1.121–89.951)	0.039
No (Baseline)	12 (92.31)	723 (99.18)		
Cancer				
Yes	1 (7.69)	5 (1.04)	7.900 (0.856–72.895)	0.068
No (Baseline)	12 (92.31)	474 (98.96)		

ICU: Intensive care unit, COPD: Chronic obstructive pulmonary disease

In the current study, most common comorbidities included diabetes, hypertension, chronic heart disease, and chronic lung disease. Tomlins et al.,[17] in his retrospective analysis of 95 patients hospitalized in the United Kingdom, reported diabetes, cerebrovascular, and cardiovascular illness associated with a poorer outcome. In their study less than half of them were discharged and one in five patients died contrast to present study where 729 (98.2%) out of 742 recovered completely. Most of the patients (31.40%) had a history of travel and 52.4% were symptomatic in present study. Kim et al.,[18] found 19% asymptomatic among 213 COVID-19 patients in South Korea. Srivastava et al.,[19] found good knowledge on COVID-19 among people of Mizoram ($P<0.001$). This higher literacy rate and good knowledge about COVID-19 might have reduced case fatality rate in Mizoram compared to other states in India.

The findings of the present study can be used as a baseline to assess changes in positivity rates over time that may show the transition of the pandemic from one phase to another. The study provides important inputs in understanding the local trend of the disease. As community transmission of SARS-CoV-2 continues, hospitals must be alert to variable presentations of COVID-19, test liberally, attempt early risk stratification of patient populations and have well-established clinical and Infection Prevention and Control protocols. Therapeutic considerations need to consider the risk of toxicity, control of antiviral replication, and early recognition and management of immune dysregulation.[20]

Limitations of the study

The present study was retrospective in nature and it was a single center study. Hence, a causal relation cannot be established and the study findings cannot be generalized to overall population. Many important laboratory parameters that can predict disease outcome were not evaluated in present study. COVID-19 specific treatment was not documented as the main purpose was to provide a timely overview of COVID-19 patients in Mizoram. Nevertheless, the present study highlighted clinical profile of patients affected by COVID-19 in Mizoram that helps health-care professional in early interventions during the course of pandemic. The findings are preliminary and can serve basis for further investigations concerning prognostication of COVID-19 patients. Further longitudinal multicentric studies are recommended to validate the findings of present study that are more generalizable.

CONCLUSIONS

Symptomatic COVID-19 infection was reported in 52.4% patients and ICU admissions transferred from ward was seen in only 32 (4.31%) patients. The present retrospective analysis showed increasing age, pre-existing conditions such as diabetes, hypertension, chronic lung and kidney disease, ICU admission associated with mortality in COVID-19 patients. Team of health-care professionals from different specialties should triage patients as per classification and provide protocol-based management that can reduce case fatality and increase COVID-19 survivors.

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