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Original Article

Microbiology Section

Clinical Features and Predisposing Factors Influencing the Outcome of COVID-19 in First and Second Wave at Nanded, Maharashtra- A Retrospective Study

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ABSTRACT

Introduction: It is crucial to determine possible factors associated with exacerbation of the disease due to the alarming global spread, morbidity and mortality associated with Coronavirus Disease-2019 (COVID-19). It is important to determine the co-morbidities associated with this disease which will help in better treatment of patients in time and to make amendments to management policy.

Aim: To compare the clinical features and predisposing factors (socio-demographic factors and co-morbidities) influencing the outcome in COVID-19 infected patients admitted in a tertiary care centre in the first and second wave of COVID-19 pandemic.

Materials and Methods: The retrospective study was conducted at the Department of Microbiology, Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India. The data was collected from the electronic resource which was maintained by the Institute Integrated Disease Surveillance Program (IDSP) health record reporting database for the duration of June 2020 to August 2021. This data included patient's demographic details (age, sex, address, contact number), other details (history of close contacts, international travel) clinical history, different types of symptoms Indian Council of Medical Research (ICMR patient category), co-morbidities, number of patients requiring Intensive Care Unit (ICU) admission, type of sample, the outcome in terms of death and discharge, cause of death. The analysis was done for the complete data and then for two separate durations of the first and second wave which were compared later with Chi-square test (Bivariate analysis).

Results: A total of 8841 patients were involved and the majority of patients in the study were between the age group of 30-75 years, there was a predominance of males in first and second waves with 2226 (66.21%) and 3569 (65.13%) respectively. The paediatric patients had a mortality rate of 7 (100%) found in the second wave. Fever (39%) and dyspnea (22%) were found as the commonest presentation in both waves. Gastrointestinal manifestations were observed relatively more in the second wave. The serious patients on ventilator were found to have (>91%) the highest mortality. It appeared that the highest attributable risk to severity and mortality (8-10 times increased) was due to hypertension, diabetes and other co-morbidities. Pregnancy did not predisposed to be as a risk factor.

Conclusion: Prompt management and preventive care are needed for patients with co-morbidities to avoid the exacerbation of COVID-19 as well as drug cross interactions.

Keywords: Co-morbidities, Coronavirus disease-2019, Disease severity, Pandemic

INTRODUCTION

As COVID-19 continues to spread, it is still unclear who exactly this virus would impact critically. As of 12th February 2022, a total of 1,02,348 COVID-19 patients with 2691 deaths were recorded having 2.62% case fatality rate in Nanded district, Maharashtra, India [1].

Given the alarming global spread, morbidity and mortality associated with COVID-19, it is crucial to determine possible factors associated with the exacerbation of the disease [2]. It is also important to note that due to differences in demographic and genetic features of various populations, the generalisability of previous reported pathophysiological parameters from all over the world may be limited [3]. It has been demonstrated that the careful and precise consideration of patient's medical history and underlying conditions plays a huge role in the proper management of COVID-19 which could make practitioners alert to the possibility of poor prognosis [2].

The importance of determining the serious risk factors (co-morbidities) of virus mortality would further make improvements in management policy and enhance the patient's treatment outcome. In specific, such data may contribute to the early identification of most at risk subjects for mortality in an emergency condition, accurately monitoring the patients and making treatment decisions and discharge accordingly [4,5]. It is also important to consolidate the information to develop an antiviral strategy for susceptible and weak people [6].

Hence, the authors decided to study the demographics, clinical features, association with co-morbidities, and outcomes of the sequentially hospitalised COVID-19 patients at a tertiary care centre.

Study Objectives

- To compare the socio-demographic factors, clinical features, co-morbidities and outcomes in COVID-19 infected patients admitted to a tertiary care centre in the first and second waves of COVID-19 pandemic.
- To study the effect of associated co-morbidities among the hospitalised COVID-19 patients in terms of prevalence and outcome by comparing those with no co-morbidity.

MATERIALS AND METHODS

The present retrospective study was conducted at Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India, serving approximately 40 lakh population. The data was collected from the electronic resource which was maintained by the institute (IDSP health record reporting database). The duration of data collected for the complete study was from June 2020 to August 2021. The duration of the first and second waves were considered as (12th June 2020 to 31st January 2021) and (1st February to 31st August 2021). The ethical approval has been waived by the

Institutional Ethical Committee in the view of retrospective nature of the study and anonymously collected data.

Inclusion criteria: All consecutive hospitalised patients with confirmed Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infections by a positive result on Real Time Polymerase Chain Reaction (RT-PCR) testing of a nasopharyngeal and oropharyngeal swab.

Exclusion criteria: Suspected patients without confirmation of a positive result were excluded from the study.

Study Procedure

The sample collection, transport, testing procedure and interpretation guidelines for COVID-19 RT-PCR were strictly followed as given by the Indian Council of Medical Research (ICMR) [7]. Nucleic acid extraction followed by Real Time Quantitative Reverse Transcription PCR (qRT-PCR) assays was done to determine the genetic markers of SARS-CoV-2 using the ICMR approved kits supplied to us as government supplies regularly. The RNA extraction kits-

a) Manual spin column based- GeneS2ME, MetaDesign.

b) Automated- Mag RNA, Kingfisher Flex. qRT-PCR kit-DiAGSure nCOV-19, COVISure Trivitron, Meril COVID-19 one step RT-PCR, Quantiplus Multiplex.

Authors have defined the patient's severity as moderate (patients requiring admission to covid ward), severe (patients requiring oxygen therapy in the form of Non Invasive Ventilation (NIV)/High Flow Nasal Cannula (HFNC) or intubation/ventilator management, as per definition of updated triage criteria used for clinical management for the COVID-19 patients [8]. Data collected included patient demographic information, co-morbidities and presenting symptoms, and outcomes (discharge and death).

STATISTICAL ANALYSIS

The analysis was done for the complete data and then for two separate durations of the first and second wave which were compared later with Chi-square test (bivariate analysis). The data obtained was entered in Microsoft excel 2010. The frequencies and the percentage were calculated. Bivariate analysis (Chi-square test) was used to know the statistical association among the study variables. This was done using the statistical software Epi Info version 7 application. The p-value <0.05 was considered as statistically significance.

RESULTS

Among the total patients 8841, the first and second waves comprised 3362 and 5479 patients respectively.

First wave: The commonly affected age group was 46-60 years (n=1043) followed by 61-75 years (n=861) with mortality rates of 14.66% and 24.39% respectively. Among the total number of 3408 COVID-19 positive patients, the numbers of male and female were found as 2226 and 1136 respectively. The male to female ratio was 1.9:1. The ratio of co-morbidities found more in males than females. The mortality rate among patients with and without co-morbidity was (383/1202) 31.86% and (112/2160) 5.18% respectively.

Second wave: The commonly affected age group was 46-60 years (n=1571) followed by 61-75 years (n=1221) with mortality rates of 18.2% and 37.91% respectively. The mortality rate in second wave was found higher in the younger population when compared to first wave. Among the total number of 6013 COVID-19 positive patients, the male to female ratio was 1.8:1. The co-morbidities were found more in the male population. The mortality rate among the patient with and without co-morbidity was (927/2318) 39.99% and (98/3161) 3.1% respectively. The overall mortality rate was higher in second wave.

The details were shown in [Table/Fig-1]. Authors did not find the data related to the outcome from 46 and 534 patients from first wave and second wave respectively, hence they were excluded from further analysis.

Various parameters in first and second waves in COVID-19 patients associated with co-morbidity: The number of patients with co-morbidities patients was higher (2318/5479) 42.3% in second wave than in first wave (1202/3362) 35.7%. When compared to first wave, the co-morbidity and mortality rate were observed higher in the younger population in second wave. The worse outcome was noted among co-morbid elderly patients with co-morbidities in second wave. The details are mentioned in [Table/Fig-2].

Age (years); First wave	n				Total (death and discharge patients)	Mortality rate (%)	p-value (Chi-square test)
	Male	Female	Death	Discharge			
0-15	35	21	01	55	56	1.78	<0.00001
16-30	280	194	20	454	474	4.21	
31-45	495	242	61	676	737	8.27	
46-60	667	376	153	890	1043	14.66	
61-75	602	259	210	651	861	24.39	
>75	147	44	50	141	191	26.17	
Total	2226	1136	495	2867	3362	14.72	
Grand total	3362		3362				
Age (years); Second wave							
0-15	183	150	28	305	333	8.4	<0.00001
16-30	487	269	47	709	756	6.21	
31-45	702	379	98	983	1081	9.06	
46-60	918	653	286	1285	1571	18.2	
61-75	911	310	463	758	1221	37.91	
>75	368	149	103	414	517	19.92	
Total	3569	1910	1025	4454	5479	18.70	
Grand total	5479		5479				

[Table/Fig-1]: Co-relation between the different age groups, gender with the outcomes among the COVID-19 positive patients in first and second waves (N=8841).

Age (years); First wave	n				Total (death and discharge patients)	Mortality rate (%)	p-value (Chi-square test)
	Male	Female	Death	Discharge			
0-15	-	-	-	-	-	-	<0.00001
16-30	7	3	2	8	10	20	
31-45	120	51	39	132	171	22.8	
46-60	323	194	137	380	517	26.49	
61-75	247	152	172	227	399	43.1	
>75	79	26	33	72	105	31.42	
Total	776	426	383	819	1202	31.86	
Grand total	1202		1202				
Age (years); Second wave							
0-15	4	3	7	-	7	100	<0.00001
16-30	32	21	26	27	53	49.05	
31-45	196	112	88	220	308	28.57	
46-60	623	274	269	628	897	29.98	
61-75	712	142	439	415	854	51.4	
>75	136	63	98	101	199	49.24	
Total	1703	615	927	1391	2318	40	
Grand total	2318		2318				

[Table/Fig-2]: Co-relation between the different age groups, gender with the outcomes among the COVID-19 positive patients having co-morbidity in first and second waves (N=8841).

The distribution of rural/urban population, outcome (in a patient with or without co-morbidity and different types of severity) in first and second waves: The urban population was having more co-morbid patients 59.4% and 61.99% in the first and second wave respectively. There was no statistical association noted for location.

The mortality rate was 24.39% and 26.17% in the age group 61-75 years and >75 years for the first wave while it was 37.91% and 19.92% respectively in the second wave. The overall mortality was 14.72% and 18.7% in first and second waves respectively. The relation between the outcomes (overall) among the patients with different age groups and co-morbidities was also found to be statistically significant in both waves.

Authors found the patients who were admitted and on oxygen support had better outcomes as 66.48% and 77.89% in terms of discharge in the first and second wave respectively. The discharge rate was 6.22% and 8.34% in the patients who required ventilator support which did not show any statistical association. In the present study, the death rate was 93.78% and 91.66% among the patients who required ventilator support in first and second waves respectively. The details are shown in [Table/Fig-3].

The outcome and associated co-morbidities among the COVID-19 patients in first and second waves: Hypertension (HTN) and Diabetes Mellitus (DM) with or without other co-morbidities 42.18% patients was the commonest co-morbidity associated with the mortality in the first wave while HTN and DM as co-morbidity 51.26% in the second wave. The patients who had the DM and HTN with or without co-morbidity were having 10-11 times the risk of mortality than those with no co-morbidities. The pregnancy did not appear to have an association with increased mortality. The other details are mentioned in [Table/Fig-4].

Parameters	First wave; n=3362 (%)	Second wave; n=5479 (%)	p-value (Chi-square test)
Based on co-morbidity			
Patients with co-morbidity	1202 (35.75)	2318 (42.30)	<0.00001
Patients with no co-morbidity	2160 (64.24)	3161 (57.69)	
Based on location			
Urban (co-morbid)	714 (59.40)	1437 (61.99)	0.13467
Rural (co-morbid)	488 (40.59)	881 (38)	
Based on outcome			
Death among co-morbid	383 (31.86)	927 (40)	<0.00001
Discharge among co-morbid	819 (68.13)	1391 (60)	
Death among non co-morbid	112 (5.18)	98 (3.1)	0.00016
Discharge among non co-morbid	2048 (94.81)	3063 (96.89)	

Outcome among subjects with different co-morbidities having greater severity (deaths)					
Parameters	**No. of patients (%)**	**Death; n (%)**	**No. of patients (%)**	**Death; n (%)**	**p-value (Chi-square test)**
Patients admitted to COVID-19 ward (moderate)	496 (41.26)	30 (6.04)	697 (30.06)	74 (10.61)	0.0056
Patients requiring O_2 (severe)	513 (42.67)	172 (33.52)	937 (40.42)	226 (24.11)	0.00014
Patients requiring ventilator support (severe with complications)	193 (16.05)	181 (93.78)	684 (29.5)	627 (91.66)	0.3349
Total co-morbid with COVID-19	1202	383 (31.86)	2318	927 (40)	-

[Table/Fig-3]: The distribution of rural/urban population, outcome (in a patient with or without co-morbidity and different types of severity) in first and second waves.

Co-morbidities	First wave			Second wave			OR (confidence interval)	p-value (Chi-square test)
	Total co-morbid	Death	Discharge	Total co-morbid	Death	Discharge		
Hypertension (HTN)	248	103	145	483	227	256	11 (9.12-13.3)	0.0001
HTN with other co-morbidity excluding DM	122	48	74	200	76	124	9.4 (7.33-12.06)	0.0001
Diabetes Mellitus (DM)	246	87	159	512	249	263	10.83 (8.96-13.07)	0.0001
DM with other co-morbidity excluding HTN	30	11	19	55	25	30	10.34 (6.843-15.64)	0.0001
HTN+DM	177	69	108	435	223	212	11.65 (9.58-14.18)	0.0001
HTN+DM+ any co-morbidity	64	27	37	95	43	52	10.75 (7.864-14.712)	0.0001
Cardiac	13	2	11	27	7	20	5.49 (2.63-11.47)	0.0001
Respiratory	38	7	31	74	12	62	4.14 (2.5-6.87)	0.0001
Cardiac+respiratory	3	1	2	9	3	6	8.14 (2.60-25.46)	0.0002
Malignancy	10	4	6	14	4	10	8.14 (3.61-18.34)	0.0002
Pregnancy	26	2	24	49	3	46	1.62 (0.65-4.07)	>0.05
IC host	15	5	10	17	7	10	9.16 (4.65-18.04)	0.0001
Others	210	17	193	348	48	300	2.84 (2.12-3.80)	0.0001
Total	1202	383	819	2318	927	1391	-	-
Number of patients with one co-morbidity	772 (first wave)			1526 (second wave)		2298 (total)	8.20 (6.99-9.63)	-
Number of patients with two co-morbidity	538 (first wave)			684 (second wave)		1222 (total)	10.75 (9.06-12.76)	-

[Table/Fig-4]: Comparison of outcome with respect to different kinds of co-morbidities in first and second waves.
p-value <0.05 was considered as statistically significance; *Any other Co-morbidity includes; CKD: Chronic kidney disease; CVA: Cerebral vascular accident; Liver disease; COPD: Chronic obstructive pulmonary disease; ILD: Interstitial lung disease; Cardiac: RHD: Rheumatic heart disease; ASD: Atrial septal defect; VSD: Ventricular septal defect; IHD: Ischemic heart disease; MI: Myocardial infarct; Valvular defects; Respiratory: Bronchial asthma; ILD: Interstitial lung disease; Emphysema; COPD: Chronic obstructive pulmonary disease; Malignancy: Cancer (Ca) lung, ca oral cavity, ca breast, RCC: Renal cell cancer; IC host: Immunocompromised host; HIV; organ transplant Others; Connective tissue disorder; Leprosy, Anaemia, Down's syndrome

Clinical presentations/symptoms found in first and second waves: The most common symptom of presentation in both waves was fever and breathlessness followed by cough and body ache. The number of asymptomatic patients was 320 (9.51%) and 940 (17.15%) in the first and second wave respectively. Breathlessness was frequently seen in the first wave. Other non respiratory symptoms such as diarrhea, abdominal pain, body ache etc were observed commonly in the second wave [Table/Fig-5].

Symptoms	First wave; n=3362 (%)	Second wave; n=5479 (%)
Cough	1190 (35.39)	1942 (35.44)
Fever	2102 (62.52)	3917 (71.49)
Breathlessness	1954 (58.12)	2145 (39.14)
Sore throat	65 (1.93)	144 (2.62)
Body ache	249 (7.4)	477 (8.7)
Chest pain	20 (0.59)	35 (0.63)
Vomiting	29 (0.86)	43 (0.78)
Diarrhea	46 (1.36)	94 (1.71)
Abdominal pain	43 (1.27)	108 (1.97)
Haemoptysis	2 (0.06)	7 (0.12)
Asymptomatic	320 (9.51)	940 (17.15)

[Table/Fig-5]: Comparison between different types of symptoms in first and second waves.

Mortality risk depending on disease severity: The risk of mortlity increased 122 times (100%) when the disease was severe. The COVID-19 patients associated with two co-morbidities (hypertension and diabetes mellitus) have eleven times risk of mortality when compared to those with no co-morbidity. The other details are shown in [Table/Fig-6].

Disease severity	No. of discharge	No. of deaths	OR (Confidence interval)	p-value (Chi-square test)
Mild	1089	104	Taken as reference	-
Moderate	1052	398	3.39 (3.14-4.99)	0.0001
Severe	69	808	122.61 (89.24-168.46)	0.0001

[Table/Fig-6]: Risk of mortality depending on disease severity and associated number of co-morbidities.

DISCUSSION

The present study mentioned in detail the characteristics and outcomes of sequentially hospitalised patients with confirmed COVID-19. As this is an ongoing pandemic, the different genetic makeup of SARS-CoV-2 and predisposing risk factors in various waves might have a different impacts on the prognosis of patients. Hence, when the comparison between various parameter in the first and second wave was done where authors found the commonly affected age group was 46-60 years followed by 61-75 years (elder) in both the waves. A study by Salari A et al., found the same [3]. In the present study, the mortality rate was observed as 31-52% and 19-38% in the elderly with and without associated co-morbidities respectively. In the current study, (2867/3362) 85.27% and (4454/5479) 81.29% of patients have been discharged (overall discharge rate among all patients) from the hospital in the first and second wave respectively. The rate of discharge of COVID-19 patients from the hospital was (819/1202) 68.13% and (1391/2318) 60% respectively in those with associated co-morbidity in first and second waves. Alamdari NM et al., found the same [2]. In the present study, no mortality was seen in the age group 0-15 years (as no child got admitted) in the first wave but the mortality was (7/7) 100% in the second wave. There were no deaths in patients with age (less than 18 years) [9]. In the present study, the overall mortality rate in the age group 16-60 years as (665/5662) 11.74%, while it was found to be 7.5% in another study [9]. The present study, concludes that the male to female ratio was 1.9:1. Similar male preponderance was seen in some previous studies [10,11].

According to the present study, the mortality rate among the patient with co-morbidities any significantly increased (31.86% and 40%) than those without co-morbidity (5.18% and 3.1%) in first and second waves respectively. A higher incidence of severe and fatal COVID-19 is observed with increasing age and is partly attributed to pre-existing co-morbid conditions [12,13]. Co-morbidities contributed to acute disease prognosis and increased risk of severe symptoms. Around 70% of patients who require ICU care have been observed to have co-morbidities [6].

Disease severity: In the present study, authors calculates the number of patients on ventilation were (877/3520) 24.91% while their mortality as (808/877) 92.13%. It had been recorded for patients on mechanical ventilation as 12.2% and a mortality rate of 21% among the hospitalised patients [9]. In the present study, when compared, the overall mortality was found similar but the serious patients on ventilation were found in half number of cases. This could be because of the less number of COVID-19 patients under study in the developed countries [9].

The present study, findings showed that the patients requiring O_2 (severe disease) has worse outcomes in first wave 33.52% than in second wave 24.11%. It was found that mortality was 2% among the patients who were not on ventilation [9]. This could be because of the better healthcare facility in a developed countries.

In the present study, the risk of mortality increased 122 times (100%) when the disease was severe with complications (patients on mechanical ventilation). Similarly, the high mortality rates (24.5%) were observed in a study and case series [9,14].

Co-morbidities: In the present study, HTN/DM with or without other co-morbidities was the commonest co-morbidities associated with 10-11 times the risk of mortality than those with no co-morbidities. The prevalence of HTN+DM and HTN, was observed as (612/3520) 17.38% and (731/3520) 20.76% respectively in the present study. This is very similar to the range 15-30% as found in a study [15]. A systematic review, it had shown an increase in severity and almost 2.5 fold increase in mortality in COVID-19 patients with hypertension [16].

The prevalence of diabetes was observed as (758/3520) 21.53% in the present study. This was similar to the different studies [9,15,17]. Where the prevalence of diabetes among hospitalised patients with COVID-19 fluctuates in the range of 10-34% and even more. Several studies conducted in China and Italy have shown a more severe course of SARS-CoV-2 infection, requiring transfer to the Intensive Care Unit (ICU) and mechanical ventilation in patients with diabetes [18]. A study by Zhu L et al., showed significant high mortality as three times than non diabetic individuals [19]. The change in immune profile and its consequences are thought to make diabetic patients more susceptible to infections [20]. The situation is complicated by the need to use glucocorticoids, which leads to an increase in the dose of hypoglycemic drugs. Diabetes is associated with a maladaptive inflammatory response leading to a worsening of the viral infection course and the possibility of bacterial complications [20]. The SARS-CoV-2 viruses show more susceptibility to the presence of excess Angiotensin Converting Enzyme 2 (ACE2) receptor, and the chances of infection and contracting the disease increase too [21,22]. SARS-CoV-2 was found to have damaged the lungs, kidney, heart and the endocrine part of the pancreas due to the presence of ACE2 receptor. This was directly related to fatality [18]. The results in the review by Ng WH et al., [23], also indicated a significant 94% increased hazard of mortality due to COVID-19 in patients with diabetes and 2.1 times increased risk in patients with HTN. It is similar to the present study even though not to that extent. The COVID-19 is associated with increased clot strength, platelet fibrinogen, elevated D-dimer levels, and hyperfibrinogenemia [24]. Hence, the association of severe outcomes in patients with hypertension and diabetes may be partially explained by the increased incidence of thrombotic complications as these co-morbid patients already have elevated

risk of thrombotic events. and also due to the induction of cytokine storm leading to hyperinflation (a hallmark of severe SARS-CoV-2 infection) [25-27].

In the present study, there was a 10 times increase in risk of death in COVID-19 patients with associated co-morbdities as HTN and DM and any other (including CKD). Similar observations were made in one review [10]. This could be because SARS-CoV-2 may have kidney tropism and the renal cells express ACE2 receptors 100 times more than the lungs [28,29]. Chronic renal diseases usually exist with other co-morbidities such as diabetes, a cardiovascular illness, which are, as already stated, further risk factors for critical COVID-19 [30].

In the present study, the prevalence of cardiovascular disease and respiratory illness as (12/3520) 0.35%. The prevalence was observed in a range of 2.5-16% in various studies and 0.95% in one study [15,31,32]. The lower prevalence may be due to a very less number of such patients. The authors from the present study found the associated cardiac and respiratory diseases were found to have 5.5 and four times increased risk of death in COVID-19 patients respectively while the risk is increased to eight times when the patient had both the co-morbidities. A similar finding was noted in previous study [33]. The reason could be explained as increased susceptibility, and severity in patients with cardiovascular conditions [34].

The patients in the present study associated with the malignancy and immunocompromised statuses were at 8-9 times increased risk of death. It is seen that an Odds Ratio (OR) of 1.63 (95% CI, 1.01-2.00) showed an increase in COVID-19 related mortality in cancer patients in one review [23]. Malignancy was observed in (24/3520) 0.68% of patients in present study. The different studies also found the percentage of COVID-19 patients with malignancy as 0.9% and 7.2% respectively with increase in severity and death rate [35-37]. The risk is increased because of the unavailability of continued treatment due to workload and saturation of the health system [38]. Immunocompromised status was observed in (32/3520) 0.90% of patients in the present study. The immunosuppressive medication affects cell mediated and humoral immunity, resulting in more severe infection in these patients [39]. The coronavirus uses the host's innate immunity to mount a deregulated and excessive immune response, which is usually the cause of the severity of the disease [40]. Hence, further studies are needed to determine the attributable risk with severity.

In the present study, pregnancy (a physiological condition) did not appear to be a risk factor for the increased mortality. The potential adverse effects on pregnancy during the COVID-19 pandemic have often shown varying results, therefore preventive measures are needed [6]. Authors observed the minimal risk with connective tissue disorders, leprosy, chronic medical disease may predispose these people to infections and disease complications [31].

Clinical presentation: In the present study, authors observed fever (71.49%) as the most commonest symptom among the COVID-19 patients in the second wave. A study by Richardson S et al., (30.7%) patients were febrile and (27.8%) received supplemental oxygen [9]. Symptoms such as cough, sore throat, fever and body ache were present in 81% of patients which is similar to the present study [6]. This may be because authors have included hospitalised patients. Similarly, shortness of breath (86.5%) and fever (83.7%) were the most common symptoms in major referral centres in Iran [2]. The present study shows the commonest symptoms in the first wave were fever (62.52%) and breathlessness (58.12%) Gasmi A et al., found 14% patients with dyspnea as findings in his review [6]. Similarly, 46% of patients experienced severe symptoms in one study [3]. Symptoms such as vomiting, diarrhoea and abdominal pain were seen vomiting, diarrhea, and abdominal pain in 0.81%, 1.58% and 1.7% of patients respectively whereas the same were seen in 32%, 27.2%, and 18.7% of all patients in one previous study [2]. The gastrointestinal manifestations were found at 20% [3].

Limitation(s)

The increased incidence of associated co-morbidity was noted in the present study due to the referral nature of the hospital. The authors did not calculate the risk associated with all the co-morbidity separately.

CONCLUSION(S)

The maximum numbers of patients were of the age group 30-75 years with male predominance in both waves. The number of pediatric patients and their mortality were more in the second wave. Asymptomatic patients were more commonly seen in the second wave. The symptoms like fever and dyspnea being the commonest presentation in both waves and pre-existing co-morbidities played an important in the management of patients. Gastrointestinal manifestations were observed relatively more in the second wave. The serious patients on ventilator were found to have (>91%) the highest mortality. It appears that the highest attributable risk to severity and mortality was due to hypertension, diabetes and other co-morbidities. This was followed by malignancy, immunodeficiency, and both cardiac illness and respiratory illness. Pregnancy did not appear as a risk. The prompt management, immunomodulatory and preventive measures need to get followed strictly for these patients.

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