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PATTERN OF OUTCOME OF COVID-19 PATIENTS ON THE BASIS OF CLINICODEMOGRAPHIC PROFILE

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ABSTRACT **Background**- Severe acute respiratory syndrome corona virus-2 with pneumonia like clinical manifestations emerged 1st in December 2019 and quickly escalated into a pandemic. With high person-person transmission ,it has serious implications on health, economy and mental well being and the clinical outcome of COVID-19 patients is variable in different countries.**Aims**- To study the pattern of outcome of COVID-19 patients on the basis of their clinicodemographic profile. **Methodology-** A retrospective observational tertiary care hospital based study was done that included COVID-19 positive patients admitted to the Institution from March 2021 to June 2021.Only patients with moderate and severe disease were admitted ,rest were advised home quarantine. Besides patient profile & clinical course,oxygen requirement ,ICU utilization rate,need for ventilatory support ,associated comorbidities and outcome was studied. **Results-** Out of 265 patients , 66.4% were males &33.5% females with a mean age of 51.4+/- 13.65 yr . Shortness of breath & cough were the predominant presenting symptoms (71.6%)with 26.4% of the patients having 50-75% lung involvement and 8.3% of patients having >75% lung involvement .ICU utilization rate was 42.3% ,however only 5.5% of the patients required mechanical ventilation. The mortality rate was 21% with hypertension(44%),diabetes mellitus(34%) and CKD(8%) being the most frequent comorbidities. More than 50% of lung involvement, preexisting comorbidities and Intensive care unit necessity were the important parameters contributing towards mortality. **Conclusion-** This study gives a better insight into the clinical and demographic profile and outcome of the patients hospitalized with COVID-19 illness by providing us a baseline data which will help us combat the pandemic swiftly in future.

KEYWORDS : Clinicodemographic Profile, Co-morbidities,outcome

INTRODUCTION

Severe acute respiratory syndrome corona virus-2 (SARS-CoV-2)with pneumonia like clinical manifestations emerged 1st in December 2019 and quickly escalated into a pandemic and gradually turned into a rapidly spreading global healthcare crisis due to its impact on health, economy, and mental well-being. [1,2] On January 30, 2020, the World Health Organization labelled it a Public Health Emergency of International Concern, and on April 11, 2020, it was designated as a pandemic.[3]. In India, the first case of COVID-19 was identified on January 30, 2020.[4]

Since then,the number has been increasing steadily due to widespread local transmission and foci of community transmission. SARS-CoV-2 is a novel species of betacoronavirus family similar to the earlier SARS-CoV and the Middle East Respiratory Syndrome virus (MERS). With high person-person transmission rate , the clinical and laboratory features of COVID-19 are associated with significant regional variations. [2] Symptoms may be mild not requiring any hospital admission or can also develop serious complications like acute respiratory failure , Adult Respiratory Syndrome (ARDS)/sepsis and cytokine storm requiring hospitalization ,ICU admission and death in severe cases. [1]

Even though COVID-19 has affected all regions of the world, the prevalence of the disease and mortality rates is highly variable in different countries, the reasons for which are poorly understood. [6,7,8]India being a large sub-continent, has also reported different patterns of disease manifestation within different states. These differences and the clinical course and severity of the disease seems to be associated with various factors, such as variations in the mean age of the population, sex, differences in ethnic backgrounds, underlying health conditions and prevalence of comorbidities, which need to be further evaluated[5] as COVID-19 pandemic still poses a serious challenge to health system worldwide.

After the unexpected ups and downs of surge in cases worldwide and in particulary in India –there is an unprecedented urgency to understand who is most at risk of severe outcomes. Understanding the features associated with COVID-19 susceptibility and severity will act as a critical guide to the local health authorities in allocating the available resources more efficiently and help in avoiding the over-stressing of the already constrained healthcare system. . Thus, with this study we aimed to understand and evaluate the demographic characteristics, clinical profile, associated co-morbid conditions, exposure characteristics and outcomes of the COVID-19 patients admitted to a tertiary care facility in north India in South western part of Rajasthan which will partially fill the existing knowledge gap & help us effectively plan outbreak control measures and combat the pandemic swiftly in future.

MATERIALS & METHODS

This was a single centre hospital based, retrospective observational study carried out on COVID-19 positive patients admitted to the Pacific Institute of Medical Sciences, Udaipur ,a 750 bedded multispecialty quaternary care private hospital from March 2021 to June 2021 over a period of 04 months.

A total of 265 confirmed cases of COVID-19 admitted to the hospital were classified as mild ,moderate ,severe as per Govt. of India COVID-19 guidelines. Moderate ,severe & critical patients admitted to the hospital with a confirmed diagnosis of COVID-19 either by positive reverse transcriptase-polymerase chain reaction (RT-PCR) or positive high resolution computed tomography(HRCT) chest and for whom the demographic ,epidemiological and clinical parameters were documented in the medical records were included in the study. While ,mild cases of COVID-19 with no evidence of hypoxemia with SpO2 above 94% who were advised home quarantine ,patients with both RT-PCR & HRCT chest negative and cases with incomplete medical records were excluded from the study.

Moderate case–
a confirmed case of COVID-19 (either by positive reverse transcriptase-polymerase chain reaction (RT-PCR) or positive high resolution computed tomography(HRCT) chest) with SpO_2 94-90% in room air & the patient had no signs of severe disease & was stable with low flow oxygen.

Severe case-
a confirmed case of COVID-19 (either by positive reverse transcriptase-polymerase chain reaction (RT-PCR) or positive high resolution computed tomography(HRCT) chest) with SpO_2<90% room air and respiratory rate (RR) >30/min.

Critical case-

a confirmed case of COVID-19 (either by positive reverse transcriptase-polymerase chain reaction (RT-PCR) or positive high resolution computed tomography(HRCT) chest) with any of the following features: respiratory failure, ARDS ,shock, sepsis or multi-organ dysfunction.

Treatment was given as per the latest Indian guidelines for treatment & management of COVID-19.The admitted patients were managed according to the following protocol. The patients based on the respiratory support they required could be divided into four categories as:-

1. Those who were stable with low flow oxygen (upto 10 litres per min nasal prongs or mask)
2. Those requiring high flow oxygen (more than 10 litres per min requiring mask with reservoir bag)
3. Those requiring noninvasive ventilation.
4. Those requiring mechanical ventilation.

Those belonging to category 1 were grouped as moderate cases and those belonging to category 2,3and 4 were severe/critical cases. The patient care was provided at two levels based on patient's severity and associated co-morbidities as follows:-

1. Level A:HDU (moderate cases)
2. Level B: ICU (severe & critical cases)

Data was collected from the medical records of the patients and information pertaining to their demographics, symptoms, clinical course, oxygen requirement ,need for ventilator support, co-morbidities, Computed tomography (CT)findings ,ICU utilization, duration of hospital stay and final outcome was noted. The CT severity score for each patient was determined based on lung involvement by assessing the percentage of involvement of each lobe individually and assigning a value from 1 to 5,with score 1: representing 5% involvement, score 2:5% to 25% involvement, score 3: 26% to 50% involvement, score 4 :51% to 75% involvement and score 5:>75% involvement. Adding the score of individual .lobes, final score was calculated out of 25. The total lung involvement is then obtained by multiplying total score by 4.Total lung involvement was thus classified as; Minimal: 1% to 25% of total lung involvement, Mild: 26% to 50% total lung involvement,Moderate:51%to 75% of total lung involvement and Severe:>75%.The sex distribution of patients, requirement of type of ventilator support ,severity of lung involvement and ICU utilization rate all were calculated applying simple formulas of percentage and age of the patient group was calculated using formula for mean and mortality rate was determined using the standard formula for mortality rate and appropriate tests of significance were employed for determining significance of association of various variables(age,co-morbidity,duration of hospital stay,severity of disease & ICU utilization) in determining or contributing towards mortality. Ethical approval was obtained from the Institution Ethics Committee and every patient admitted in the hospital had an informed consent signed at the time of admission for testing ,procedure and use of reports for non-medicolegal purposes.

RESULTS

A total of 265 patients were studied of whom 66.4% were males &33.5% were females. Maximum 48.8% of the patients belonged to the age group 40-60years, 29.9% of the patients belonged to the age group >60 years and 21.2% of the patients belonged to the age group <40 years with a mean age group of 51.4+/- 13.65 years .Although a wide index of suspicion is required to diagnose COVID-19, the predominant presenting symptoms in this study were shortness of breath & cough(71.6%)followed by fever and myalgia(24.5%) and diarrhea ,body ache, lethargy and anosmia contributing to3.90%.

The predominant co-morbid conditions were hypertension (44%), diabetes mellitus(34%) , Bronchial asthma & COPD(8.8%),ischaemic heart disease(6.7%) & CKD(4.5%) . The overall ICU utilization rate was 42.3% however only 5.5% of the patients required mechanical ventilation,6.4% were on high flow O_2,31.1% maintained on non invasive ventilation and 57% were on low flow O_2(<10litre).(Table 1 ,Fig;1)

Table1: Pattern of respiratory support required by the hospitalized patients

| Type of respiratoy support	% of patients requiring respiratory support
Low flow O2 therapy (<10 litre)	57%
High flow O2 therapy	6.4%
Non invasive ventilation	31.1%
Mechanical ventilation	5.5%

Fig:1Pattern of respiratory support required by the hospitalized patients
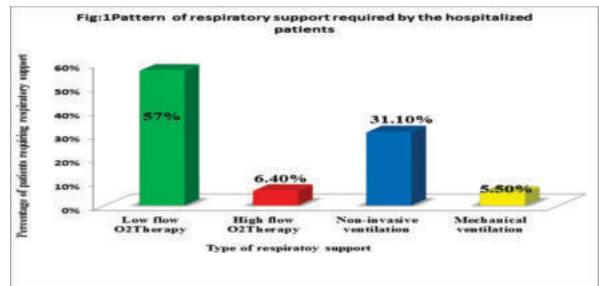
On the basis of CT severity score ,maximum 46.8% of the patients had mild degree of lung involvement, followed by 26.4% patients with moderate degree of lung involvement ,18.5%patients had minimal lung involvement and only 8.3% of the patients had severe degree of lung involvement. (Table2,Fig;2)

Table2:Distribution of CT involvement of lung and severity grade among COVID-19admitted patients

CT involvement of lung(grade and extent in %)	Percentage of patients affected
Minimal (1-25)	18.5
Mild (26-50)	46.8
Moderate (51-75)	26.4
Severe (>75)	8.3

Fig:2Distribution of CT involvement of lung and severity grade among COVID-19 admitted patients
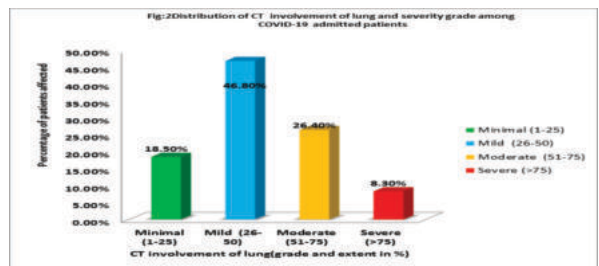
92.2% of the critical cases ,65.4% of severe cases and32.7% of moderate cases had one or more associated co-morbid conditions .The average hospital stay was 7.5days and the overall mortality rate was 21% with disease severity ,presence of co-morbidities , Intensive care unit necessity & advanced age being the predominant contributing factors towards mortality.

DISCUSSION

The second wave of COVID-19 had a catastrophic impact on the Indian subcontinent, resulting in higher infection rates, ICU utilization and death as compared to the first wave and third wave. (Graichen, 2021, Jain et al., 2021)[9,10].This study aimed at studying the pattern of outcome of COVID-19 patients on the basis of their clinicodemographic profile and it was found that of all the patients studied male patients were predominant with 66.4% and the mean age group was 51.4+/- 13.65 years with maximum 48.8% of the patients belonging to the age group 40-60 years.

The studies done by Harharpreet Kaur etal in 2020[11], by Hossain etal in 2021[1]and by Prithvi Mohandas etal in 2020[2] also recorded that males(68.15% ,62.9% and 69.20% respectively) were approximately twice as more affected than females which is very much similar to findings of our study. The study done by Mohammad Iqbal etal[1] & Rahim et al.in 2021[12] & Prithvi Mohandas etal in 2020[2] reported similar findings to our study with predominant age group being 41to 60years while the study done by Harharpreet kaur etal reported that most of the patients affected were between ages of 51-70 years.Studies have shown that during the early phase of the pandemic,patients aged>=70 years were at a higher risk and were subsequently isolated .However,it has been observed over time that mean age has shifted towards 50 years age group which corroborates with the results observed in our study .[2] .The predominnat presenting symptoms in our study were shortness of breath & cough(71.6%) which is very much similar to the findings by Harharnpreet kaur etal[11] & Md Jamil etal,2020.[5]

The most frequent co-morbidities in thus study were hypertension (44%) and diabetes mellitus(34%) which is very much similar to the findings of Mowla et al.,2020 ,& Nelson et al.,2020 .[13,14]In the present study ,92.2% of the critical cases & 65.4% of severe cases had one or more associated co-morbid conditions patients ,and the studies done by Md Jamil etal,2020[5], Hossain etal ,2021[1], Oliveira et al. 2021[15] and Harharpreet Kaur etal, 2021[11] also support our finding that the presence of co-morbidities is significantly associated with the disease severity. The overall ICU utilization rate was 42.3%,however maximum 46.8% of the patients had mild degree(26-50%) of lung involvement,which is very much similar to the findings of Hossain etal,2021(50% patients had 25-50% lung involvement)[1] .Although in another study done by Alam SZ etal,2020[16] they reported that most of the patients had <25% lung involvement. The ICU utilization rates of study done by Hossain etal,2021also showed similarities with our study with 25%while studies done by Oliviera etal,2021[15] and Abate etal 2020[17] also showed similar but a slightly higher ICU utilization rates of 30and 32% respectively while study done by Harharpreet kaur etal ,2021[11] reported a much lower ICU utilization rate of only 12%.Higher ICU utilization rate in present study is an indicator of more severity of the disease varaint in second wave as compared to 1st wave.

The average hospital stay was 7.5days and the overall mortality rate was 21% in the current study.Pellaud c,etal in 2020[18] reported a mortality rate of 17%which is close to findings of our study while Ahmad etal in 2020[19] reported overall mortality rate 11% and Harharpreet kaur etal in 2020[11] also reported overall mortality rate of 12% .The overall high mortality rate in the current study could be attributed to the fact that in-hospital mortality among COVID-19 patients varies widely and this variation probably depends on severity criteria of admission, comorbidities in the patient, presence of ICU facility in hospital & age composition of the region. It has also been demonstrated by various other studies that COVID-19 positive patients with preexisting co-morbidities like diabetes and hypertension have twice and thrice the risk of mortality as compared to those with COVID-19 without co-morbidities.[20]

Limitations of the study-There were certain limitations with the current study as it was carried out at a single tertiary care COVID-19 specialized referral facility; therefore, the propor- tion of critically ill patients may be higher than in other centers or in population-based research.Further as it was a retrospective study entirely based on hospital records,follow –up information about relapses was lacking.

CONCLUSION-

The COVID-19 pandemic caused not only a huge burden on health care facilities but also a significant disruption in societies globally. During second wave, elderly persons especially of male sex were affected more and co-morbidities such as diabetes and hypertension were the predominant risk factors for hospitalization & progression to severe disease. Early aggressive ICU care particularly non-invasive ventilation plays an important role in management of COVID-19 patients with severe disease. Knowledge of the factors affecting outcome & disease progression can serve as guideline for more effective management of COVID-19 patients in future and thus with all its limitations this study still holds a good value as it assesses many variables and will help us get a deeper insight into clinical course and outcome of COVID-19 and will help us combat the pandemic in future.

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