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Management of moderate to severe Covid-19 cases in a non ICU Hospital setting in rural India

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Abstract

Background: Covid-19 is a global pandemic declared by the world health organization (WHO). The morbidity andmortality increase as the gradeof disease severity increases as per WHO criteria. When the government health facilities and hospitals in major cities were flooded with patients, it was essential to manage Covid-19 cases at remote rural places with limited health facilities.

Limited information is available about the management of moderate to severe cases in resource constraint hospital settings.

Objective: To assess outcomes of patients with moderate and above severity.

Patients and Method: It was a retrospective observational study. Forty-six moderate to severe covid-19 cases admitted in a rural hospital setting with limited resources were studied. Selected cases were included and excluded, as per WHO-defined criteria.

Result: The proposed approach provides an alternative cheap and reliable management in limited-resource hospital settings for the management of moderate to severe Covid-19 cases. All treated patients except two (Referred) were recovered and doing well in the follow-up.

Conclusion: The authors emphasize the importance of close monitoring, proper management of covid 19 as well as comorbidities using simple medicine techniques. There was an important role of psychological support from treating staff and family.

Keywords: SARS-CoV-2(severe acute respiratory syndrome coronavirus 2), covid-19, rural setting, empathy

Introduction

The pandemic of Covid-19 is caused by a single-stranded RNA virus, SARS-CoV2 (Severe Acute Respiratory Syndrome Coronavirus 2). SARS-CoV-2 spreads via respiratory droplets and fomites where the virus can enter the mucus membrane of the eyes, nose, and mouth. The cases continued to spread across the world and on March 11, 2020, WHO declared a pandemic stage [1, 2, 3].

High morbidity and mortality were seen among the people who presented with moderate to severe and critical disease so need special attention and time management [4].

Covid-19 infected persons with underlying health conditions (comorbidities like Diabetes, Hypertension, Ischemic heart disease, pulmonary disease, etc.) are most vulnerable to succumbing to Covid-19. Mortality also increases with age as noted World Wide. Hence these cases need to be managed appropriately [5, 2, 3].

Social and psychological factors like fear, loneliness, depression, isolation were aggravating factorsand related to the worsening of comorbidities [6].

Objective

To assess the outcome of patients with moderate to severe Covid-19 infection in a limited-resource setting.

Material and Methods

Sample size: 46COVID 19 CASES

Study type: Retrospective Observational Study

Study Duration: 5 months (Sept 2020-Jan2021)

All the patients were under the supervision of a single physician (medical specialist and intensivist). The proposed approach provides an alternative cheap and reliable management in limited-resource hospital settings for the management of moderate to severe Covid-19 cases. This study is based on our experience of managing 46 moderate to severe covid cases in a 50 bedded primary care private hospital. All the patients were diagnosed and categorized based on RTPCR, chest X-Ray and High resolution computed tomography (HRCT) chest findings [7, 8, 9].

Inclusion Criteria – Moderate to severe cases as per WHO Covid-19 disease severity criteria.

Exclusion Criteria – Mild cases as per WHOCovid-19 disease severity criteria.

Who Criteria (Adults) [10]

COVID-19 disease severity

Moderate disease - Pneumonia in an adult with clinical signs of pneumonia (fever, cough, dyspnea, fast breathing) but no signs of severe pneumonia, including SpO2 ≥ 90% on room air. While the diagnosis can be made on clinical grounds; chest imaging (radiograph-pneumonia present +, CT scan 25-75%) may assist in the diagnosis and identify or exclude pulmonary complications.

Severe disease - Severe pneumonia adult with clinical signs of pneumonia (fever, cough, dyspnea, fast breathing) plus one of the following: respiratory rate > 30 breaths/min; severe respiratory distress; or SpO2 < 90% on room air. While the diagnosis can be made on clinical grounds; chest imaging (radiograph -pneumonia present ++, CT scan->75%) may assist in the diagnosis and identify or exclude pulmonary complications.

The severity of patients was assessed by Dyspnea, Spo2 by Pulse oximeter, CXR, HRCT, and associated comorbidities [2, 7, 9].

Patients were kept in the isolation ward and not in the intensive care unit (ICU) due to the Non-availability of separate ICU.

Oxygen (O2) is given by nasal cannula and masks intermittently or continuously to maintain their Spo2 level > 92%. No high-flow O2 or ventilators were used. The maximum flow of O2 used was 15 lit/h.

Selected cases were given Dexamethasone/ Betamethasone initially started with 32 to 48 mg /day then tapered to daily by 4-8 mg according to the severity and discontinued in 7-21 days.

In dyspneic patients with bronchospasm, nebulization with steroids and bronchodilators was done [11].

Patients were kept on Favipiravir (3600 mg in two divided doses as a loading dose on day one followed by 800 mg twice daily for 7-10 days or Injection Remdesivir 200 mg IV infusion on day one followed by 100 mg daily for the next 5-10 days as per severity [12, 13].

Low molecular weight heparin (LMWH) was used 40-60 mg/day subcutaneously to prevent pulmonary thromboembolism (PTE) [14].

Antibiotics used were Azithromyin/ + - amoxicillin-clavunate or Piperacillin-tazobactam [10].

Cases with diabetes were managed by strict blood sugar monitoring by glucometer and sugar levels were kept near to normal by using oral drugs and subcutaneous/IV insulin infusion.

Other comorbidities like hypertension and renal disease were managed with strict drug compliance and monitoring.

Vitamins B/C/D/Zinc were used as supportive therapy.

Social and psychological upliftment - Relatives were allowed to meet the patients daily with proper protective precautions (PPE) and patients were also allowed homemade food by relatives.

Patients were discharged from the hospital after six Minutes walk test, normal SPO2 at room air and improvement in chest x ray and HRCT.

Result

From September 2020 to January 2021 total of 100 patients reported to our center with COVID -19 RTPCR positive status. 46 patients who were moderate to severe as per WHO criteria were included in the study group.

14 patients were diabetics, 5 were hypertensive, 12 with multiple comorbidities like diabetes, hypertension, and renal disease, and 15 patients were without any comorbidity.

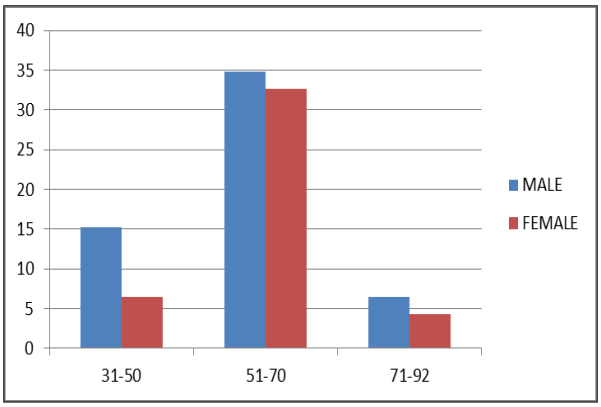

Fig 1: Age and sex distribution among cases of Covid-19 Total patients =46, Male=25, Female=21 Age group 31-50 yrs = 10 pts, 51-70 yrs=31 pts, 71-92 yrs = 5 pts

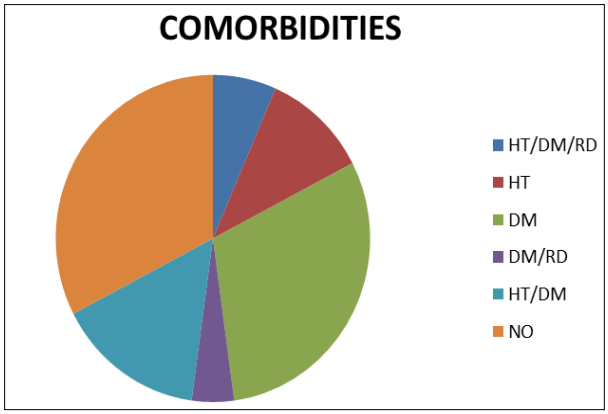

Fig 2: Distribution of comorbidities among 46 patients

Total = 46 patients, Hypertension (HT) =5 pts,DM= 14 pts, HT+DM=7 pts, HT+DM+Renal Disease=3 ptsDM+RD=2 pts No comorbidities=15 pts

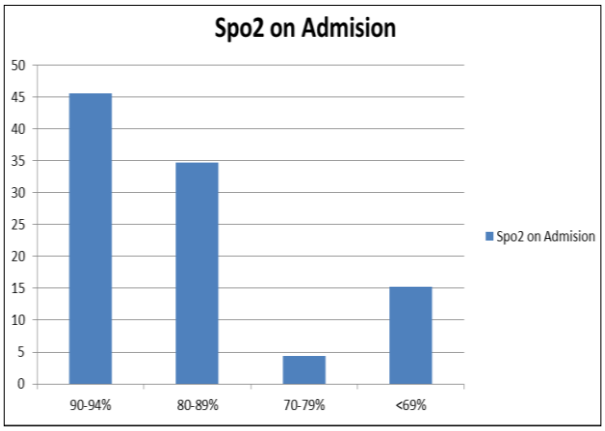

Fig 3: Shows Spo2 at room air on admission Total pts=46, Spo2, 90-94%=21, 80-89%=16, 70-79%=2, <69%=7

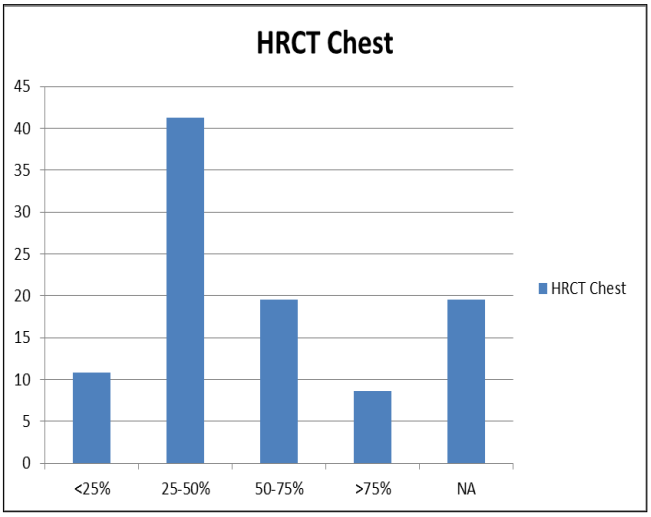

Fig 4: Percentage of lungs involvement on HRCT Total pts =46, <25%=5 pts, 25-50%=19 pts 50-75%=9 pts, >75%=4 pts

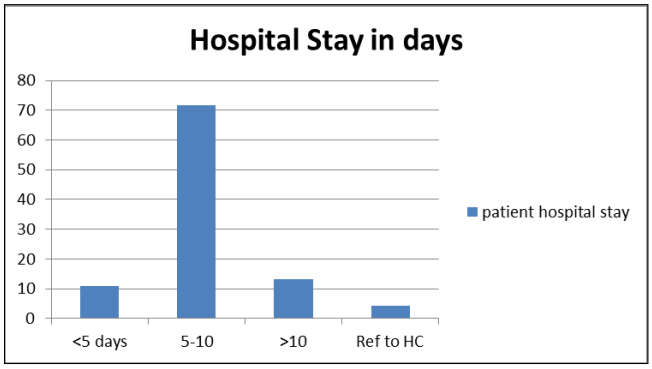

Fig 5: Total days of hospital stay from admission to discharge Total pts=46, <5 days= 5 pts, 5-10 days=33 pts, >10 days=6 pts, Referred pts=2

Discharge from the hospital was considered based on clinical assessment, six minutes' walk test with Spo2 >96% on room air, improvement in chest x-ray, and HRCT.

Table 1: Association of clinical variables with the severity of Covid-19 of patients studied

Variables	Total	Severity		P value
		Moderate	Severe	
Patient No.	46	21(45.6%)	25(54.3%)	0.404
Male	25	15(60%)	10(40%)	0.157
Female	21	6(28.5%)	15(71.4%)	0.005**
Age Group				
31-50 Year	10	6(60%)	4(40%)	0.371
51-70 Year	31	14(45.1%)	17(54.8%)	0.446
71-92 Year	5	1(20%)	4(80%)	0.206
Hospital Stay Days				
<5 Days	5	5(100%)	0(0%)	0.008**
5-10 Days	33	15(45.4%)	18(54.5%)	0.460
>10 Days	6	1(16.6%)	5(83.3%)	0.080+
Antiviral Used	44	20(45.4%)	24(54.5%)	0.394
Fevipiravir	20	13(65%)	7(35%)	0.058+
Remdesivir	24	7(29.1%)	17(70.8%)	0.004**
Steroids Used	35	11(31.4%)	24(68.5%)	0.002**
Recovered	44	21(47.7%)	23(52.2%)	0.670
SPO2 %	46	21(45.6%)	25(54.3%)	0.404
90-94%	21	21(100%)	0(0%)	<0.001**
80-89%	16	0(0%)	16(100%)	<0.001**
70-79%	2	0(0%)	2(100%)	0.333
<69%	7	0(0%)	7(100%)	<0.001**
HRCT Chest	Total 37			
<25%	5	3(60%)	2(40%)	1.000
25-50%	19	11(57.8%)	8(42.1%)	0.330
50-75%	9	1(11.1%)	8(88.8%)	0.003**
>75%	4	0(0%)	4(100%)	0.029*
CXR				
+	19	14(73.6%)	5(26.3%)	0.004**
++	27	7(25.9%)	20(74.0%)	<0.001**

In the study of a total of 46 patients, 25 Males and 21 Females were included out of which 21 (45%) were Moderate and 25 (54%) were of severe category.

Patients Severity was assessed by Spo2 on admission.

21 Patients had Spo2 of 90-94%, all (100%) had Moderate Disease (Significant P-value <.001).

16 Patients Presented with Spo2 80-89% all (100%) had Severe Disease (P-value<.001).

2 Patients presented with Spo2 70-79% all (100%) Severe Disease (P-value 0.333).

7 Patients with Spo2 <69% all (100%) had Severe Disease (P-value <.001).

HRCT Chest was done in 37 Patients out of 46 Patients.

5 Patients had <25% Pulmonary Involvement out of which 3 (60%) had Moderate Disease and 2 (40%) had Severe Disease (P-value 1.00).

19 Patients had 25-50% Pulmonary involvement out of which 11 (57.8%) with Moderate Disease and 8 (42%) with Severe Disease (P-value 0.330).

9 Patients had 50-75% Pulmonary involvement out of which 1 (11%) with Moderate Disease and 8 (88.8%) with Severe Disease (P-value 0.003).

4 Patients had >75% lung involvement all had Severe Disease (P-value 0.029).

Chest X-ray was done in 46 Patients - Slight unilateral patch of Pneumonia (+) was found in 19 Patients out of which 14 (73.6%) had Moderate Disease while 5 (26.3%) had Severe Disease (P-value 0.004)

Bilateral diffuse Pneumonia (++) was found in 27 Patients out of which 7 (25.9%) had Moderate Disease and 20 (74%) had Severe Disease (P-value <0.001).

Antiviral Drugs Favipiravir (Oral) and Remdesivir (Intravenous) were used in a total of 44 Patients, two Patients were not given any antiviral.

Favipiravir was used in a total of 20 Patients 13 (65%) Moderate and 7 (35%) Severe Disease (P-value 0.058)

Remdisivir used in 24 patients 7(29.1%) Moderate and 17 (70.8%) Severe Disease (P value 0.004).

Dexamethasone was used in 35 Patients 11 (31.4%) Moderate and 24 (68.5%) Severe Disease, in 11 Patients no steroid was used (P-value 0.002).

Hospital Stay – 5 Patients recovered in less than 5 days. All (100%) were of moderate disease. (P-value 0.008).

33 Patients recovered in 5-10 days. Out of which 15 (45%) Moderate and 18 (55%) had severe disease. (P-value 0.460).

6 Patients out of which 5 (83.3%) Severe and 1 (16.6%) Moderate recovered in >10 days (P-value 0.080).

In total 46 Patients, 21 were of Moderate and 25 were of severe category, out of these patients recovered were 21 and 23 respectively. Two Patients with Severe Disease were referred to a higher center (outcome not known) (P value 0 .394).

Statistical Methods

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at a 5 % level of significance. The following assumptions on data are made, Assumptions: 1.Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, and Cases of the samples should be independent.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on a categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher Exact test used when cell samples are very small.

Significant figures

+ Suggestive significance (P value: $0.05<P<0.10$)

* Moderately significant (P value: $0.01<P \leq 0.05$)

** Strongly significant (P value: $P \leq 0.01$)

Statistical software

The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data, and Microsoft Word and Excel have been used to generate graphs, tables, etc**.**

Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Discussion

In the situation of epidemics when the Government recognized institutions were flooded with patients and when the patients cannot go or afford the specialized center for their illness, these patients have to be managed whatever is the severity of the disease and available healthcare facilities.

In other studies investigations like Arterial Blood Gas (ABG) analysis, IL6, D-dimer, Serum Ferritin were considered as essential investigations and prognostic markers [15, 16].

In our study, these investigations were not done because of non-availability and financial constraints. Even without these investigations, it makes no difference in the outcome of patients when compared to other studies.

In other studies when SPO2 levels in tachypneic patients were not maintained up to 90%, they used high flow oxygen followed by noninvasive (BIPAP) and if required, invasive ventilators to maintain oxygen levels >90% to prevent hypoxic damage [2,10,17].

But in our cases with tachypnea, we used oxygen with mask and nasal cannula only up to 15 lit/hr, even though the patient's SPO2 levels remained below 90%. In our experience, the patients tolerated this hypoxia very well and gradually the oxygen levels improved with the same facility. Thus the presence of only hypoxemia should in general not trigger the use of invasive ventilation because hypoxemia is remarkably well-tolerated [18].

In other studies where methylprednisolone was the choice of steroid [19] while we used proper doses of Dexamethasone and Betamethasone which made the regimen very cost-effective with comparable results [11].

In dyspneic patients who were kept in isolation, we regularly used nebulization with bronchodilators and steroids which gave a remarkable improvement in patients. They were monitored regularly for Heart rate/ pulse rate and tremors.

All the patients were kept in isolation wards only and not in ICU because of the no availability of separate ICU. At the same time, a strict watch was kept on clinical Features, Vital signs, Spo2 & Routine investigations like CBC, CRP, Blood sugar, CXR, and Strict input-output charting were done [4, 5, 10].

In general, covid-19patients were kept isolated from family, which might be depressing for aged patients [18]. In our study patients were allowed to meet one relative at a time with proper protective precautions and also allowed to take homemade food provided by the attendant. This might have provided a psychological boost to patients and might have reduced adrenergic drive and help in good recovery/ outcome [9].

In general, ICU patients are managed by shifting duty doctors with sharing responsibilities while in our study patients were managed by a single physician without ICU.

The estimate of mortality among moderate to severe hospitalized patients with comorbidities is 9-15%. [23] But in our study of 46 moderate to severe cases, no mortality was experienced in 44 patients. Two patients were referred due to inappropriate improvement in condition.

Conclusion

Covid -19 patients of varying severitycan be managed with available resources even without the availability of advanced laboratory and intensive care facility. Patients can benefit from principles such as empathy, love tender care

from family, and the development of effective patient–physician communication. Remarkably, the aforementioned principles in the management of covid-19 have been related to Reduced overall mortality in patients, especially with advanced age and comorbidities.

Possible factors associated with a better outcome in our patients may be, supervision by a single physician, proper management of comorbidities, Psychosocial upliftment by allowing meeting relatives, and homemade food and probably better immune status of patients from rural backgrounds.

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