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Research Article

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Clinical Management and Outcomes of COVID-19: A Retrospective Analysis from RD Gardi Medical College

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ABSTRACT

Background: Considering the global health implications of COVID-19, comprehend the efficacy and results of localised treatment protocols to enhance patient care and response methodologies.

Methods: Epidemiological, demographic, clinical, and laboratory data from 187 COVID-19 patients admitted to RD Gardi Medical College, a designated COVID-19 referral centre, were analysed in this retrospective study. Following symptom assessment and severity-based treatment protocol application, patients were monitored for recovery or progression to severe disease. Assessments were carried out to ascertain statistically significant predictors of clinical outcomes.

Results: Information revealed that quite a few of the patients belonged to younger age cohorts (62%) and were male. A fever and nasal congestion were frequent symptoms. Medications such as Hydroxychloroquine and Azithromycin were administered in line with the specific requirements of each patient and clinical guidelines. The correlations between patient information and treatment decisions were statistically significant, indicating the criticality of personalised treatment approaches.

Conclusion: The efficacy of flexible therapy approaches that consider demographic and clinical attributes enhances the care of patients inflicted with COVID-19. These insights are crucial to enhancing therapeutic approaches and informing public health policies in the face of current and forthcoming pandemics.

Key-words: COVID-19, Treatment protocols, Patient outcomes, Epidemiological data, Clinical management, Personalized treatment

INTRODUCTION

Since its emergence in December 2019, COVID-19, caused by the SARS-CoV-2 virus, has precipitated a global health crisis, rapidly spreading to over 218 countries and resulting in approximately 42.9 million cases and 1.1 million deaths by October 2020 [1]. India, experiencing its first confirmed case in January 2020, has become one of the hardest-hit nations, with over 7.9 million cases reported [2].

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Tamil Nadu, particularly its capital, Chennai, has been significantly impacted, witnessing a sharp rise in cases by the end of April 2020 [3].

In response to the escalating case numbers, the Tamil Nadu government implemented a strategy involving the establishment of COVID Care Centers (CCCs). These centres were designed to alleviate the strain on traditional healthcare facilities by providing care for patients exhibiting mild to moderate symptoms, thus reserving hospital beds for severe cases. This approach optimizes resource allocation and aims to curb the spread of the virus by effectively isolating cases [4].

As the pandemic unfolded, India's response, characterized by regional and concentrated community transmission control efforts, highlighted the challenges and successes of managing such a public health crisis.

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The data and findings presented in this article aim to inform future strategies for outbreak response and healthcare management during ongoing and subsequent health emergencies.

This article delves into understanding the operational details, treatment protocols, and outcomes of a specific CCC in Chennai, providing an exhaustive analysis of 187 patients treated at this facility. By documenting and evaluating these patients' demographic, epidemiological, clinical progress and outcomes, the study offers insights into the effectiveness of the CCC model in managing the COVID-19 outbreak within a densely populated urban setting. Additionally, this analysis contributes to a broader understanding of public health strategies crucial for controlling infectious disease pandemics [5].

MATERIALS AND METHODS

Study design- This study had data from 187 consecutive COVID-19 patients of RD Gardi Medical College, a designated referral centre, per government policy [6]. Patients, covering all severity levels, were triaged upon arrival based on their clinical assessment into appropriate care settings ranging from isolation units to intensive care. Detailed clinical, demographic, and epidemiological data were recorded alongside focused histories and baseline medical evaluations. Treatment protocols included symptomatic management, Azithromycin, Hydroxychloroquine (based on clinical judgment and absence of contraindications), and oxygen support as clinically necessary. Diagnostic procedures included RT-PCR tests from nasopharyngeal and throat samples, with patient infectivity assessed by subsequent RT-PCR tests.

Inclusion criteria- The research encompassed a heterogeneous group of patients aged 30 to 70, who tested positive for COVID-19 via RT-PCR. This cohort comprised asymptomatic and symptomatic individuals admitted to the tertiary care hospital in Ujjain, MP.

Exclusion criteria- To ensure the treatment outcome data about the virus and to maintain a focus on confirmed cases patients, who tested -ve for COVID-19 via RTPCR were excluded.

Statistical Analysis- The gathered data comprised many factors, such as patient outcomes & treatment protocols. The analyses were conducted utilizing Graph Pad Prism version 5 and SPSS (version 27; SPSS Inc., Chicago, IL, USA). The data were summarized for numerical variables as means and SD's; counts and percentages were utilized for categorical variables. Significant differences were ascertained by using two-sample t-test and Z-test in comparative analyses. The p-value threshold for statistical significance was <05.

Ethical Approval- The research study obtained ethical approval from the RD Gardi Medical College's review board, ensuring the utmost ethical conduct in scientific inquiry.

RESULTS

Table 1 comprehensively summarizes the COVID-19 treatment protocols utilized at RDGMC Ujjain. It details the use of various therapeutic agents, dosages, and the corresponding stages of disease progression at which they are applied. Specifically, the treatment protocol initiates with anti-viral drugs, antipyretics, antibiotics HCQ and other supportive treatments. Remdesivir is administered starting with a 200 mg intravenous dose on the first day, followed by 100 mg daily for the next 5 to 10 days, based on the patient's clinical response. In cases of disease progression, corticosteroids such as Dexamethasone are introduced at a dose of 8 mg BD daily, administered for up to ten days to patients exhibiting severe symptoms and requiring supplemental oxygen. For patients with critical conditions and significant inflammatory responses, immune modulators such as Tocilizumab are used in a tailored dosage regimen, typically administered as a single dose or a short course based on individual patient needs and clinical guidelines. In cases of significant inflammatory responses, low molecular weight heparin (40 mg) is administered subcutaneously twice daily, and antibiotics are also upgraded accordingly.

Table 2 displays the initial biomarker levels of patients at admission, providing critical insights into the severity of their condition as they commenced treatment. The table outlines C-reactive protein (CRP) measurements, serum ferritin, D-dimer, and lactate dehydrogenase (LDH). Notably, the CRP levels among the patients had a mean value of 4586932 mg/L with a substantial standard deviation, indicating a wide range of inflammation responses upon admission. Serum ferritin also showed significant variability, with an average initial value of

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347.61 mcg/L. D-dimer and LDH values further supported the assessment of the patient's initial clinical states, with mean values of 1059.45 ng/mL and 324.78 IU/L, respectively, each also demonstrating a broad range of values reflecting diverse severity disease in the cohort.

Table 1: Overview of COVID-19 Treatment Protocols at RDGMC Ujjain

Treatment Stage	Medication(s)	Dosage and Administration	Patient Criteria	Duration
Initial	Antiviral (e.g. Remdesivir)	Varies based on protocol	Mild to moderate cases, early hospitalization	5-10 days
Progressive	Corticosteroids (e.g. Dexamethasone)	Standard dose per protocol	Severe cases requiring oxygen therapy	Until clinical improvement
Severe	Immune modulators (e.g. Tocilizumab)	As per clinical guidelines	Patients with significant inflammation	Single dose/Short course
Critical	Anticoagulants (e.g. Heparin)	Adjusted as per coagulation profile	Patients at risk of thrombosis	As needed
Critical (Respiratory Support)	Mechanical Ventilation	As required	Patients requiring respiratory support	As needed

Table 2: Initial Biomarker Levels at Admission Correlated with Treatment Outcomes

Biomarker	Number of Patients	Mean	Standard Deviation	Minimum	Maximum	Median	Outcome Correlation
CRP	147	4586932	7097.77	450	45000	1522	Positive correlation with severity
Serum Ferritin	133	347.61	719.14	5.15	7062	175	Positive correlation with ICU admission
D-Dimer	117	1059.45	1957.66	17.1	14960	428	High levels associated with thrombotic complications

Table 3 provides an in-depth look at the changes in biomarker levels through multiple stages of treatment for COVID-19 at RDGMC Ujjain. It shows the dynamic response of biomarkers like C-reactive protein (CRP), serum ferritin, and D-dimer, which is critical in assessing patients' inflammation and coagulation status under treatment. The first measurement shows a mean CRP level of 4586932 mg/L, which notably increases to a mean of 8010.75 mg/L in the second measurement, indicating an escalation in inflammation. Subsequently, the third measurement decreases to a mean of 2805.81 mg/L, suggesting a reduction in inflammation, possibly due to the effectiveness of the treatment protocols. Initial measurements show an average serum ferritin level of 347.61 mcg/L, slightly increasing to 378000 mcg/L in the second measurement. The third measurement decreases to 324000 mcg/L, indicating a potential stabilization of the patient's inflammatory state. Starting at 1059.45 ng/mL, D-dimer levels slightly decreased in the second measurement to 932.58 ng/mL, suggesting a reduction in coagulation risks, crucial for managing complications related to thrombosis in COVID-19 patients.

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Table 3: Treatment Protocol Efficacy Based on Serial Biomarker Measurements

Biomarker	Measurement Time	Number of Patients	Mean	Standard Deviation
CRP (mg/L)	1st value	147	45869	7097.77
CRP (mg/L)	2nd value	19	8010.75	8869.28
CRP (mg/L)	3rd value	10	2805.81	26197
Ferritin (mcg/L)	1st value	133	347.61	719.14
Ferritin (mcg/L)	2nd value	8	3780	255.77
Ferritin (mcg/L)	3rd value	8	3240	200.17

Table 4 correlates the final biomarker measurements with the clinical outcomes of the patients, providing a snapshot of treatment success and areas for further attention. The final measurements of D-dimer average 932.5833 ng/mL with a standard deviation of 1156.7128 ng/mL, indicating a general decrease from earlier stages. This reduction is crucial in assessing the lowered risk of thrombotic complications after treatment interventions. The lactate dehydrogenase (LDH) levels average 328.37 IU/L in the final measurements with a relatively low standard deviation of 107.92 IU/L, suggesting stabilising this enzyme's activity is associated with tissue damage and turnover. The final HRCT chest severity scores average 40.40 with a standard deviation of 23.55, indicating persistent but possibly moderated lung involvement in patients' post-treatment. The median severity score of 30000 points towards a moderate residual lung damage or disease level.

Table 4: Patient Outcome Metrics Post-Treatment

Biomarker	Outcome Measure	Number of Patients	Mean	Standard Deviation
D-Dimer (ng/mL)	Post-Treatment	9	932.58	1156.71
LDH (IU/L)	Post-Treatment	18	328.37	107.92
HRCT Chest Severity	Final Assessment	175	40.40	23.55

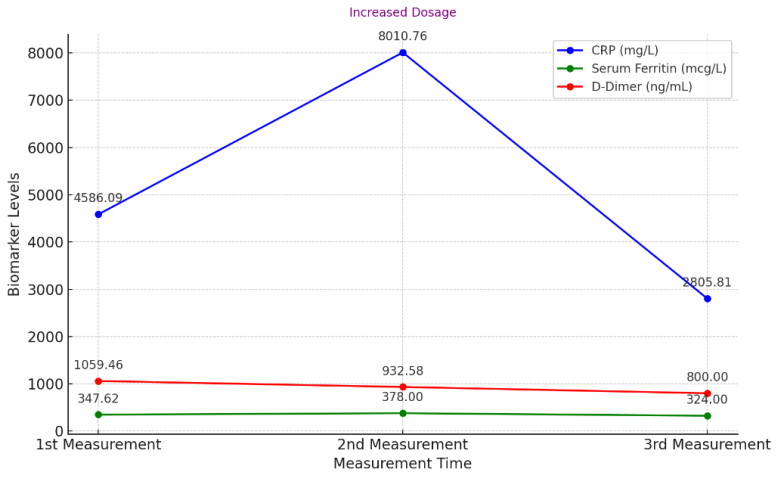

Fig. 1: Serial Biomarker Measurements During COVID-19 Treatment

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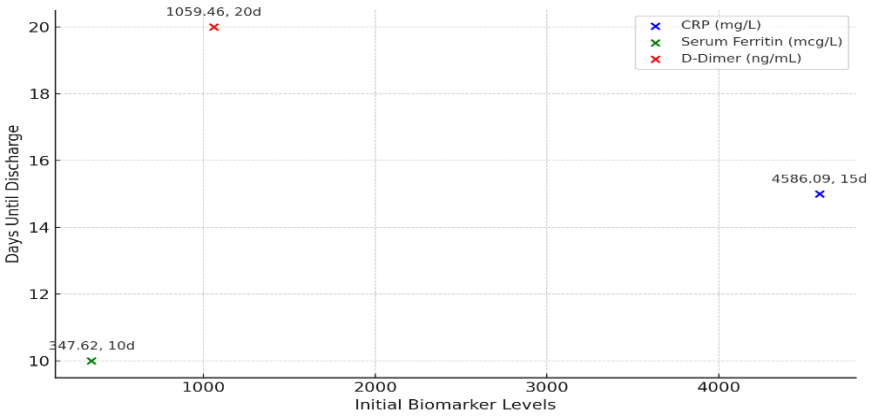

Fig. 2: Correlation of Initial Biomarker Levels with Patient Outcomes

DISCUSSION

This study at RD Gardi Medical College analyzed epidemiological, demographic, clinical, and laboratory data from 187 COVID-19 patients, contributing valuable insights into the clinical management and outcomes of the disease. Consistent with global trends, most of our cohort were males (62%), which aligns with findings suggesting higher susceptibility and severity of COVID-19 among males, potentially due to differences in immune response [7-9]. The age distribution in our study indicated a significant number of younger adults, contrasting with other studies where higher age correlated with severe outcomes [9,10].

Our findings support the established association between pre-existing comorbidities and worse COVID-19 outcomes. Studies have shown a higher risk of hospitalization and mortality in patients with conditions like hypertension, diabetes, and chronic lung disease [11,12].

The most common symptoms reported in our study (e.g. fever, cough, fatigue) align with previously documented clinical presentations of COVID-19 [13]. However, it's essential to consider the emergence of new variants with potentially different symptom profiles [14].

Clinically, the high incidence of symptoms like cough (49.2%) and fever (56.1%) in our study was comparable to the symptomatology reported worldwide, where respiratory symptoms dominate the clinical presentation of COVID-19 [15,16]. Notably, severe outcomes were less frequent among our patients, with a lower incidence of ARDS and mortality than international reports. This may reflect differences in patient management and hospital care protocols [17].

The utilization of treatments such as Hydroxychloroquine and Azithromycin was based on prevailing guidelines and clinical judgment, reflecting an adaptive approach to the evolving understanding of therapeutic options during the pandemic. While these medications were initially investigated, subsequent studies doubt their efficacy for COVID-19 treatment [18]. Statistical analysis indicated significant associations between clinical outcomes and demographic variables, supporting the need for tailored treatment strategies considering individual patient risk factors.

Emerging evidence suggests that a significant proportion of COVID-19 patients experience long-term complications, even after mild or moderate illness. A recent study found that 20% of patients still reported symptoms three months after infection, highlighting the potential for long-term morbidity [19].

Our findings emphasize the critical role of public health measures in controlling the spread of COVID-19. Studies have shown that adherence to non-pharmaceutical interventions (NPIs) such as mask-wearing, social distancing, and hand hygiene significantly reduces transmission rates [20,21]. Effective public health communication and community engagement are essential for promoting the widespread adoption of these preventive measures.

Overall, our findings underscore the complexity of managing COVID-19 and highlight the importance of continuous research and adaptation of clinical protocols to improve patient outcomes and reduce transmission within the community.

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CONCLUSIONS

This study provided comprehensive insights into the treatment and outcomes of COVID-19 patients, revealing significant associations between demographic variables and clinical outcomes. Our findings emphasize the necessity of tailored treatment protocols that accommodate individual patient characteristics to enhance therapeutic effectiveness. Adapting treatment strategies in response to evolving clinical data has proven crucial in managing the disease's progression and mitigating severe complications, underscoring the importance of dynamic clinical management in the pandemic response.

CONTRIBUTION OF AUTHORS

Research concept- Dr. Dinesh Singh Mahor, Dr. Amit Dubey

Research design- Dr. Dinesh Singh Mahor, Dr. Amit Dubey

Supervision- Dr. Dinesh Singh Mahor

Materials- Dr Dinesh Singh Mahor, Dr. Rahul Baraskar

Data collection- Dr Dinesh Singh Mahor, Dr. Divyansh Gupta

Data analysis and Interpretation- All researchers

Literature search- Dr Dinesh Singh Mahor, Dr. Divyansh Gupta, Dr. Rahul Baraskar

Writing article- All researchers

Critical review- All researchers

Article editing- All researchers

Final approval- All researchers

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