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TREATMENT OUTCOMES OF ANTIVIRAL, ANTIBIOTIC AND STEROID DRUGS IN COVID-19 PATIENTS IN A TERTIARY HEALTHCARE CENTER PESHAWAR

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ABSTRACT

Purpose: This study aimed to evaluate the treatment outcomes of antivirals, antibiotics and steroids drugs in COVID-19 patients, and to assess patterns of drug utilization in relation to comorbidities, co-infections, mortality, and length of hospital stay (LOS).
Methods: A retrospective study was carried out at a tertiary healthcare center in Peshawar from 2021 to 2022. Medical records of 194 PCR-confirmed COVID-19 patients admitted to the intensive care unit were reviewed. SPSS version 26 was used to analyse data on demographics, drug use, co-infections, LOS, and clinical outcomes. The chi-square test was used to evaluate associations, with $p<0.05$ considered statistically significant.
Results: Among the 194 hospitalized COVID-19 patients, 53.09% of patients received antivirals, mostly remdesivir (43.80%). Despite lower mortality among treated individuals, antiviral did not significantly correlate with mortality ($p=0.360$). A significant association was found between antiviral use and LOS ($p=0.001$). Antibiotics were prescribed to 89.70% despite a low coinfection rate of 9.80%. Co-infection and antibiotic use did not significantly correlate ($p=0.156$). The most often utilized antibiotics were cephalosporins (44.80%). 96.40% of patients received steroid which was significantly associated with mortality ($p=0.005$). The death rate was 4.60% while the total recovery rate was 95.40%.
Conclusion: Antiviral was associated with shorter hospital stays. Although there was no significant correlation between antiviral and mortality, a tendency towards lower mortality indicates the need for additional research. Antibiotic use was notably high despite a low prevalence of bacterial co-infections. Steroid therapy was associated with lower mortality. Enhancing antimicrobial stewardship is crucial for improving treatment plans.

Keywords: Antibiotics, Antivirals, COVID-19, Co-Infections, Steroids

1. INTRODUCTION

The severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was the cause of coronavirus disease 2019 (COVID-19), which initially surfaced in Wuhan, China, in December 2019. It caused a worldwide public health emergency as it spread rapidly around the world. The pandemic caused large increase in morbidity, mortality, and socioeconomic issues, putting a lot of strain and pressure on healthcare systems, particularly tertiary care facilities that managed hospitalized patients. In response to the lack of definitive early treatments and uncertainty in clinical management, a wide range of therapeutic agents including antibiotics, antivirals, and corticosteroids were extensively used in the management of COVID-19 [1], [2].
Although COVID-19 is primarily a viral illness, antibiotics were often prescribed to hospitalized patients because of rising concerns with secondary bacterial infections. However, evidence that has been gathered indicates that antibiotic use during the pandemic often far exceeded the actual prevalence of confirmed co-infections caused by the secondary bacteria. Despite the low incidence of microbiologically confirmed bacterial

infections, a significant percentage of hospitalised COVID-19 patients got antibiotics, according to global systematic studies. This inconsistency has raised serious concerns regarding the increase in antimicrobial resistance (AMR) within healthcare settings [3], [4]. Hospital-based studies have further shown that excessive antimicrobial use during the COVID-19 pandemic contributed to increasing resistance trends, most particularly in tertiary care hospitals. Long-term surveillance and retrospective studies from teaching hospitals reported notable increases in multidrug-resistant organisms during the time of the pandemic, reflecting the consequences of prolonged experimental use of antibiotics and caused disruptions in antimicrobial stewardship programs. These findings highlight the risk of undermining the effectiveness of future treatments through irrational antimicrobial prescribing [3], [5]. In South Asia, including Pakistan, overuse of antimicrobials during COVID-19 has been especially obvious. Studies that were conducted in tertiary healthcare settings in Pakistan have reported that the antibiotic prescription rates exceeded 90% among hospitalized COVID-19 patients, despite the lower rates of documented bacterial co-infection. Such prescribing patterns are particularly concerning in low-resource settings where AMR already represents a major public health challenge [6].

Besides the antibacterial agents, other therapeutic measures have also played an important role in the management of COVID-19. Antiviral agents such as remdesivir were used widely, with several studies showing association with shorter hospital stays and faster clinical recovery, although evidence about benefits in mortality remain unreliable. Corticosteroids became the standard of therapy for patients with moderate to severe disease and hypoxia. Even though steroid therapy has been associated with improved survival, its immunosuppressive effects, combined with longer hospitalization and increased antimicrobial exposure, have contributed to secondary infections, including invasive fungal infections, especially in patients with critical illness [7], [8].

In addition to the clinical consequences, the COVID-19 pandemic has caused a major economic burden on healthcare systems. Tertiary care hospitals reported increased costs for healthcare facilities due to admissions lasting longer, extensive use of drugs, and management of complications caused by the secondary infections and antimicrobial resistance. Furthermore, global and regional studies have documented and shown significant changes in patterns of utilization of medicine during the pandemic, influenced by improvement and change in clinical guidelines, severity of disease, and the availability of drugs [2], [9]. Despite the growing international literature, local evidence from Pakistan evaluating real-world treatment outcomes in relation to antibiotics, antivirals, and corticosteroids among hospitalized COVID-19 patients remains limited. In-depth assessments linking patterns of drug utilization with co-infections, co-morbidities, length of hospital stay, recovery, and mortality in tertiary healthcare settings are rare. Thus, the purpose of the retrospective study we reported is to assess the effectiveness of steroid medication, antibiotics, and antivirals in treating hospitalised COVID-19 patients in Peshawar's tertiary healthcare facilities. By the analysis of medical records of PCR-confirmed patients, this study seeks to assess patterns of drug utilization and their association and relation with clinical outcomes, while highlighting the importance of rational drug use and antimicrobial stewardship during public health emergencies. The present study adds to the research work being done by the tertiary health institutes in Pakistan. Besides retrospective clinical studies evaluating the therapeutic success in infectious diseases, molecular genetic studies have revealed novel deleterious mutations in primary microcephaly families from consanguineous Pakistani population in the ASPM and RBBP8 genes [10], [11]. These are complementing clinical and genomic studies that collectively show the growing research infrastructure and evidence-based medicine commitment in Pakistan, providing locally relevant data in various disease contexts.

2. LITERATURE REVIEW

2.1 Antiviral Therapies

A group of antiviral agents have been used to manage COVID-19, both globally and in Pakistan. In Pakistani tertiary care centers, remdesivir has shown measurable benefits in clinical setting. A cohort study in Lahore ($n = 108$) found that patients that received remdesivir had better oxygenation, lower inflammatory markers, and higher rates of being discharged than patients in control, especially in those with moderate severity of disease [12]. Remdesivir also significantly decreased hospital admissions and mortality, with 4.4% in the remdesivir group compared to 17.5% in the non-remdesivir group ($p < 0.001$), according to a study that included patients from Bahawalpur [13]. However, international evidence presents a more detailed picture. The WHO SOLIDARITY trial, in which over 11,000 patients were enrolled across multiple countries, found that remdesivir had minimal impact on overall mortality or the need for mechanical ventilation [14] Remdesivir may lower mortality in hospitalised COVID-19 patients who require supplemental oxygen, but not in patients on mechanical ventilation, according to a meta-analysis of eight randomised controlled trials with over 10,700 participants. However, it did not consistently improve survival in all severe or critically ill cases [15].

2.2 Steroid Therapies

Hashmi et al. conducted a prospective trial in Pakistan that examined the effects of methylprednisolone and dexamethasone in severely ill COVID-19 patients admitted to intensive care. According to this study, individuals treated with methylprednisolone had reduced mortality rates and better oxygen levels (about 18–22%) than those treated with dexamethasone (around 28–30%). They also experienced shorter stays in the ICU and recovered more quickly. These findings represent the important role of systemic corticosteroids in management of COVID-19 in severe cases and suggests that the specific type of glucocorticoid that is used may influence survival outcomes in patients that are critically ill [16]. Glucocorticoids have become central in treating severe cases of COVID-19 by suppressing the hyperinflammatory response. In Pakistan, a retrospective study at Hayatabad Medical Complex, Peshawar, showed that the use of dexamethasone largely reduced hospital stays (mean 8.2 vs 11.2 days; $p < 0.001$) and also reduced the need for mechanical ventilation (15.1% vs 28.3%; $p = 0.02$) [17].

According to a 2023 network meta-analysis that included 10,544 participants from 19 randomised controlled trials, a number of steroid treatments, especially medium-dose dexamethasone and pulse-therapy methylprednisolone, significantly decreased 28-day all-cause mortality when compared to usual care or a placebo. This confirms that corticosteroid therapy improves survival in severe COVID-19 beyond regional cohorts [18]. Another meta-analysis of prospective studies found that corticosteroid therapy was associated with reduced mortality among patients with severe COVID-19. However, the effects on mechanical ventilation or ICU admission were not consistently quantified across all studies. This represents a gap in the study [19]. The use of corticosteroids in hospitalised patients with severe or critical COVID-19 was investigated in a multicenter retrospective study carried out in Chongqing, China. This study found that corticosteroid therapy did not significantly reduce 28-day all-cause mortality compared with non-steroid treatment. However, corticosteroid recipients showed longer survival times among non-survivors [20].

2.3 Antibiotic Use and Antimicrobial Resistance

Despite COVID-19 being a viral illness, antibiotics were frequently prescribed in Pakistan. A five-hospital study (n = 3,221) reported that 89.7% of inpatients received at least one antibiotic, with an average of 1.66 antibiotics per patient, even though confirmed bacterial co-infection occurred in only 1–3% of cases. Broad-spectrum agents, including piperacillin/tazobactam (20.7%), azithromycin (17.4%), and meropenem (15.5%), dominated prescriptions, and 93% of these antibiotics fell into the WHO “Watch” category [17].

Worldwide, 74% of COVID-19 patients received antibiotic prescriptions, although only 8% had verified bacterial co-infections, according to a meta-analysis of 154 studies involving over 30,000 patients [21]. Antibiotic prescribing was widespread (approximately 62.0% overall), according to a comprehensive review and meta-analysis of hospitalised COVID-19 patients in Southeast Asian countries, despite that the bacterial infection was documented in only a minority of cases (16.0%). This improper use of antibiotic highlights concerns regarding antimicrobial overuse and the potential risk of increasing antimicrobial resistance [22].

2.4 Gaps in Literature Review

Various studies were done with separate effects of drug on COVID-19 patients. One thing lacking was the combined effect of drugs on COVID-19 patients. Our study was conducted in order to find the best and optimal sets of drugs to cure the patients in Peshawar Pakistan, while keeping the co-morbidities and co-infections keeping in mind.

3. MATERIALS AND METHODS

3.1 Study design and setting

At a tertiary care facility in Peshawar, Pakistan, we carried out a single-center retrospective study. Patients admitted to the intensive care unit (ICU) between January 2021 and January 2022 with PCR-confirmed COVID-19 were included in the study. 194 patients in all satisfied the requirements for inclusion. All patients diagnosed with COVID-19 by PCR methods and had a definite outcome were included. Before the study started, ethical approval was acquired from the appropriate ethical review committee. Informed consent was not required because the study comprised a retrospective examination of previously existing data. Confidentiality of patient information was ensured by anonymizing the data, and all collected information was used solely for academic and research purposes. The Declaration of Helsinki's ethical guidelines were followed when conducting the study.

3.2 Data Collection Procedure

Data were collected retrospectively from hospital medical records using a structured data extraction form. The extracted variables included demographics (age and gender), medications used to treat COVID-19, clinical characteristics, presence of bacterial co-infections, co-morbidities, length of hospital stay and ultimate outcome (recovery or death). Data integrity and privacy is ensured throughout the data collection process.

3.3. Sample characteristics

A non-probability convenience sampling method was used to include 194 patients in total. All patients with confirmed COVID-19 who were admitted to the tertiary care hospital's intensive care unit during the study period met the inclusion criteria. Patients with incomplete medical records, suspected COVID-19 cases, and COVID-19 patients managed at home were excluded.

3.4 Variables

Independent variables included antibiotic use, antiviral therapy, and steroid therapy. In-hospital mortality and LOS were outcome variables. Descriptive statistics, such as median and interquartile range (IQR), were used to summarise LOS. For inferential analysis, Length of hospital stay was classified into two categories: short stay (≤ 2 days) and long stay (> 2 days).

Bacterial co-infection was recorded as a categorical variable (present/absent) based on the clinical evidence in the medical records and was analyzed as a secondary outcome in relation to antibiotic use.

3.5 Outcome Measures

In-hospital mortality and LOS among severely ill COVID-19 patients admitted to the intensive care unit were the study's main outcomes. Mortality was defined as death from any cause during hospitalization, while recovery was defined as discharge alive from the hospital, as documented in medical records. Length of hospital stay was calculated as the number of days from hospital admission to discharge or death. Recovery status at discharge and the prevalence of bacterial co-infections was considered a secondary descriptive outcome.

3.6 Statistical analysis

Data on demographic characteristics, drug utilization, co-infections, co-morbidities, length of hospital stay (LOS), and clinical outcomes were analyzed. Statistical analyses were carried out with SPSS version 26. continuous variables were summarised using means ± standard deviations (SD) or medians with interquartile ranges while Categorical data were provided as frequencies
(n) and percentages (%). For inferential analysis, LOS was categorized based on the median value, and the chi-square test was used to evaluate correlations between categorical variables. A p-value of <0.05 has been considered statistically significant. The chi-square test was used to determine the associations between antibiotic use and bacterial co-infection.

4. RESULTS

In the current study, data was collected from tertiary health care centres in Peshawar. Our study included the medical record of those patients who were infected by SARS COVID-19 and the Outcomes of drugs which were administered to the patients during their stay in a tertiary health care centre. The average age of patients were 62.97 years with SD of 15.93 (Range 91 y, min 6 y and max 97 y). Among which the male patients were 111 (57.2%) and the female patients were 83 (42.8%) as shown in Table 1. Infection with SARS-CoV-2 is linked to a variety of clinical characteristics and comorbidities. The following were the most frequently reported respiratory symptoms Fever (91.2%) , Cough (85.0 %) , Shortness of Breath (78.3%), Generalized Body aches (39.6%) and others as shown in the Table 1.

A significant number of patients (156 ,80.4%) had at least one co morbidity with hypertension (60.3%) , Diabetes mellitus type 2 (47.2%) and Ischemic Heart Disease (18.5%) being the most common and the Other co-morbidities recorded were less than 10% as shown in Table 1.

Table 1. Patients demographics, clinical characteristics and comorbidities (n=194)

Patient Characteristics	N(%)	SYMPTOMS	N (%)
Age (mean + SD)	62.97±15.93	SOB	152 (78.3%)
Male	111 (57.2%)	FEVER	177 (91.2%)
Female	83 (42.8%)	COUGH	165 (85.0%)
COMORBIDITY	156 (80.4%)	GBA	77 (39.6%)

HTN	117 (60.3%)	ABDOMINAL PAIN	42 (21.6%)
DM TYPE 2	92 (47.2%)	GBW	36 (18.5%)
IHD	36 (18.5%)	LOSS OF APPETITE	35 (18.0%)
CKD	12 (6.1%)	CHEST PAIN	27 (13.9%)
COPD	11 (5.6%)	VOMITING	14 (7.2%)
OBESITY	8 (4.1%)	NAUSEA	13 (6.7%)
KIDNEY DISEASE	8 (4.1%)	DROWSINESS	12 (6.1%)
ARDS	8 (4.1%)	SORE THROAT	9 (4.6%)
ASTHMA	7 (3.6%)	CONSTIPATION	7 (3.6%)
CAD	6 (3.0%)	HEMOPTYSIS	7 (3.6%)
AFIB	5 (2.5%)		
CVA	4 (2.0%)		
HYPERTHYROIDISM	3 (1.5%)		
HYPOTHYROIDISM	3 (1.5%)		
LIVER DISEASE	3 (1.5%)		

HTN: Hypertension; DM: Diabetes Mellitus; IHD: Ischemic Heart disease; CKD: Chronic Kidney disease; COPD: Chronic Obstructive Pulmonary Disease; ARDS: Acute Respiratory Distress Syndrome; SOB: Shortness of Breath; GBA: Gernalized Body Ache; GBW: Gernalized Body weakness; CVA: Cerebral Vascular Accident.

4.1 Pharmacological classification

Out of 194 patients, 103 (53.09%) patients acquired the treatment with Antiviral, contrary to 91 (46.9%) patients. Remdesivir was the most particularly used antiviral, with 85 (43.8%) of patients. subsequently combivair 12 (6.2%). Remdesivir and combivair 6 (3.1%) were the two antiviral utilized in combinations to treat COVID-19 patients while they were hospitalised as shown in Table 2.

Among the total 194 patients, 174 (89.7%) patients received the treatment which includes antibiotics though 20 (10.3%) patients neither received any treatment with antibiotics. cephalosporin is the most commonly used antibiotics for the treatment of COVID-19 patients (44.8%), followed by macrolide (11.3%) and fluoroquinolone (3.1%). While more than one antibiotic or antibiotics used in combination for the treatment of COVID-19 patients during their stay were cephalosporin, macrolide (22.2%) , afterwards cephalosporin, fluoroquinolone(6.2%) along with cephalosporin, fluoroquinolone, macrolide (2.1%) Table 2.

Steroids were given to 187 (96.4%) of the 194 patients admitted to the intensive care unit, whereas 7 (3.6%) did not receive steroids therapy. The most commonly used steroid is corticosteroids which was administered by 155 patients (79.9%), followed by Corticosteroids and Glucocorticosteroids, which were combined, utilized up to 32 (16.5 %) as shown in Table 2.

Table 2. Prescribed drugs used in the management of COVID-19 patients (n=194).

ANTIVIRALS	N (%)
Remdesivir	85 (43.8%)
Combivair	12 (6.2%)
Remdesivir + Combivair	6 (3.1%)
Total received antiviral	103 (53.09%)
No antiviral therapy	91 (46.9%)
ANTIBIOTICS	
Cephalosporin	87 (44.8%)
Macrolide	22 (11.3%)
Fluoroquinolone	6 (3.1%)
cephalosporin + macrolide	43 (22.2%)
cephalosporin + fluoroquinolone	12 (6.2%)
cephalosporin + fluoroquinolone + macrolide	4 (2.1%)
Total received antibiotics	174 (89.7%)

No antibiotic therapy	20 (10.3%)
STEROIDS	
Corticosteroids	155 (79.9%)
Corticosteroid + Glucocorticosteroid	32 (16.5%)
Total received steroid	187 (96.4%)
No steroid therapy	7 (3.6%)

4.2 Outcomes

Length of hospital stay (LOS) and in-hospital mortality among critical ill COVID-19 patients admitted to the intensive care unit were the study's main outcomes. Antiviral treatment was associated with a decrease in hospital length of stay in COVID-19 patients (p value 0.001). The median length of hospital stay was 2 days (IQR: 1–5 days). The patients Length of hospital stay was categorized into short (≤ 2 days) and long (> 2 days) stay based on the median value. Also Despite lower mortality among treated individuals, antiviral did not significantly correlate with mortality (p=0.360) Table 3.

During their hospital stay, the COVID-19 patients' recovery and death rates were recorded. The overall recovery rate for the 194 COVID-19 patients was 185 (95.4%) and the mortality rate was 9 (4.6%) Table 3. Steroid therapy were significantly associated with mortality (p=0.005) Table 3.

Bacterial co-infection were recorded as a categorical variable based on the clinical evidence in the medical records and were analyzed as a secondary outcome in relation to antibiotic use. Co-infection and antibiotic use did not significantly correlate (p=0.156). Although a high prevalence of antibiotic prescribing 174 (89.7%) despite there only being (19, 9.8%) bacterial co-infections were found. The frequent coinfection that were identified and documented in patients' records included Lower Respiratory tract infections 7 (3.6%), Urinary tract infection 5 (2.5%), Pleural

Effusion 5 (2.5%) and Hepatitis B 2 (1.0%) as shown in the table 3.

Table 3. Treatment Outcomes of different drugs in COVID-19 Patients (n=194).

VARIVARIABLES	N (%)	CO-INFECTIONS	N (%)
Recovered patients	185 (95.4%)	LRTI	7 (3.6%)
Deaths	9 (4.6%)	UTI	5 (2.5%)
LOS in days, median (IQR)	2 (1-5)	PLEURAL EFFUSION	5 (2.5%)
Short stay based on median	(≤ 2 days)	HEPATITIS-B	2 (1.0%)
Long stay based on median	(> 2 days)	Total co-infections	19 (9.8%)
DRUGS	**p-value**	**DRUGS**	**p-value**
Antiviral with LOS	P=0.001	Antibiotics with coinfections	P=0.156
Antiviral with mortality	P=0.36		
Steroids with mortality	P=0.005		

LOS: Length Of Stay. IQR: interquartaile range; LRTI: Lower Respiratory tract infections; UTI: Urinary tract infection.

5. DISCUSSION

In the current study, medical data of the 194 patients were selected from a tertiary healthcare centre in Peshawar, Pakistan, after taking approval of Institutional Ethical Board from 1st January 2021 to 1st January 2022. Age, gender, the presence of co-morbidities, co-infection, symptoms, length of stay (LOS), administration of drugs such as antivirals, antibiotics, steroids and outcomes are the variables that were gathered from the patients' medical records. The proportion of COVID-19 patients using antivirals was significantly lower than that of antibiotics. Treatment with Antiviral was provided to 103 (53.09% of the total) patients out of 194, compared to 91 (46.9%). Among antivirals, Remdesivir was the first medication to be granted FDA approval for the treatment of COVID-19 patients, and it remained the primary antiviral option throughout the study period. In our study, remdesivir was the antiviral medication that was utilised by the maximum number of patients, 85 (43.8%) and the mortality rate is recorded up to (4.6%). Despite lower mortality among treated individuals, antiviral did not significantly correlate with mortality. However, a significant association was found between antiviral use and LOS. Similar to our findings, remdesivir medication may lower the incidence of in-hospital mortality in patients with mild respiratory distress, according to a retrospective observational study from Japan. Crucially, the study also discovered that

remdesivir was linked to a shorter hospital stay [23]. Similarly, a quasi-experimental study conducted in Bahawalpur, Pakistan, found that 52.9% of patients received Remdesivir. Remdesivir significantly reduced COVID-19 patients' mortality and hospital stays [13]. Remdesivir also decreased mortality in hospitalized COVID-19 patients who needed standard or no oxygen assistance, according to an individual patient data meta-analysis [24]. Additionally, a propensity score-matched cohort trial from Vietnam found that patients using remdesivir had significantly lower death or progression to critical illness [25]. Our results are also consistent with a Qatari retrospective cohort research that also found that patients treated with remdesivir had much shorter hospital stays [26].

The prevalence of antibiotic usage in the current study was reported up to (89.7%) on those COVID-19 patients who were admitted in ICU and have co-infection up to (9.8%). Which was quite low from a study done in China that found that even though 15% of COVID-19 patients developed bacterial infections, 95% of them received antibiotics [27]. It is nearly equivalent to a retrospective analysis of 3221 patients' records from five tertiary care facilities. Despite bacterial co-infections (1.14%), they discovered a high rate of antibiotic prescriptions (89.69%) [17]. Our results are also in line with a retrospective analysis multicenter study conducted in Pakistan, which included 284 patients and found that almost 91% of hospitalized patients used antibiotics, with only a small percentage having secondary bacterial infections or bacterial co-infections [6]. Additionally, a retrospective cohort analysis at Sant'Anna and San Sebastiano Hospital was carried out. According to the study, 82.4% of COVID-19 patients were treated with antibiotics. Bacterial co-infection was found in 14.3% of individuals with COVID-19 [28].

However, higher from a meta analysis study where the estimated rate of bacterial co-infection was (8.6%), but the prevalence of antibiotic prescribing was shown to be (74.6%) [21]. Also higher from a study in Hong Kong, where antibiotic use during COVID-19 was reported to be as high as 29.1%, only 1.84% had co-infection [29]. Additionally, despite a high rate of antibiotic administration (61.77%), a thorough systematic review and meta-analysis revealed a low prevalence of bacterial coinfection (5.62 %), in COVID-19 patients [30]. Additionally, it is high in comparison to a meta-analysis and systematic review that found a low overall prevalence of bacterial co-infection (11%). While the overall antibiotic use was (60%) [31]. The most often used antibiotics in the current study for the treatment of COVID-19 patients were cephalosporin (44.8%), followed by macrolide (11.3%) and fluoroquinolone (3.1%). Correspondingly low from a study conducted in Nepal where they reported antibiotic usage up to (98%) and the most often used class of antibiotic was Cephalosporin with (81.73%), followed by Macrolides with (54.8%) and fluoroquinolone (10.58%) [32]. Additionally, according to study conducted in Bangladesh where they reported antibiotic usage was up to (92%) and the most common antibiotic class for COVID-19 patients used was Cephalosporin (64%), followed by Macrolide (40.5%) and Quinolones (5.3%) [33].

According to our findings, the proportion of COVID-19 patients who used steroids was much greater than the proportion of patients who used antibiotics and antiviral medications. Out of 194 patients, 187 (96.4%) received steroid treatment, who were brought to the intensive care unit.

Corticosteroid treatment has become the standard of care for all ICU patients. Our research expands on recent findings that corticosteroids are safe and beneficial. According to the findings of our research, the most commonly used steroid was corticosteroids which was administered by 155 patients (79.9%) which is lower compared to the prospective multicenter study which concluded that treatment with corticosteroids was given to the (93.8%) patients [34]. But comparatively higher from the study conducted in Colombia where they reported the Corticosteroids were the most commonly prescribed treatment up to (63.6%) [35].

Steroid therapy in our study is received by (96.4%) patients which is linked to a decrease in mortality rate ($p=0.005$). Our results are in accordance with a comprehensive cross-sectional investigation from central India that was conducted over three pandemic waves using records. Proving that throughout the course of three pandemic waves, steroid usage drastically decreased mortality [36]. Similar to a recent review that summarized clinical trials, the RECOVERY trial's mortality benefit findings have confirmed that dexamethasone has become the standard of therapy for hospitalized patients with severe or serious COVID-19 [37]. Similarly, corticosteroid therapy was linked to lower in-hospital mortality among patients with severe and critical COVID-19, according to a cohort study involving 1,540 patients [38]. A large multicenter retrospective cohort research carried out in Hubei Province that assessed the impact of systemic corticosteroid therapy among patients with non-severe COVID-19 differed from our findings.

Corticosteroid use was linked in that study to an increased risk of mortality, length of hospital stay, and disease progression [39]. Furthermore, a comprehensive systematic review and meta-analysis found that corticosteroid medication had a negative prognosis, as seen by higher mortality among COVID-19 patients, rather than a positive effect on mortality prevention [40].

5.1 Study Strength

The strength of the current study is availability of PCR report of patients and data about the multiple administration of drugs and their different outcomes and offers valuable practical insights into treating severe COVID-19. The evidence-based approach described in this study may improve patient outcomes by minimizing unnecessary drug exposure and informing future pandemic awareness strategies.

5.2 Study Limitation

This single-center investigation limits the capacity to generalise the results to the population level. Furthermore, unmeasured confounding variables like oxygen dependence and immunization status might have affected the patients' outcomes.

6. CONCLUSION

In conclusion, the outcomes of this retrospective study demonstrate that antiviral treatment significantly reduces LOS in hospitalized COVID-19 patients. The present study also showed that antiviral treatment does not uniformly improve mortality in COVID-19 patients despite lower mortality among treated individuals. However, a tendency towards lower mortality indicates the need for additional research. Remdesivir was the most frequently prescribed antiviral. Among various drugs, the current study also suggested that treatment with antibiotics was observed to be greater among hospitalised COVID-19 patients despite the fact that the number of co-infections is extremely low which leads to the risk of increasing antimicrobial resistance (AMR). The most widely prescribed antibiotics are Cephalosporin and Macrolide. As the antimicrobial resistance (AMR) crisis continues to worsen, there is an immediate requirement for antimicrobial stewardship to guarantee proper prescribing and prevent unfavorable effects on patient outcomes and antibiotic resistance. Our study also concludes that steroid therapy is significantly associated with mortality in hospitalized COVID-19 patients and results in reduction of the risk of early mortality.

Although our results highlights the individual roles of different drugs in hospitalized COVID-19 patients, it is still unknown how these treatments work together. Future research is necessary to assess their combined effects on mortality, length of stay in the intensive care unit, and mechanical ventilation requirements. Gaining insight into these impacts could help develop more effective treatment plans and enhance patient outcomes.

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