

PRESCRIPTION PATTERN IN COVID-19 PATIENTS ADMITTED TO A TERTIARY CARE CENTER IN KERALA

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ABSTRACT

Objectives: The objectives of the study were to analyze the prescribing pattern in COVID-19 patients and to identify the most commonly prescribed drugs and their routes.

Methods: A hospital-based retrospective observational study was conducted based on data of COVID-19 positive patients admitted over a period of 6 months, from May 1, 2020, to October 31, 2020. Relevant data were collected from medical records library.

Results: The prescriptions of 1223 COVID-19 positive patients were analyzed. Among them 63.7% were men (n=780). The mean age was 46.5 years. 49.9% (n=611) of our patients were mild cases, categorized as category A. 41.2% (n=505) were category B, and 8.7% came under the severe disease category C. Duration of hospital stay of the patients ranged from 1 to 44 days with a mean duration of 9 days. The most prescribed medication was paracetamol which was prescribed to 55% (n=679) of patients. From the 488 (39.9%) patients who received some antibiotic, the most frequently prescribed was azithromycin (80.1%) followed by ceftriaxone (17.2%) and cefotaxime (3.07%). 18.5% of patients were prescribed anticoagulants, the most common being LMWH-enoxaparin. 17.9% of patients received some systemic corticosteroids. Antivirals prescribed were favipiravir (7.4%), oseltamivir (4.7%), and 0.8% remdesivir.

Conclusion: Different drugs belonging to different groups have been prescribed, for symptomatic treatment of disease and its complications as a single effective drug has not been discovered. Almost all the drugs prescribed were generic drugs and were from the Essential List of Medicines-2015.

Keywords: Prescription pattern, COVID-19, Antivirals in COVID-19, Anticoagulants.

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) was first identified in December 2019 in Wuhan, China, and has evolved into an ongoing pandemic [1]. While the majority of cases result in mild symptoms, some progress to acute respiratory distress syndrome possibly precipitated by cytokine storm, multi-organ failure, septic shock, and blood clots [2,3].

The World Health Organization declared the COVID-19 outbreak, a public health emergency of international concern on January 30, 2020 and a pandemic on March 11, 2020 [4]. The first case of the COVID-19 pandemic in Kerala (which was also the first in all of India) was confirmed in Thrissur on January 30, 2020 [5]. Since then 3 waves have struck India. The first wave had a long course, spanning from March 2020 to January 2021, but then the second wave had a rapid course stemming from March 2021, and there was a sharp rise of cases and deaths over the next 1–2 months [6].

No vaccines were approved or available for use in India during the first wave of COVID-19. Management involved the treatment of symptoms, supportive care, isolation, and experimental measures. No pharmaceutical products have shown to be completely safe and effective for the treatment of COVID-19. Concomitant use of several drugs may be justified. The Ministry of Health and Family Welfare, Indian Council of Medical Research (ICMR), and Kerala state Health Department have recommended treatment guidelines to manage the pandemic since its emergence. Several existing medications have been and are being evaluated for the treatment of COVID-19 including antivirals, antimalarials, and immunomodulatory drugs.

Rational prescribing is an essential step to ensure rational drug use. Improvement in medicine use behaviors is seen as a step toward

optimizing the use of limited health resources and improving the quality of health-care delivery. The WHO has developed a set of “core drug use indicators,” that measure performance in three-related areas of “prescribing practices, patient care, and facility-specific factors” [7].

The prescription monitoring studies serves as tools to assess rational use of drugs, and interconnects pharmacovigilance, evidence-based medicine and pharmacoconomics. The Government Thirumala Devaswom Medical College, Alappuzha (GTMCA) is a tertiary care center and was the main COVID treatment center in Alappuzha district. A study on prescription pattern in COVID-19 patients who were admitted here will help in describing the commonly prescribed drugs and the rationality of prescriptions.

METHODS

Source of data

It was a hospital-based retrospective, observational study conducted in the Government Medical College, Alappuzha, for 6 months, from May 1, 2020, to October 31, 2020. All COVID-19-positive patients admitted to GTMCA hospital during this period were included in the study. Relevant data were collected from the medical records library.

Collection of data

The data were collected and duly filled in the pro forma. The details of the treatment given to the patient were collected. Prescription patterns of antibiotics, steroids, anticoagulants, and other drugs administered were analyzed.

All patients included in the study were grouped according to the COVID-19 Kerala Government guidelines [8].

Data collected included patient details such as inpatient number (IP No:), age, sex, date of admission, date of discharge/death, comorbidities, if any, drugs prescribed (name, dose, duration, and route) confidentiality of patients were maintained.

Inclusion criteria

Medical records of all discharged or deceased COVID-19 patients for the period of the study.

Case definition of COVID-19

Laboratory confirmed case: A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs, and symptoms [9].

Exclusion criteria

Incomplete medical records were excluded from this study.

Data entry and analysis

Data were tabulated using Microsoft Excel. Qualitative variables have been expressed as proportions/percentages and quantitative variables as mean.

Ethical approval

Ethical clearance for this study was obtained from Institutional Ethical Committee, Government T D Medical College, Vandanam, Alappuzha. Reference number EC:82/2020.

RESULTS

A total of 1223 patients with confirmed diagnosis of COVID-19 were analyzed. Among them, 63.7% were men (n=780). Mean age was 46.5 years. A total of 4.7% (n=57) were younger than 18 years, of which 5 were <1-year old. 35.9% (n =440) were between 18 and 40 years, 33.3% (n=408) were between 41 and 60 years, and 22.4% (n=275) were 61–80 years, and 3.1% (n=38) were 80 years or older (Fig. 1).

Since our study population belonged to the first wave, and the state policy was to admit all COVID-19 positive patients to COVID care centers, initially at the time of the pandemic, 49.9% (n=611) of patients were mild cases, categorized as category A. 41.2% (n=505) were category B, i.e., moderate disease and 8.7% came under the severe disease category C. (Fig. 2). Pregnant patients constituted 2.2% (n=28) of the patients studied. Duration of hospital stay of the patients ranged from 1 to 44 days. The mean duration of stay was 9 days. A total of 7.3% (n=89) required supplemental oxygen. Of the 1223 cases studied, a total of 42.35% (n=518) had some chronic comorbidity, the most frequent being arterial hypertension (n=201; 16.4%), followed by diabetes mellitus (n=167; 13.6%) and dyslipidemia (n=36; 2.9%). Other comorbidities recorded were coronary artery disease (n=85; 6.9%), obstructive pulmonary disease (n=25; 2%), and chronic kidney disease (n=21; 2%). 18 were cancer patients (1.5%) (Fig. 3).

About 57.6% (n=705) of the study population were free from any comorbidities. 15 patients had all the three comorbidities - diabetes, hypertension, and hyperlipidemia, 79 had both diabetes and hypertension.

In our study, 181 patients were not given any medication, as the initial state policy demanded institutional quarantine of all positive patients. The most commonly prescribed medication was paracetamol which was prescribed to 55% (n=679) patients. 22.2% (n=272) received the antihistamine, cetirizine. 39.9% (n=488) of patients received some antibiotic (Table 1). The most prescribed antibiotic was azithromycin. 80.1% (n=391) of the patients who received antibiotic (n=488) were given azithromycin, followed by ceftriaxone 17.2% (n=84), cefotaxime 3.07% (n=15), amoxicillin–clavulanic acid 2.6% (n=13), levofloxacin 1.6% (n=8), and piperacillin–tazobactam injection and metronidazole 0.61% (n=3) each and one patient was prescribed clarithromycin (0.2%) (Fig. 4). Multiple antibiotics were administered to 35 patients. 21% (n=103) of patients received injectable antibiotics, mainly ceftriaxone. Anticoagulants were used in 18.5% (n=226) patients during the study period and 11.9%

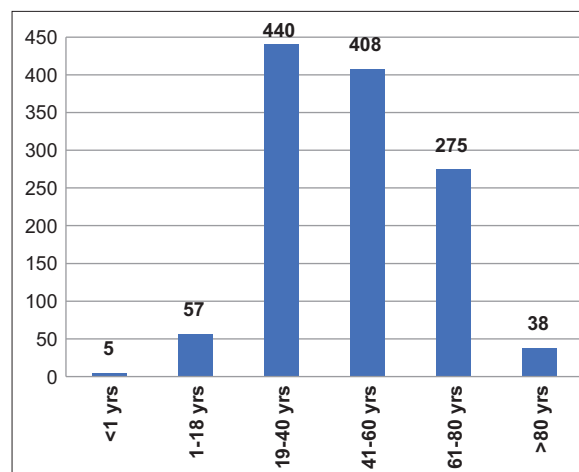


Fig. 1: Age distribution of patients

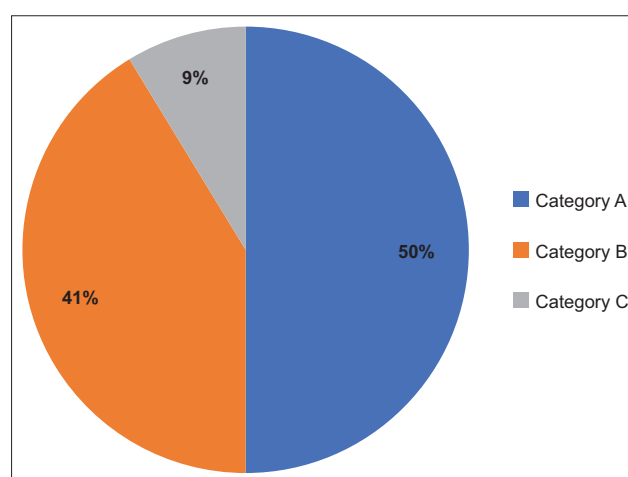


Fig. 2: Severity categorisation of patients

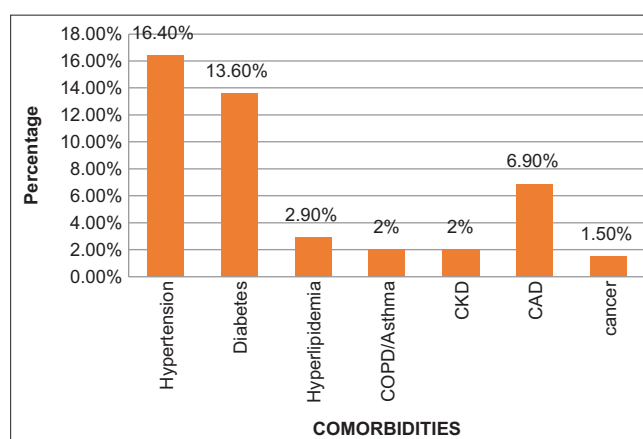


Fig. 3: Comorbidities among the patients

had received LMWH–enoxaparin, 4.5% oral anticoagulant apixaban and 2.5% unfractionated heparin injection (Fig. 5). 17.9% of patients received some systemic corticosteroids, mainly dexamethasone and the rest received methylprednisolone and hydrocortisone. 115 patients (9.4%) were prescribed metered dose inhaler-majority received budesonide and formoterol combination. Other drugs acting on the respiratory system that were used were-deriphyllin in 5.2% (n=64) and salbutamol in 1.7% (n=21) patients. Oxygen was administered in 6.9% of patients. Antiviral drugs given for managing COVID-19 infection were favipiravir,

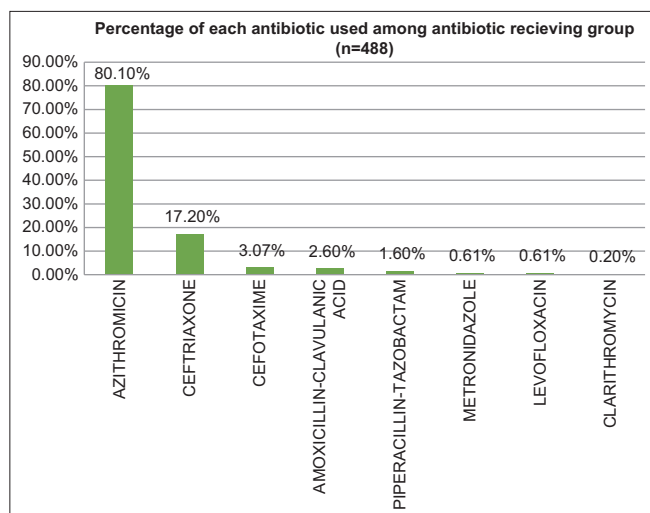


Fig. 4: Antibiotics received by the patients

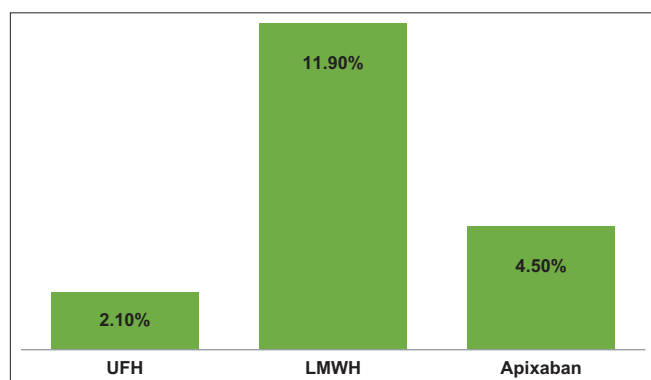


Fig. 5: Anticoagulants prescribed

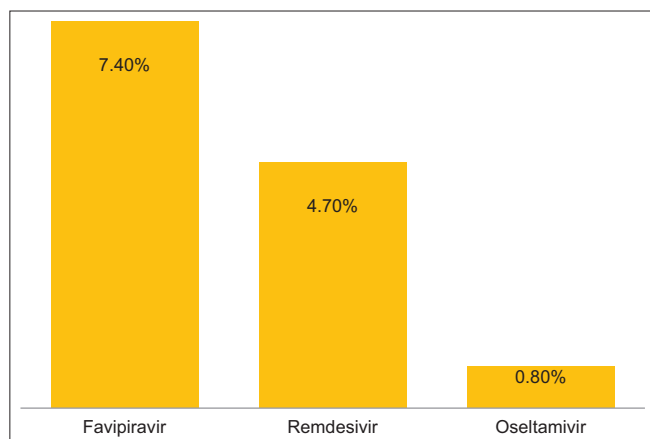


Fig. 6: Antivirals prescribed

oseltamivir; and remdesivir: 7.4% (n=91) received favipiravir; 4.7% (n=58) oseltamivir, and 0.8% (n=11) remdesivir (Fig. 6). Pantoprazole was prescribed as a gastroprotective along with other drugs in 24.6% patients. Almost 10% of patients received Vitamin C and 5% each received Zinc and Vitamin B complex (Table 1).

Considering the drugs given in the injectable form, 15 patients received injection deriphyllin, 108 received antibiotic injection, 208 received steroid injection, and 176 patients received anticoagulant injection as UFH or LMWH. Remdesivir injection was administered in 11 patients (Table 2).

Table 1: Drugs prescribed to COVID-19 patients

Drug prescribed	Number of patients (n=1223)	Percentage of patients
Paracetamol	679	55
Cetirizine	488	22.2
Pantoprazole	300	24.6
Antibiotic	488	39.9
Anticoagulant	226	18.5
Systemic steroid	219	17.9
Metered dose inhaler	115	9.4
Vitamin C	122	10
Zinc	61	5
Vitamin B	61	5

Table 2: Drugs administered as injection (n=1223)

Drug administered intravenously	Number of patients	Percentage of patients
Deriphyllin	15	1.2
Antibiotic	108	8.9
Corticosteroid	208	17
Anticoagulant	176	14.4
Remdesivir	11	0.9

DISCUSSION

Case sheets of 1223 COVID-19 positive patients admitted over a period of 6 months were analyzed. At large, most of the findings of this report regarding sociodemographic data, comorbidities, and pharmacological treatment were in accordance with what has been described in other studies carried out in India as well as other parts of the world. The mean age of the patients, 46.5 years, was lower than that found in other studies (55–65 years) with a predominance of men (63.7%), similar to majority of the studies [10–12]. The reason for male preponderance could be that women, compared to men, are less susceptible to viral infections based on a different innate immunity, steroid hormones, and factors related to sex chromosomes [13]. The mean duration of stay in the hospital was 9 days and ranged from 1 to 44 days. This finding correlated to the duration of COVID-19 positive patients admitted at hospitals in other parts of the country, as the national and state policy during the first wave demanded admission and quarantine of all test positive patients [14]. A total of 42.35% patients had some chronic comorbidity. Similar to most other studies, the most frequently observed comorbidities were arterial hypertension and diabetes mellitus [11,12].

Analyzing the prescriptions, there were more than 20 drugs prescribed commonly to COVID-19 patients that ranged from paracetamol, antihistamines, antibiotics, systemic steroids, antivirals, anticoagulants, and various supplements. We have focused on those drugs, which have had some data on their use as part of treatment for COVID-19. Those were: paracetamol, azithromycin and other antibiotics, vitamin C, zinc, antivirals such as remdesivir and favipiravir, systemic corticosteroids, and anticoagulants. Surprisingly 181 patients, i.e., around 15% of patients received no medication, the reason could be attributed to the lack of knowledge and experience in dealing with the novel virus, warranting admission of all positive patients irrespective of their symptomatology.

The most prescribed medication was paracetamol which was prescribed to 55% (n=679) patients. 22.2% (n=272) received the antihistamine, cetirizine. Pantoprazole was prescribed in 24.6% patients, as a gastroprotective agent when antibiotics and systemic steroids were being administered. Almost 10% patients received Vitamin C and 5% each received zinc and Vitamin B complex. These findings correlated with the results of similar prescription pattern studies conducted elsewhere [15–17]. 17.9% of patients received some systemic corticosteroids, mainly dexamethasone, as seen in Colombia study [11]. This finding

contrasted with the findings of the most other studies where systemic steroids use was found in more than 50% of patients [16]. Initial versions of Kerala state health treatment guidelines for COVID-19 did not include the use of systemic steroids [8,18]. A questionnaire-based study on prescription pattern in COVID-19 in Yemen reports paracetamol and systemic steroids as the least prescribed drugs. Only 8.2% received paracetamol and 0.8% systemic steroids [19]. Inhaled steroid use was observed in 115 patients (9%). The state treatment guidelines advocated the early administration of inhaled budesonide as it reduced the likelihood of needing urgent medical care and reduced time to recovery after early COVID-19 [18]. The STOIC trial proved the benefits of inhaled steroids (budesonide) in quicker symptom relief in COVID-19 patients if started early [20]. This study analyzed the prescription pattern during the initial 6 months of the first wave of COVID-19, from May 2020 to October 2020, when numerous trials and efforts were being made to find an effective treatment for the COVID-19 infection. The comparatively lower percentage of use of systemic steroids could be due to the reason that our assessment period included patients admitted before the publication of results of recovery trial. The recovery trial established that treatment with dexamethasone at a dose of 6 mg a day for 10 days reduced the 28-day mortality rate in COVID-19 patients who required some respiratory support [21].

Analyzing the antibiotic prescription pattern, 39.9% patients received some antibiotic with azithromycin being the most commonly prescribed. 78% of the patients who received antibiotic were given azithromycin, followed by ceftriaxone (17%), cefotaxime, amoxicillin-clavulanic acid combination, piperacillin-tazobactam combination and levofloxacin. Multiple antibiotics were administered to 35 patients. 21% (n=103) of patients received injectable antibiotics, mainly ceftriaxone. Antibiotic usage was comparatively higher in other studies [17,19,22]. Azithromycin for its additional antiviral, anti-inflammatory, and immunomodulatory properties was the antibiotic proposed in all guidelines and, therefore, the most commonly prescribed in almost all studies [17,22]. Third-generation cephalosporins-cefotaxime and ceftriaxone were the most commonly prescribed injectable antibiotic, as observed in other similar prescription pattern studies [15,17,23].

Anticoagulants were used in 18.5% patients and majority were administered LMWH-enoxaparin (11.9%), and the rest received unfractionated heparin or oral anticoagulant apixaban. This finding was consistent with several studies where LMWH was the most used anticoagulant [11]. But in contrast anticoagulant use in prescriptions were not reported in certain prescription pattern studies [15,16]. Oseltamivir, remdesivir, and favipiravir were the antivirals prescribed. 4.7% (n=58) received oseltamivir, 0.8% (n=11) received remdesivir, and 7.4% received (n=91) favipiravir. Similar results were reported in a COVID-19 drug utilization study conducted at another center in India [24]. In contrast, antiviral prescriptions were found to be comparatively higher in another study conducted in another part of the country [25].

Limitations of our study

As the study included all admitted COVID patients and only incomplete records were excluded, there was huge data to be collected; adverse drug reactions to any medications could not be collected. Adverse drug effects were not duly recorded in the case sheets, and the data being record based, adverse effects if any could not be monitored.

CONCLUSION

The study imparts insight into the pattern of drug use in the first wave of COVID-19, to manage the disease and its complications. A huge number of drugs belonging to different groups have been assessed, as a single effective drug has not been discovered to manage COVID-19 and symptomatic treatment of disease and its complications is the only course of action. The most commonly prescribed drug was paracetamol and the most commonly prescribed antibiotic was Azithromycin. Almost all the drugs prescribed were from the Essential List of Medicines-2015 except for remdesivir, favipiravir, and oseltamivir, which are the repurposed drugs recommended for emergency use. The contemporary

guidelines for management of COVID-19 issued by ICMR were followed apart from antibiotics which were extensively used. Generic drugs were prescribed to all patients as drugs for all inpatients were government supply. The most commonly used injectable drugs were unfractionated heparin, corticosteroid, and third-generation cephalosporins.

AUTHORS CONTRIBUTIONS

The authors have equally contributed to the study design, conception, data analysis, result interpretation, and manuscript drafting.

CONFLICT OF INTEREST

The author(s) declare no potential conflicts of interest with respect to research, authorship, and/or publication of this article.

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