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Impact of COVID-19 on Antibiotic Prescribing Pattern in Private Clinics in Iraq: An Exploratory Retrospective Study

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Abstract

Antibiotics are mandatory for the prevention and treatment of bacterial infection; their rational prescription would reduce bacterial resistance and new drug requirement. The COVID-19 pandemic affects antibiotic prescribing patterns worldwide in a manner that requires investigation. To Assess antibiotic prescription patterns for COVID-19 infected patients in private clinics for improving antibiotic stewardship. A retrospective exploratory study in which 87 patients' documents were reviewed for the following: COVID-19 infection, type of infection, recurrence of infection, state of vaccination, other systemic diseases, and treatment of infection (prescribed by physician) with full details about antibiotic type. Data were statistically related according to significance level p≤0.05. 64.4 % of the patients were female. Seventy percent of the patients were vaccinated against corona virus and completed their vaccine regimen. Seventy-three percent of the patients were mildly infected, and there was no significant difference between antibiotic prescription and infection severity with increased multiple antibiotic prescription pattern. A significant relationship between infection severity and patients' history of systemic diseases was found with significant empiric antibiotic prescription in 33.3% of patients prescribed with azithromycin with or without ceftriaxone. Significant irrational empiric antibiotic prescriptions for outpatients with COVID-19 regardless of infection severity. Azithromycin found predominant.

Keywords: *Antibiotics, Azithromycin, COVID-19, Empiric Antibiotics, Infection.*

Introduction

Antibiotics are lifesaving drugs against bacterial infections and are revolutionary inventions for the prevention and treatment of serious bacterial infections. Yet, irrational prescription and misuse have led to rapid development of bacterial resistance that halts antibiotic effectiveness and results in mortality from preventable infections [1]. Continuous bacterial exposure to antibiotics changes their susceptibility to these drugs as a measure of bacterial defense mechanism. Consequently, many bacterial species now acquire resistance to various safe antibiotics, such as penicillin [2, 3].

According to established guidelines, viral infections do not require antibiotic treatment because they are not effective against viral species. Despite this, antibiotics could be prescribed to patients with viral infection to avoid bacterial superinfection or as repurposing of certain antibiotics with proven in vitro antiviral effect [4, 5].

The COVID-19 pandemic represents a health system challenge worldwide. Corona virus, the causative agent, infects the respiratory system in a highly contagious manner, leading to mortality and long hospital stays [6-8]. The respiratory symptoms of COVID-19 infection are highly similar to those caused by bacterial pneumonia and bacterial co-infection speculated, making the decision for empiric antibiotic prescription judicious for severely infected patients [9, 10].

The pattern of antibiotic prescription was variable among countries, particularly during the first wave of covid-19. The lack of confirmed

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treatment guidelines, insufficient information about virus behavior, and high infection rate mandated antibiotic prescription principally for hospitalized patients [11]. Furthermore, the repurposing of certain antibiotics such as azithromycin, which show promising in vitro effects on SARS –Cov-2, encourages antibiotic prescription [12, 13]. Therefore, the optimum type and dose of antibiotics were not established or generalized.

In Iraq, as a developing country, antibiotic prescription not always on guidelines it might subjective and predispose to different factors such as physicians' experiences, pharmaceutical companies' influence, and unclear institutional guidelines in addition to inadequate hospital infection control [2, 14]. Accordingly, different broad-spectrum antibiotics are prescribed [15, 16]. Conversely, the Ministry of Health recommended a certain strategy to control and unite prescribed drugs for COVID-19-infected patients, including antibiotics. Nevertheless, adherence to the announced instructions was undefined.

It is important to identify the pattern of antibiotic prescription for COVID-19-infected patients to improve antibiotic stewardship and control the emergence of bacterial resistance in our country. Based on that, the current study was designed as an exploratory study to investigate the pattern of antibiotic prescription for covid-19-infected patients in private clinics.

Materials and Methods

The current study was a retrospective exploratory study conducted at the Department of Medicine. The data of patients included was for the period from September to November 2022. The study design approved by the department scientific committee and was in accordance with graduate research programs.

Sample

A total of 87 patients documented records, ranging in age from 18 to 70 years, who had visited the department of medicine in College of Dentistry, University of Babylon were examined. We focused on records containing comprehensive information regarding their past COVID-19 infection and documented treatment prescribed by physicians in private clinics. Patients whose documents lacked specific details regarding the infection confirmation test and treatment were excluded from the analysis. Patients with a hospital residency history attributable to COVID-1 were also excluded from the study. Sample size was determined according to the number of patients who attended oral medicine clinics per month in accordance with the method of sample size determination lows [17, 18].

Limitations

Although it was an exploratory study, the sample size was small due to the limited number of patients visited the dental clinics during the pandemic second wave however, sample size was accepted in relation to patients population visited single center for two months.

Outcome

The main investigated outcomes were the onset of infection, type of infection (mild to moderate), recurrence of infection, state of vaccination, other systemic diseases, and treatment of infection (prescribed by physician) with full details about antibiotic type.

Statistical Analysis

Data were evaluated and tested using IBM SPSS software 22, in which non-parametric data were tested with Chi-square for significance and correlations were performed with Kindall's tau_b and Spearman's rho tests. The significance level was .05. Data expressed as percentages and mean ±standard deviation.

Ethical Approval

This study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients' verbal and analytical approval before the sample was taken. The study protocol, subject information, and consent form were reviewed and approved by a local ethics committee according to document number 5010 (including the number and the date in 25/10/2022) to obtain this approval.

Results

100 patients' records were investigated, and 87 records were coherent with the study inclusion criteria.64.4 % of patients were females, whereas 35.6%were males. Seventy percent of patients were vaccinated against corona virus and completed their vaccine regimen (Table 1).

Regarding infection severity, 73.6% of patients were mildly infected and found no relationship between receiving vaccination and infection severity. However, there were no significant differences between antibiotic prescription and infection severity with increased multiple antibiotic prescription pattern, (figure 1).

The current study found a significant relationship between infection severity and patients' history of systemic diseases, especially diabetes mellitus, with significant empiric antibiotic prescription regardless of history of systemic diseases $p \leq 0.05$ (figure 2).

33.3% of patients prescribed with azithromycin with or without ceftriaxone, whereas meropenem was prescribed for 25.4% of patients, (table 2). The other antibiotics were amoxicillin, cefixime, and ceftriaxone.

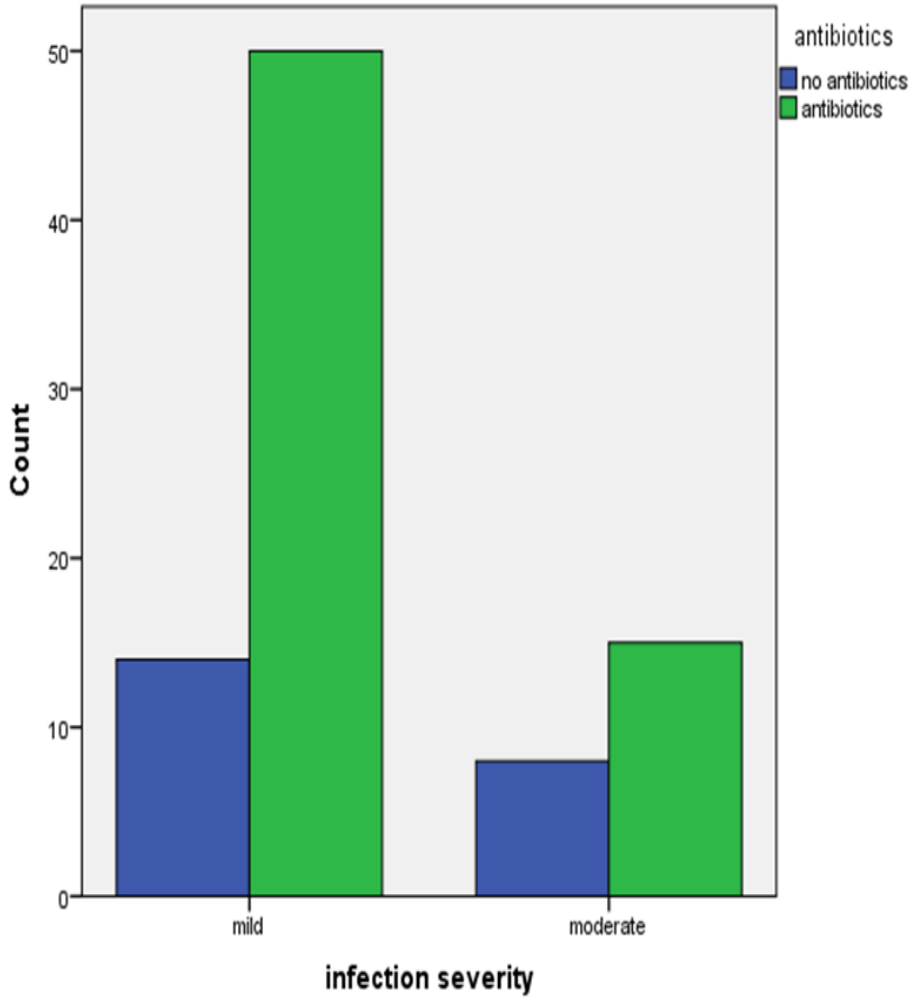

Figure 1. Relationship between Antibiotic Prescription and Infection Severity

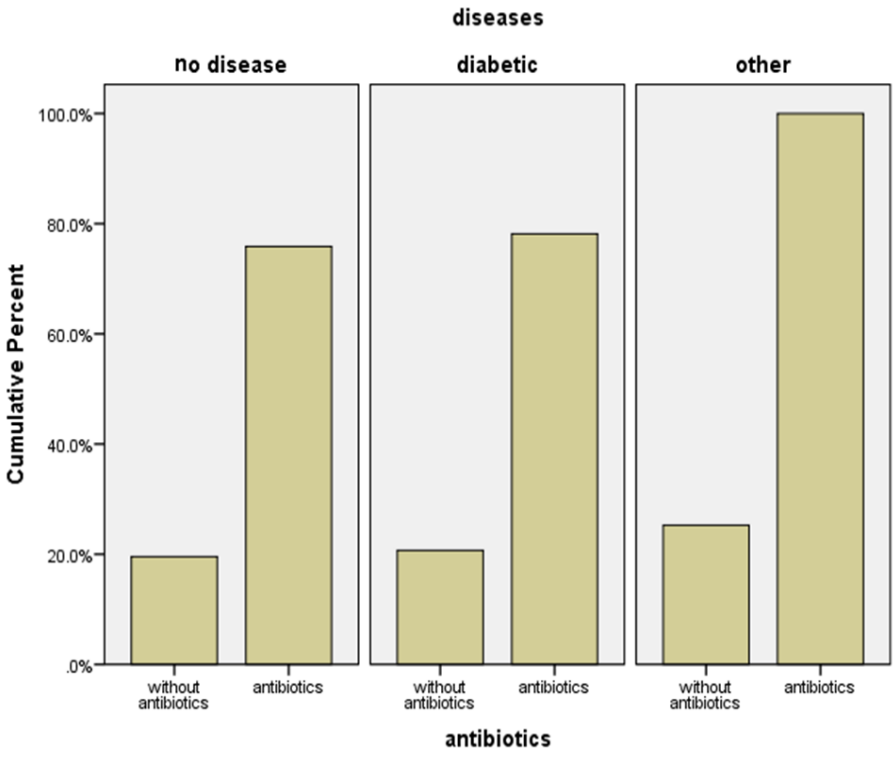

Figure 2. Relation of Empiric Antibiotic Prescription With History Of Systemic Diseases In Patients Infected with COVID-19. (No Diseases: Patients Without Chronic Diseases, Diabetic Diseases: Patients with type 1 or type 2 Diabetes Mellitus And Others: Patients With Other Chronic Systemic Diseases like migraine, Congestive Heart Diseases And Hypertension)

Table 1. Outcome of Patients Included in the Study

Outcome	***Patient number(87)***	***P value***
Age	39.011±13.879	0.591
Sex	Male 31(35.6%)	0.036*
	Female 56(64.4%)	
Infection severity	Mild 64(73.6%)	0.00*
	Moderate 23(26.4%)	
Antibiotic prescription	yes 65 (74.7%)	0.00*
	no 35(25.3%)	
Vaccination	No vaccine 26(29.9%)	0.00*
	Vaccinated 61(70.1%)	

p≤0.05

Table 2. Types of Antibiotics Prescribed to Outpatients Infected with SARS-CoV-2

Antibiotics	*No. of patients(percentage)*
Azithromycin	**29 (33.3%)**
Amoxicillin	**12 (13.8%)**
Cefixime	**4 (4.5%)**
Ceftriaxone	**20 (23%)**
Meropenem	**22 (25.4%)**

Discussion

The current study is an exploratory study to determine the pattern of antibiotic prescription during COVID-19 infection waves. Although it is not a nationwide study, it could provide considerable information to begin a nationwide study to improve antibiotic stewardship. The design of the current study was based on patients who visited the clinics of oral medicine and provided sufficient history of COVID-19 infection and treatment plan. Therefore, based on our aim, these records are acceptable documented records for investigating antibiotic prescription patterns in our patients.

The results found significant antibiotic prescription regardless of infection severity in empiric pattern. Patients prescribed with single or multiple antibiotics once confirmed infection test achieved regardless of the severity of symptoms. These findings agree with previous experience with influenza virus infection, particularly if there was a respiratory symptom to avoid secondary bacterial infection [19], [20]. However, the unavailability of culture sensitivity tests made prescribing broad-spectrum antibiotics a strong factor to enhance bacterial resistance and impair symbiosis of normal flora, resulting in the growth of other pathogenic bacteria [1, 21, 22].

World Health Organization guidelines discourage empirical antibiotic prescription in COVID-19 [23] and previous studies limit antibiotics for hospital resident patients, especially those on respiratory assistant [4, 24, 25] . However, in our country, the pandemic occurred after European raise in infection mortality and once the infection rate elevated the mortality raised in a manor made the whole health system under huge pressure to manage and reassure population [26].

Accordingly, physicians tried their best to alleviate symptoms and prescribe the available drugs based on their knowledge, experience, and other countries' guidelines . Although it is not a defense, it is considered a way to deal with raised mortality, particularly in a developing country [16, 27, 28]. On the other hand, to our knowledge, there have been no evident based studies on pandemic mortality rate in relation to antibiotic prescription. Respectively, concerns about inappropriate antibiotic prescription pattern especially for our patients confirmed in this study and possible antibiotic resistance could anticipated in future.

The current study results show rise in antibiotic prescription pattern for diabetic and medically compromised patients. This finding goes with Clancy and Hong study [29] who stated that antibiotic prescription during covid19 consistent with patients having serious diseases and hospitalized. Nevertheless, our patients were not hospitalized or severely infected.

According to the result of this study, azithromycin mostly prescribed for patients, and this finding is consistent with the Oliver and Hinks [30] study, which proved azithromycin antiviral behavior in addition to its bactericidal effect. Hence, selecting azithromycin seems to be based on a sold background. In addition, azithromycin was tried for COVID-19 and recommended in the first wave [11, 31].

The other antibiotics found in this study known for their efficiency against respiratory infections, which explains their prescription to avoid secondary bacterial infection [32]. Yet, it is

essential to have sufficient evidence for the secondary bacterial infection effect on mortality due to COVID-19 infection. Combination of antibiotics was recognized in this study, that difficult to explain, just as a pattern of overuse. Generally, in our country, antibiotics require strict stewardship and control to prevent resistant problem that unfortunately could transfer to other countries.

Another finding from this study is number of female patients that significantly higher than male. This result disagrees with previous studies results declared that female less prone to COVID 19 infection than male owing to their immunological and life style factors [33, 34]. An explanation to that could be due to the relative number of females to male included in this study that requires larger studies to prove infection susceptibility according to gender which still arguable.

Conclusion

In conclusion, we found significant empiric antibiotic prescriptions for outpatients infected with COVID-19 regardless of infection severity. Our findings support the World Health Organization's concern about appropriate empiric antibiotic prescriptions during a pandemic. Azithromycin was predominant. A nationwide study is mandatory to prove this study's findings and to provide the necessary information to control antibiotic prescription behavior to avoid resistance problems.

Conflict of Interest

The authors declare no conflict of interest.

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