Research Article

Submitted: Sep 05, 2022
Accepted: Nov 27, 2022
Published: Dec 30, 2022

Antibiotics Prescribing Patterns among Coronavirus Disease 2019 Patients in a Hospital in Central Nepal

Dr. Satish Kumar Deo,[1] Mr. Biswash Sapkota,[2] Dr. Anju Bajracharya,[3] Mr. Sailendra Chaudhary,[4] Dr. Bishal Sapkota[5]

[1]Department of Clinical Pharmacology, Maharajgunj Medical Campus, Institute of Medicine, Kathmandu, Nepal

[2,4]Department of Pharmacy, Madan Bhandari Academy of Health Sciences, Makwanpur, Nepal

[3]Department of Pharmacy, Ashwins Medical College and Hospital , Lalitpur, Nepal

[5]Department of General Practice and Emergency Medicine, Patan Academy of Health Sciences, Lalitpur, Nepal

Correspondence :

Dr. Satish Kumar Deo. Email: satdeo@gmail.com

ABSTRACT

Introduction: Excessive antibiotics prescribing and overuse were observed during coronavirus disease 2019 (COVID-19) pandemic. This may affect patients' management and ongoing battle against antimicrobial resistance (AMR).

Objective: To assess the antibiotics prescriptions patterns to COVID-19 hospitalised patients based on disease severity.

Materials and Method: An analytical, cross-sectional study was conducted at Hetauda Hospital in Makwanpur, Nepal. Retrospective data were collected from 2021 May 17 to 2021 June 18 after ethical clearance among 400 COVID-19 patients admitted in hospital using convenience sampling. Variables examined were age, gender, disease severity, and antibiotics per prescription. Statistical analysis was done using SPSS v.25. Continuous variables were expressed as mean and standard deviations while categorical variables in frequency and percent. Fisher's exact and Pearson's Chi-square tests were used to test association between variables.

Result: Out of 400 patients, 234 (58.50%) were male. All study patients (100%) received one or more antibiotics on the survey date. Patients' clinical condition was either categorised as mild, moderate, or severe upon admission (P <0.001). No statistical association could be observed between gender and disease severity (P = 0.974). Ceftriaxone, Azithromycin, Cepodoxime, Doxycycline, Meropenem, and other antibiotics were prescribed to 289 (72.30%), 267 (66.80%), 239 (59.80%), 204 (51.00%), 212 (53.00%), and 221 (55.30%) in hospitalised patients.

Conclusion: It was observed that antibiotics were frequently used to treat COVID-19 patients, regardless of disease severity. Ceftriaxone, cepodoxime, and azithromycin were the most common. Evidence-based initiatives to promote prudent use of antibiotics for COVID-19 treatment may aid in minimising antibiotic misuse in Nepal.

Keywords: Antibiotics; Coronavirus disease 2019; prescription patterns; severity.

INTRODUCTION

In many facets of health care systems around the world, the coronavirus disease 2019 (COVID-19) pandemic has caused an unheard-of calamity. Symptoms range from mild to moderate in most affected individual who exhibit signs similar to

Citation

Deo SK, Sapkota B, Bajracharya A, Chaudhary S, Sapkota B. Antibiotics Prescribing Patterns among Coronavirus Disease 2019 Patients in a Hospital in Central Nepal. J Nepal Dent Assoc. 2022 Jul-Dec;22(35):98-102.

bacterial pneumonia.[1] Physicians are frequently compelled to give antibiotics despite the viral aetiology of COVID-19 and the lack of evidence of bacterial super infection in a significant majority of cases. A surplus of antibiotics because Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has no specific antiviral medication or vaccine in early phase bacterial pneumonia is difficult to distinguish from COVID-19, and secondary bacterial infection is unknown.[2]

Excessive antibiotic prescribing and overuse have been observed during this pandemic, which may affect management of COVID-19 patients and the ongoing battle against antimicrobial resistance (AMR).[3] Data on hospital antibiotics use and prescribing patterns during the COVID-19 pandemic are currently scarce, particularly in nations lacking a well-functioning antimicrobial stewardship program.[4] This is especially true in countries like Nepal, where the general public and health care practitioners are mostly unaware of antibiotic misuse and resistance.[5] This retrospective study of prescription of antibiotics would help to address a knowledge gap and aid in the effective planning of COVID-19 clinical management.

MATERIALS AND METHOD

An analytical, cross-sectional study was conducted from 2021 May 17 to 2021 June 18 at Hetauda Hospital in Makwanpur district, Nepal. For this study, data were retrospectively collected using convenience sampling technique from a total of 400 COVID-19 patients admitted in the hospital. On admission, patients were categorised into mild; moderate; and severe: intensive care unit (ICU) or ventilator; based on the criteria set by World Health Organisation (WHO).[6] For this study, patients on COVID-19 dedicated wards were identified as suffering from either moderate or severe disease. Data were collected from hospital records, and the variables examined in this study were age, gender, disease severity, and antibiotics per prescription. Adults' (≥18 years of age) antibiotic prescriptions that contained at least one antibiotic (oral and parenteral) were selected. Topical antimicrobials, antifungals, and antiprotozoal drugs were excluded from this study.

Statistical analysis was done using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Continuous variables were expressed as mean ± standard deviation (SD) and categorical variables were expressed in numbers (n) and percent (%). Fisher's exact and Pearson's Chi-square tests were used to test the association between variables. For all analyses, statistical significance was set at $P < 0.05$. Data were collected from patient cardex and anonymous data were sent to the core team for statistical analysis. No patient was interviewed during the study and hence informed written consent was waived. This study was approved by the ethical review board of Nepal Health Research Council (NHRC), Ramshah Path, Kathmandu, Nepal (Ref. 3139: 282/2021 P).

RESULT

Of these 400 patient's data, 234 (58.50%) were male (Table 1). The most common age group was 66 years and above that accounted for 139 (34.80%) of antibiotic prescriptions. Patient age ranged from 18 years to 96 years with the mean age of participants being 54.03±19.82 years. Most of the patients belong to Brahmin/ Chhetri which comprises of 173 (43.30%) followed by Janajati population of 124 (31.00%). Only 21 (5.30%) patients had received the first dose of vaccine while 4 (1%) received second dose and others were unvaccinated (Table 1). Patients' clinical condition was either categorised as mild, moderate or severe upon admission ($P < 0.001$). No statistical association could be observed between gender and disease severity ($P = 0.974$, Table 2).

All study patients (100%) received one or more antibiotics on the survey date. In total, 400 study participants received a total of 1686 antibiotics from the time of hospital admission to the survey date (Table 3). Ceftriaxone, a beta-lactamase stable broad-spectrum antibiotic, was found to be prescribed drug with 289 patients (72.30%), out of 400 total participants receiving the drug according to their treatment record (Table 4). Secondly, Azithromycin, Cepodoxime, Doxycycline, Meropenem, and other antibiotics were, prescribed in 267 (66.80%), 239 (59.80%), 204 (51.00%), 212 (53.00%), and 221 (55.30%) to admitted patients. The prescription of levofloxacin ($P < 0.001$) and meropenem ($P = 0.004$) were found statistically significant to disease condition.

Table 1: Demographic characteristics of participants.

Characteristics	n (%)	Characteristics	n (%)
Age group (years)		Janajati	124 (31.00)
18-25	31 (7.80)	Muslim	13 (3.30)
26-35	46 (11.50)	Others	13 (3.30)
36-45	47 (11.80)	**Health condition**	
46-55	63 (15.80)	Mild	262 (65.50)
55-65	74 (18.50)	Moderate	22 (5.50)
≥66	139 (34.80)	Severe-ICU	61 (15.30)
Gender		Severe-ventilator	55 (13.80)
Male	234 (58.50)	**Treatment outcome**	
Female	166 (41.50)	Death	100 (25.00)
Ethnicity		Discharge	300 (75.00)
Brahmin/Chhetri	173 (43.30)	**Vaccinated status**	
Terai/Madhesh	17 (4.30)	First dose	21 (5.30)
Dalit	34 (8.50)	Second dose	4 (1.00)
Newar	26 (6.50)	None	375 (93.80)

Table 2: Clinical categorisation of patients with age and sex (N = 400).

		Frequency n (%)	Mild	Moderate	Severe - ICU	Severe -ventilator	P value
Age group (years)	18-25	31 (7.80)	30	-	1	-	<0.001
	26-35	46 (11.50)	39	2	3	2	
	36-45	47 (11.80)	34	3	8	2	
	46-55	63 (15.80)	46	3	7	7	
	56-65	74 (18.50)	42	5	15	12	
	66- above	139 (34.80)	71	9	27	32	
Sex	Male	234 (58.50)	153	14	35	32	0.974
	Female	166 (41.50)	109	8	26	23	

Table 3: Most commonly prescribed antibiotics.

Antibiotics	n (%)
Ceftriaxone	289 (72.3)
Azithromycin	267 (66.8)
Levofloxacin	231 (57.9)
Meropenem	212 (53.0)
Cepodoxime	239 (59.8)
Doxycycline	204 (51.0)
Other antibiotics	221 (55.3)

Table 4: Antibiotic prescribing patterns and disease condition, n (%).

Antibiotics	Mild	Moderate	Severe -ICU	Severe -ventilator	Total (N = 400)	P value
Ceftriaxone	194 (48.50)	17 (4.25)	43 (10.75)	35 (8.75)	289 (72.30)	0.425
Azithromycin	168 (42.00)	17 (4.25)	39 (9.75)	43 (10.75)	267 (66.80)	0.148
Levofloxacin	131 (32.75)	19 (4.75)	44 (11.00)	37 (9.25)	231 (57.90)	<0.001
Meropenem	122 (30.50)	13 (3.25)	42 (10.50)	35 (8.75)	212 (53.00)	0.004*
Cepodoxime	149 (37.25)	11 (2.75)	44 (44.00)	35 (8.75)	239 (59.80)	0.110
Doxycycline	128 (32.00)	14 (3.50)	35 (8.75)	27 (6.75)	204 (51.00)	0.404
Other antibiotics	137 (34.25)	12 (3.00)	40 (10.00)	32 (8.00)	221 (55.30)	0.293

DISCUSSION

According to current WHO guidelines, no antibiotics or antifungal drugs should be provided in mild or moderate instances unless there are pre-existing bacterial or fungal symptoms, co-infection. Furthermore, when it comes to empirical antimicrobial prescription in severe situations, patients' overall health, area epidemiology, and the treating physician's clinical judgment should all be considered to allow for judicial antimicrobial administration.[7] The Ministry of Health and Population (MoHP) of Nepal developed the 2014 National Antibiotic Treatment Guidelines and the National Antimicrobial Resistance Containment Action Plan Nepal 2016 to promote rational antibiotic usage, good surveillance systems, and antibiotic stewardship. Similarly, the Department of Livestock Services (DLS) implemented a zero tolerance antibiotic policy to reduce the illogical use of antibiotics in animal feed. However, despite following so many criteria, many health care professionals continue to use antibiotics irrationally.[8]

The most often used antibiotics in the treatment of COVID-19 patients were ceftriaxone and azithromycin. Based on the epidemiology of local infections and resistance patterns, most local guidelines and some international guidelines support the use of these antibiotics. The use of these antibiotics has the advantage of covering the majority of the opportunistic bacteria that could cause secondary infection in COVID-19. However, widespread and inappropriate use of these antibiotics can result in the emergence of resistance to these popular, inexpensive, and highly effective antibiotics.[9,10]

The influenza pandemic was primarily a viral infection problem exacerbated by bacterial co-pathogenesis. This has been the rationale for using a wide variety of antibiotics empirically, despite the fact that COVID-19 is predominantly a viral aetiology pathology that is not often treated with antibiotics.[11]

Cephalosporin, macrolides, carbapenem, tetracyclines, and fluoroquinolones were found to be the most commonly utilised antibiotic classes in this study investigation, which is similar with the findings of an observational study conducted on a comparable population in an Oman tertiary teaching hospital.[12] Similarly, in the current study, third-generation cephalosporins and meropenem were the two most commonly prescribed medications, while co-amoxiclav, amoxicillin, and doxycycline were the most commonly prescribed drugs in Scottish and Singaporean hospitals. Multiple antibiotic prescriptions were more common in this study as compared to studies conducted in Scotland and Sinagapore.[13]

In contrast to findings of current study, Kitano et al. in 2021 discovered that antibiotics were used less frequently in Ontario, Canada during the COVID-19 pandemic. The magnitude of the decrease in antibiotic prescriptions was greater in children, medications for respiratory diseases, and family physician prescribers.[14]

This study has several limitations because it was conducted at a single centre, and the results cannot be extrapolated to the entire population of

Makwanpur area, Nepal. The WHO prescription indicators merely assess prescribing tendencies without regard for quality. Future study should focus on understanding the impact of incomplete prescriptions on patient health and drug resistance.

CONCLUSION

When compared to other studies conducted in similar settings, the prevalence of antibiotic use among hospitalised COVID-19 patients was shown to be greater. Antibiotics were also utilised at a high rate and number for mild to moderate disease. Cephalosporins and macrolides, such as ceftriaxone, cepodoxime, and azithromycin, were the most often used antibiotic classes. Higher class antibiotics were generally utilised in the ICU and with ventilator support to treat severe illness. Judicious antibiotic usage among COVID-19 patients with varying severity, particularly those admitted to ICU and on ventilator support, could be encouraged to decrease AMR during current COVID-19 pandemic. The findings of the study further indicate the need for context-specific practicable interventions to promote, strengthen, and sustain the anti-microbial stewardship program (ASP) to ensure antibiotic judicious use.

ACKNOWLEDGEMENT

The authors would like to thank their family members, relatives, and all faculties of Madan Bhandari Academy of Health Sciences, Hetauda, Makwanpur, Nepal who provided continuous support for conducting this research.

Conflict of interest: None.

REFERENCES

1. O'Kelly B, Cronin C, Connellan D, Griffin S, Connolly SP, McGrath J, et al. Antibiotic prescribing patterns in patients hospitalised with COVID-19: Lessons from the first wave. JAC-Antimicrobial Resist. 2021;3(2):dlab085. [PubMed | Full Text | DOI]
2. Oluyege A, Aregbesola OA, Olaoluwa OJ, Olubukola OA, Deborah DO, Oluwanike O, et al. Incidence of drug resistant bacteria and physicochemical properties of ero dam, nigeria. Rep Opin . 2010;2(12):78-85. [Full Text]
3. Rawson TM, Zhu N, Ranganathan N, Gilchrist M, Satta G, Cooke G, et al. Bacterial and fungal co-infection in individuals with coronavirus: A rapid review to support covid-19 antimicrobial prescribing. Clin Infect Dis. 2020;71(9):2459-68. [PubMed | Full Text | DOI]
4. Dawadi P, Syangtan G, Lama B, Kanel SR, Joshi DR, Pokhrel LR, et al. Understanding covid-19 situation in nepal and implications for sars-cov-2 transmission and management. Environ Health Insights. 2022;16:11786302221104348. [PubMed | Full Text | DOI]
5. Rijal KR, Banjara MR, Dhungel B, Kafle S, Gautam K, Ghimire B, et al. Use of antimicrobials and antimicrobial resistance in nepal: A nationwide survey. Sci Rep. 2021;11(1):11554. [PubMed | Full Text | DOI]
6. Son KB, Lee TJ, Hwang SS. Disease severity classification and covid-19 outcomes, republic of korea. Bull World Health Organ. 2021;99(1):62-6. [PubMed | Full Text | DOI]
7. Desvaux É, Faucher JF. Covid-19: Clinical aspects and management. Rev Francoph Lab. 2020;2020(526):40-7. [PubMed | Full Text | DOI]
8. Kakchapati S, Rijal A, KC SP. Antimicrobial resistance in nepal: The next invisible pandemic. Health Prospect. 2021;20(1):22-4. [Full Text]
9. Neto AGM, Lo KB, Wattoo A, Salacup G, Pelayo J, DeJoy R, et al. Bacterial infections and patterns of antibiotic use in patients with covid-19. J Med Virol. 2021;93(3):1489-95. [PubMed | Full Text | DOI]
10. King LM, Tsay SV, Hicks LA, Bizune D, Hersh AL, Fleming-Dutra K. Changes in outpatient antibiotic prescribing for acute respiratory illnesses, 2011 to 2018. Antimicrob Steward Healthc Epidemiol. 2021;1(1):1-8. [PubMed] | Full Text | DOI]
11. Thapa B, Pathak SB, Jha N, Sijapati MJ, Shankar PR. Antibiotics use in hospitalised covid-19 patients in a tertiary care centre: A descriptive cross-sectional study. J Nepal Med Assoc. 2022;60(251):625-30. [PubMed | Full Text | DOI]
12. Hogerzeil HV, Ross-Degnan BD, Laing RO, Ofori-Adjei D, Santoso B, Chowdhury AKA, et al. Field tests for rational drug use in twelve developing countries. Lancet. 1993;342(8884):1408-10. [PubMed | Full Text | DOI]
13. Nathwani D, Sneddon J, Malcolm W, Wiuff C, Patton A, Hurding S, et al. Scottish antimicrobial prescribing group (sapg): Development and impact of the scottish national antimicrobial stewardship programme. Int J Antimicrob Agents. 2011;38(1):16-26. [PubMed | Full Text | DOI]
14. Kitano T, Brown KA, Daneman N, MacFadden DR, Langford BJ, Leung V, et al. The impact of covid-19 on outpatient antibiotic prescriptions in ontario, canada; An interrupted time series analysis. Open Forum Infect Dis. 2021;8(11):ofab533. [PubMed | Full Text | DOI]