

# Pattern of Antibiotic Prescription in Private Clinics in Baquba City in Iraq

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## Abstract

Antibiotics are one of the most common drugs that are widely used globally. Irrational use of antibiotics is the main cause of the emergence of multidrug-resistant organisms. Rational use of antibiotics is important to prevent antibiotic resistance and to preserve the efficacy of existing antibiotics. It was estimated that there is a high rate of antibiotic prescription worldwide. The main threat in the treatment of infectious diseases is the irrational use of antibiotics, so it is important to use current antibiotics properly to ensure the long-term availability of effective treatment for all infectious diseases. All physicians should be careful about combination therapy, which causes antibiotic resistance. In addition to the awareness of adverse drug reactions. The aim of this study is to evaluate the pattern of antibiotic prescription in private clinics in Baquba city. This is a cross-sectional study conducted in Baquba city and a review of prescription papers in private clinics, which was done for the period from 15/2 to 3/3/2023. Data was collected by a special design questionnaire that included sex, age, diagnosis, doctor's specialty, type of antibiotic administration, number of antibiotics, duration, and history of previous antibiotic prescription. Results were expressed as numbers and percentages. The total number of prescriptions was 270. The number of female patients was 63.3% while male patients was 36.7%. The range of age groups involved in the study was 16-35 years old. Oral dosage form of antibiotic prescription was 55.9% while parenteral dosage form was 30.4%. The duration of use of antibiotics from 3 to 5 days was 54.4%, while from 6 to 10 days was 32.2%. The severity of clinical indications of antibiotics was 51.8% as moderate, 37.8% as mild, and 10.4% as mild. Most of the prescriptions was related to surgical cases as percent 51.8%, while others related to gynecological cases as percent 31.5%. Monotherapy antibiotic was the most commonly prescribed 74.8% while a combination of two antibiotics was 24.1%. Cephalosporin was the most commonly group which prescribed as 28.9%, followed by amoxicillin 16.7%.

## 1. Introduction

Antibiotics are one of the most common drugs that are widely used globally, so it is necessary to be prescribed rationally by well-designed programs or guidelines to achieve the goal of treatment and good infection control [1]. Irrational use of antibiotics is the main cause of the emergence of multi drug resistance organism [2]. Rational use of antibiotics is important to prevent antibiotic resistance and to preserve the efficacy of existing antibiotics [3]. Wide prescription of antibiotics leading to

more cost and more economic burden on the health system [4,5].

Irrational use of antibiotics leads to more financial burden in addition to their adverse effect and more morbidity and mortality. It was estimated that there is a high rate of antibiotic prescription worldwide [6,7]. The World Health Organization adopted three indicators, which are prescribing indicators, patient care and facility indicators [8]. Many factors play an important role to make physician prescribing more antibiotics than what is indicated, such as market announcements, in opportune use, obeying the wishes of the patient to prescribe

antibiotics, and sometime special doctor in infections disease is not accessible in outpatient clinics [9].

It has been estimated that in the United States of America (USA), about 50% of prescribed antibiotics are not indicated, and such antibiotic prescribing may contribute to the growth and spread of resistant bacteria [10]. Antibiotic resistance is a major problem worldwide, and it is a real threat to health systems. Although antibiotic resistance is a natural process, many factors contribute to its increase, such as inappropriate prescribing, self-medication, and the widespread use of antibiotics in agriculture and husbandry [11].

The main threat in the treatment of infectious diseases is the irrational use of antibiotics, so it is important to use current antibiotics properly to ensure the long-term availability of effective treatment for all infectious diseases [12]. All physicians should be careful about combination therapy and its role in the enhancement of antibiotic resistance, in addition to the adverse drug reactions [13]. The aim of the study is to evaluate the prescription pattern of antibiotics in private clinics in Baquba city.

## 2. Materials and Methods

It is a cross-sectional study conducted in Baquba city by reviewing prescription papers in private clinics for the period between 15th February and 3rd March 2023. Information was collected by special designed questionnaire that included: age, sex, diagnoses, specialty of doctor, name of antibiotic, type whether injection or capsule, duration of treatment, and history of previous antibiotic prescription. Results are presented by numbers and percentages with tables.

## 3. Results

The total number of prescriptions during the study period was 270. The majority of prescriptions (63.3%) were to female patients, while (36.7%) for male patients, as shown in Table 1. According to age, most of the prescriptions were in the age group of (16-25) years (37.8%), followed by (24.8%) in the age group of (26-35) years, as shown in Table 2. Oral dosage form prescription was (55.9%) while parenteral dosage form prescription was (30.4%), as shown in Table 3.

**Table1.** Distribution of patients according to gender

Gender	No.	%
Male	99	36.7
Female	171	63.3
Total	270	100

According to the duration of treatment, most prescriptions (54.4%) were prescribed for 3-5 days, and (32.2%) were prescribed for 6-10 days, as shown in Table 4. Most of the prescriptions were to moderate clinical state

(51.8 %), followed by (37.8%) prescribed to mild clinical state. The severe cases form (10.4%) of all prescriptions, as shown in Table 5. Most of the prescriptions were prescribed for surgical cases (51.8%), followed by gynecological cases (31.5%), as shown in Table 6. Single antibiotics were the most commonly prescribed (74.8%), followed by a combination of two antibiotics (24.1%), as shown in Table 7. The most commonly prescribed antibiotic was cephalosporin (28.9%), followed by Amoxicillin (16.7%), as shown in Table 8.

**Table 2:** Distribution of patients according to age

Age	No.	%
< 1year	4	1.5
1-5	15	5.5
6-15	27	10
16-25	102	37.8
26-35	67	24.8
36-45	36	13.3
46-55	7	2.6
	7	2.6
56-65	5	1.9
> 65	7	2.6
Total	270	100

**Table 3:** Distribution of prescriptions according to route of administration

Type of AB	No.	%
Injection	82	30.4
Oral	151	55.9
Mix	37	13.7
Total	270	100

**Table 4:** Distribution of prescriptions according to duration of treatment

Duration of Rx	No.	%
< 3 days	6	2.2
3-5 days	147	54.4
6-10 days	87	32.2
11-15 days	19	7.1
< 15 days	11	4.1
Total	270	100

**Table 5:** Distribution of prescriptions according to clinical state

Clinical state	Injection	
	No.	%
Mild	13	5
Moderate	57	21
Sever	12	4
Total	82	30.4

**Table 6:** Distribution of prescriptions according to doctor specialty

Doctor specialty	No.	%
Physician	25	9.3
Surgeon	140	51.8
Gynecology	85	31.5
Pediatrics	20	7.4
Total	270	100

**Table 7:** Distribution of prescriptions according to the number of AB

Number of AB	No.	%
Single AB	202	74.8
2 AB	65	24.1
> 3 AB	3	1.1
Total	270	100

**Table 8:** Distribution of prescriptions according to use of antibiotics

Name of AB	No.	%
Ceftriaxone	78	28.9
Amoxicillin	45	16.7
Amikacin	36	13.33
Lincomycin	36	13.33
Levofloxacin	23	8.51
Metronidazole	22	8.14
Azithromycin	20	7.4
Meropenime	10	3.7
Total	270	100

#### 4. Discussion

This study was performed in private clinics in Baquba city in Diyala Governorate, and this city is the main center for the private clinics in the Governorate, so from our study, we can get a rough estimate about the pattern of antibiotic prescription. The main obstacle in this study is the lack of information in the prescription papers, especially those variables under study. In our study, the majority of prescriptions were for female patients (63.3%), and this finding agrees with the studies in Turkey [14] and Ghana [15].

Female preponderance in our study may indicate that females are at a higher risk of infection than males, although females are less exposed to the external environment than males. According to the route of administration, most of the prescriptions were oral antibiotics (55.9%), and this result is consistent with studies in Libya [16], Iraq [17], and Ethiopia [18]. This finding could be explained by the fact that in our study, we investigated outpatient settings in which oral antibiotics are enough to achieve the goal of treatment.

Duration of treatment was mostly for 3-5 days (54.4%), and this is consistent with the studies in Ghana [19], India [20], and the study by Shabazi et al. [21], but this finding does not agree with the study by Wadly et al. [22]. According to the clinical state of patients, most of the prescriptions were for mild and moderate clinical state (89.6%), and only (10.4%) of patients were in severe clinical state, and this could be attributed to the fact that our study was performed in private clinics in which most of the patients were mild to moderate clinical state while severe cases were mainly in the hospitals.

Surgical cases formed most of the prescriptions (51.8%) followed by gynaecological cases (31.5%) and this finding agrees with studies in Ghana [19], Japan [23], England [24] and this could be due to the wide use of antibiotic in gynaecological and obstetrical cases as prophylactic and therapeutic in addition to that the city in which the study is implemented there are many doctors with this specialities. Single antibiotic was the most prescribed (79.8%), while combination with two antibiotics or more forms (20.2%), and this is consistent with the studies in Iraq [17], Libya [16], Egypt [25], and Swiss [26]. Single antibiotic prescribed mostly, and this can be explained by the fact that in outpatient the majority of cases are mild and the use of a single antibiotic is enough to cure the patient.

Ceftriaxone was the most prescribed antibiotic (28.9%), and this was similar to the studies in Pakistan [27], India [28], and China [29]. Amoxicillin was the second most prescribed, and this is consistent with studies in India [30], Britain [31], but this finding was not agreed with the study in Korea [32], where they reported that Penicillins were mostly prescribed, followed by the second-generation cephalosporin.

#### 5. Conclusions

The majority of prescriptions of antibiotics were for Female patients than males. The majority of prescriptions in the age group of 16-35 years. The oral dosage form was the most common. Duration of a treatment was 3 to 5 days in most prescriptions and in a moderate state regarding clinical severity. Surgical and gynaecological cases were the most common prescriptions. A single antibiotic is used more than a combination. The most commonly used antibiotics were cephalosporin and amoxicillin.

#### Authors' contributions:

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Data analysis and interpretation: Abdulsalam Harfash Hasan, Hayder Abdulhafedh Kurji, Inas Sami Ali, Enas Ammar Mohammed

Drafting of the article: Inas Sami Ali, Enas Ammar Mohammed

Reviewing the paper critically for key ideas: Abdulsalam Harfash Hasan, Hayder Abdulhafedh Kurji.

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Article's ultimate endorsement and guarantor: Abdulsalam Harfash Hasan, Hayder Abdulhafedh Kurji, Inas Sami Ali, Enas Ammar Mohammed

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### Conflicts of interest

The authors declare no conflicts of interest.

### Declaration of Generative AI and AI-assisted technologies in the writing process:

The authors assert that this study does not use generative AI or AI-assisted technologies.

### References

- [1] Lesar TS, Briceland LL. Study of antibiotic control policies in university-affiliated teaching institutions. *Ann Pharmacother* 1996; 30: 31-4.
- [2] Krivoy N, W.A. El-Ahal, Y. Bar-Lavie and s. Haddad. Antibiotic prescription and cost pattern in a general intensive care unit. *Pharm. Pract.* 20075 (2):67-73.
- [3] De With K., E. Meyer, M. Steib-Bauert, F. Schwab., F.D. Daschner and W.V. Kern. Antibiotic use in two cohorts of German intensive care unit. *J Hospital Infect* 2006; 64:231-237.
- [4] Von Gunten V, Reymond JP and Troillet N. Use of broad spectrum antibiotics in six non-university Swiss hospitals. *Swiss Med Wkly* 2011; 29-30; 438-41.
- [5] Lew DP, Garbino J, Gerber AU, Sudre P. Use of antimicrobials in Swiss hospitals. *Swiss Committee of Anti-Infective Agents. Drugs* 1996; 88-91.
- [6] Dahiyat, F.; Salah, D.; Alomari, M.; Elrefae, A.; Jairoun, A.A. Antibiotic Prescribing Patterns for Outpatient Pediatrics at a Private Hospital in Abu Dhabi: A Clinical Audit Study. *Antibiotics* 2022, 11, 1676.
- [7] Cole, C.; James, P.; Kargbo, A. An evaluation of the prescribing patterns for under-five patients at a Tertiary Paediatric Hospital in Sierra Leone. *J. Basic Clin. Pharm.* 2015, 6, 109–114.
- [8] Mestrovic, T.; Aguilar, G.R.; Swetschinski, L.R.; Ikuta, K.S.; Gray, A.P.; Weaver, N.D.; Han, C.; Wool, E.E.; Hayoon, A.G.; Hay, S.I.; et al. The burden of bacterial antimicrobial resistance in the WHO European region in 2019: A cross-country systematic analysis. *Lancet Public Health* 2022, 7, e897–e913.
- [9] Choudhury, D.; Bezbaruah, B. Antibiotic Prescriptions Pattern in Paediatric In-Patient Department Gauhati Medical College and Hospital, Guwahati. *J. Appl. Pharm. Sci.* 2013, 3, 144–148.
- [10] Priyadharsini RP, Ramasamy K, Amarendar S. Antibiotic prescribing pattern in the outpatient departments using the WHO prescribing indicators and aWaRe assessment tool in a tertiary care hospital in South India. *J Family Med Prim Care* 2022; 11:74-8.
- [11] Ofori-Asenso R, Agyeman AA. Irrational use of medicines—A summary of key concepts. *Pharmacy* 2016; 4:35.
- [12] Prestinaci F, Pezzotti P, Pantosti A. Antimicrobial resistance: A global multifaceted phenomenon. *Pathog Glob Health* 2015; 109:309-18.
- [13] Shrestha R, Prajapati S. Assessment of prescription pattern and prescription error in outpatient Department at Tertiary Care District Hospital, Central Nepal. *J Pharm Policy Pract.* 2019; 12(1):1–9.
- [14] Vinodkumar MUGADA, Damayanthi MAHATO, Damayanthi ANDHAVARAM, Sairam, Mouli VAJHALA. Evaluation of prescribing pattern of antibiotics using selected indicator, for antimicrobial use in hospitals and the Access, Watch, Reserve (AWaRe) classification by the world Health organization. *Turk J pharm SCi* 2021; 18(3):282-288.
- [15] Amponsuh Ok, Buabeng KO, owusu-ofori A, Ayisi-Boateng NK, Hameen-Anttila K, Enlund H. Point prevalence survey of antibiotic consumption across three hospitals in Ghana *JAC-Antimicrobial resistance.* 2021; 3(1): diaba08. PubMed/ Google scholar.
- [16] ELZouki A. N, Almabri H, Alagori N, Ibkhatra S. Pattern of antibiotic prescribing in medical inpatients of a major teaching hospital in Benghazi. *GMJ*, 2005; 22 (2): 37-41.
- [17] Kasim Mahmood Jumaa, Saad Abdul-Rahman Hussein, Ali Moussa Jaffer, Ali Saqban Abdel-Aziz, Rash Ahmed Abdul-Latif. *The N Iraqi J Med. Angst* 2011; 7(2):81-87.
- [18] Gebre Teklemariam Demoz, Gebre Michael, Gebre Slassie, Kasahun, kalayhagazy, Gebre Mariam woldu, Shishay Wahdy, Denega Bahrey Tadesse, Yirga Legesse Niriayo. Prescribing pattern of antibiotics using WHO prescribing indicators among inpatients in Ethiopia. *Infection and Drug resistance* 2020;13, 2783-2794.
- [19] Thomas Opoku Darkwah et al. Assessment of prescribing of antibiotics using National treatment guidelines and world health organization prescribing indicators at the Ghana police hospital a pilot study. *Pan African Medical Journal* 2021; 93(222).10.11604/paMJ.39.222.29569.
- [20] Williams A, Mathal AS. Antibiotics prescription pattern at admission into a tertiary level intensive care

- unit in northern India. *J pharm Bio allied sci.* 2011; 3 (4):531. doi: 10.4103/0975- 7406.90108.
- [21] Shabazi Nias, Hiremath sRR; Parrads. Assessment of antimicrobial use pattern using World Health Organization prescribing indicators at tertiary hospital: a prospective, observational study. *TAPP pharm sci* 2018; 8: 132 - 138.
- [22] Woldu M A, Suleiman S, workneh N, Berhane H. Retrospective study of the pattern of antibiotic use in Hawassa University referral hospital pediatric ward Southern Ethiopia. *J App pharm sci* 2013; 3:93-98.
- [23] Hashimoto H, Matsui H, Sasabuchi, Yasunaga H, Kotani K, Nagai R etal. Antibiotic prescription among-out patients in a prefecture of Japan, 2012-2013: a retrospective claims database study. *BMJ open.* 2019; 9(4):e026251.
- [24] Dolk FCK, Povwels KB, Smith DRM, Robotham JV, Smieszek T. Antibiotics in primary care in England: which antibiotics are prescribed and for which conditions. *J Antimicrob chemother.* 2018; 73(suppl-2):ii2-ii10.
- [25] Osama H. Ibrahim M. Evolution of drug and antibiotic utilisation in an Egyptian university hospital: An interventional study. *Intern Med* 2012;2:1-3.
- [26] Bugnon-Reber A, de Torrente A, Troillet N, Genne D, ETUDAS group. Antibiotic missuse in Medivmsized Swiss hospitals. *Swiss Med wkly.* 2004 Aug 21; 143(33-34):481-5.
- [27] Atif M, Azeem M, Saqib A, Scahill S. Investigation of antimicrobial use of a tertiary care hospital in southern Punjab, Pakistan using WHO methodology. *Antimicrob Resist infect. control* 2017; 6:41.
- [28] Kotwani A, Holloway k. Trends in antibiotic use among outpatients in New Delhi, India. *BMC inf Dis* 2011; 11:99.
- [29] Wan GJ, Wan GP, wan GX. Zheng Y, Xiao Y. Use and prescription of antibiotics in primary health Care settings in china. *JAMA int Med* 2014; 174:1914-1920.
- [30] Mule AV, Sharma MC, Raghunath A, Deshpande PR. A survey of antibiotics dispensing pattern in a community pharmacy of pune city. *J sci.* 2018; 45:119-124.
- [31] British National Formulary (BNF). BNF 78 (British National Formulary) September 2019 Bnf.2019.
- [32] Yoon YK, Park GC, An H, Chun BC, Sohn JW, Kim MJ. Trends of antibiotic Consumption in Korea according to national reimbursement data (2008-2012): a population based epidemiological study *Medicine (Baltimore)* 2015; 94:e2100.