Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v30i18.3421

APPRAISAL OF ANTIBIOTIC PRESCRIPTION IN COMMUNITY OF DISTRICT DERA ISMAIL KHAN, PAKISTAN

Muhammad Rehan Malik[1], Tayyaba Khalid[2], Mudassar Mazher[1*], Umer Shaukat[3], Musrat Sana[1], Sidra[1], Umar Farooq[4], Saad Ashfaq Cheema[1], Iram Bibi[2], Shahnila Jamil[5], Bareera Akram[2], Mansoor Azam[1], Sheikh Abdur Rashid[6*]

[1]Department of Pharmacy, The University of Chenab, Gujrat, Pakistan
[2]Department of Pharmacy, The University of Lahore, Gujrat, Pakistan
[3]Rashid Latif College of Pharmacy, Lahore, Pakistan
[4]Comsats University Islamabad، Abbott Abad Campus, Pakistan
[5]Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, University of Karachi, Pakistan
[6]Faculty of Pharmacy Gomal University, Dera Ismail Khan, KPK, Pakistan

***Corresponding Author :**Mudassar Mazher
mudassarmazher@gmail.com

Sheikh Abdur Rashid
sheikhabdurrashid11@gmail.com

Abstract

In developing nations, antibiotics are the medication classes most frequently prescribed. Improper use of antibiotics leads to public health issues and is responsible for antimicrobial resistance. The goal of the current study was to ascertain the community's non-infectious disease practitioners' prescription practices, examining the appropriateness of the antibiotic prescriptions in regards to antibiotic choice, duration of treatment, dose as well as misuse in case of viral infections. A pilot cross-sectional research was conducted on ward individuals who had been prescribed antibiotics. It took place over four months in different wards of the D.H.Q teaching hospital of D.I.Khan. Participants responded to questions on their socio-demographic characteristics, medical concerns, symptoms that necessitated medical care, the doctor's diagnosis, the antibiotic that was recommended, and its misuse in case of viral infections as well as whether or not laboratory tests were requested to determine the causing organism. The results revealed that the most popular antibiotics prescribed were ceftriaxone (36%) and that RTIs accounted for approximately half of the illnesses over which antibiotics had been prescribed (24.7%).

The study also revealed that whilst prescription dose plus treatment duration were incorrect in 51% as well as 51% of the cases, respectively, the antibiotic choice was appropriate in 51% of the cases. The selection of drug conformity towards guidelines lowered from 48.8% (day 1 of fever) to 22.2% (week 1 of fever), plus compliance of dose prescription to standards had been significantly greater (45.9%) for individuals having fever in comparison to individuals who did not have fever (41.5%), suggesting that fever may have also influenced the prescription of the physician. This study revealed a significant incidence of inappropriate antibiotic prescriptions in D.I.Khan. Hence, steps should be taken to make improvements in the prescription of antibiotics.

Keywords: Antibiotic, Prescription, Conformity to Guidelines, Resistance, Prescription Trends

1. Introduction

The use of antibiotics is quite common in developing countries to cure various diseases and hence these are sold in very large quantities (1). Recently, the injudicious and lavish use of antibiotics has resulted in severe public health issues. The issue cannot be resolved completely although its frequency can be minimized (2). The illogical application of antibiotics includes recommending injections instead of the oral dose, insufficient or additional extra medications, imbalanced drug duration than required, antimicrobial treatment for non-bacterial disorders, and choosing expensive medications (3-6).

Improper antibiotic usage leads to the growth and formation of resistant bacterial strains. Consequently, these bacterial strains cause life-threatening infections. Moreover, negative reactions and a huge economic loss for the health system of the country are also related to these antibiotics (7). Several different possibilities for inadequate antibiotics usage e.g. Insurance-related health policies, economic factors, physicians' lack of concern for long-term effects as well as resistance whilst treating current symptoms, the selling of antibiotics without the need for a prescription in certain countries as well as pharmaceutical marketing (8, 9).

The World Health Organization (WHO) has recommended that prescribers follow proper procedures and guidelines for suggesting antibiotics based on strong evidence to cure certain diseases (10). There are several advantages if these guidelines are properly followed. The treatments would be standardized, dosage mistakes will be reduced, etc. (11, 12). It is clear from recent studies that if guidelines are not followed then mistakes in prescribing antibiotics occur concerning dose and perhaps even duration (13-15).

District D.I.Khan, the healthcare system solely depends on the public sector; although 42% of the antibiotics which are sold in pharmacies are given in the absence of a prescription, 58% of them have been written by physicians. It is still quite uncommon to get extensive information about the prescribing of antibiotics in a community setting (8, 9).

Evaluation of community non-infectious diseases practitioners' prescribing behaviors was the overarching goal of the current study, antibiotic prescription in case of non-infectious diseases, examining the suitability of antibiotic prescription in regards to the treatment duration, dose, as well as the antibiotic choice (8-10).

2. Materials and Methods

2.2. Population and data collection

On the ward's patients, a pilot cross-sectional survey had been conducted. Between May and August of 2022-2023, 4 months, the study was done. The study had been carried out in 4 different wards of the District Headquarters Teaching Hospital of D.I.Khan (KPK) Pakistan. The wards selected were OPD, ICU, Children's ward, and Medical ward male and female. Convenience played a role in selecting the pharmacy sites, and all patients who met the criteria for inclusion were included (4-6). Therefore, all patients of various ages as well as genders who were transferred to different wards including antibiotic prescriptions had been part of this study. Individuals who had antibiotics prescribed to them via an infectious disease specialist, a non-infectious disease specialist, even without a prescription, or who had a non-antibiotic prescription were removed. 200 patients or their attendants in total were questioned (12).

2.3. Tools and procedures

Participants were questioned by the community pharmacy's working pharmacist. Data were collected regarding the patient whose prescription it was; parental proxy responses were only

allowed when the patients were ICU patients or children. The Infectious Disease Society of America (IDSA) recommendations had been utilized for this purpose, and participants were informed of the study's objectives, which included examining the patterns of prescribing antibiotics by the physicians and determining if they complied (11, 16). The IDSA guidelines, which are regarded as being among the most significant guidelines on even an international level because Pakistan does not have its guidelines, are typically taught throughout medical education in the country.

The study made use of a standardized questionnaire that was created especially for it and was written in English. The following information was inquired: socio-demographic details, medical conditions, symptoms requiring medical attention, medication prescription information (dose, name, duration, as well as the manner of administration, as specified on the prescription), the doctor's diagnosis as well as whether lab tests had been performed to determine the causing agent. The information made it possible to evaluate the suitability of the drug selection (if recommended by guidelines), as well as the appropriateness of the treatment's dose plus duration. The specialization of the doctor was also noted; prescriptions from non-specialists (family as well as general physicians) and specialists in non-infectious diseases (Nephrologists, Pulmonologists, Gastroenterologists, etc.) were compared (17).

2.4. Statistical analysis

Statistical software SPSS was used to analyze the collected data (version 17). A p-value that was lower than 0.05 was deemed significant. With discrete variables, descriptive statistics, primarily proportions, were used. To compare the qualitative variables, a chi-square test was employed.

3. Results

3.1. Study of population characteristics

Data of 200 patients was collected, from which 125 were males (62.5%) as well as 75 were females (37.5%). There were individuals of various ages included, the majority were >51 years of age (40%), while 12.5% were between the ages 1–11 years, 15.5% were between the ages 12–21 years, plus 31% were between the ages 22-50 years. The participants were mostly from D.I.Khan city (35%), followed by Pahar Pur (27%), Paro (21%), and finally Kulachi (17%).

A total of 200 individuals (84.1%) were unaffected by any underlying medical conditions, whilst 27 patients (15.9%) had chronic diseases, amongst which 16.8% had diabetes, 4.9% had CLD, 3.5% had COPD and Cerebral Malaria, 1.4% had CCF and 0.69% for Asthma, SJS, Jaundice, Dysphoria, Drug-induced parkinsonism, BPH, CVA.

Moreover, most individuals (42;24.7%) had respiratory tract infections (abbreviated as RTIs; primarily acute bronchitis as well as pneumonia), followed by 31 individuals (18.2%) with cystitis of the urinary tract, 31 (11%) with acute cholecystitis of the gastrointestinal tract, 26 (10%) with oral infections, 11 (4%) with infections of the skin and soft tissues, 6 (2%) with infections of postoperative wound, as well as 5 (2%) with reproductive system infections (18).

Unfortunately, 42 (16%) of them weren't able to determine the disease they had, and also the physician failed to include the diagnosis upon a prescription (as seen in Table 1). Along with these 30 patients (15%) suffered from non-infectious diseases, among which 13.3% had HTN and CLD, 10% had CKD, CCF, COPD, and diabetes, 6.7% had asthma, cancer, jaundice, and osteoarthritis, and 3.3% for hepatic + splenomegaly and infestation of *Entamoeba histolytica* as illusterated in table 1.

Table 1. Characteristics of the study population

Characteristic	n (%)
Gender	125
Male	(62.5%)
Female	75 (37.5%)
Age category	
1–11	25(12.5%)
12–21	31 (15.5%)
21–50	62(31%)
≥51	80 (40%)
Missing	2 (1%)
Residence	
Paroa	42
Pahar pur	54
Kulachi	34
D.I.Khan city	70
Type of infection	42
Respiratory infection	(24.70%)
Urinary tract infection	31(18.23%)
Gastrointestinal (chronic diarrhea)	22
Meningoencephalitis	(12.94%)
Septicemia	9(5.29%)
Hepatitis C	8(4.70%)
Oral infection	8 (4.70%)
Bacterial meningitis	6 (3.52%)
Otitis media	5 (2.94%)
Skin and soft tissue infection	5 (2.94%)
Unknown	1 (0.58%)
	30 (13.6%)
Associated	
Yes	27 (15.9%)
Diabetes	24 (16.8%)
CLD	7 (4.9%)
Cerebral malaria	5 (3.5%)
COPD	5 (3.5%)
CCF	2 (1.4%)
Asthma	1 (0.69%)
SJS	1 (0.69%)
Jaundice	1 (0.69%)
Dysphoria	1 (0.69%)
Drug-induced parkinsonism	1 (0.69%)
BPH	1 (0.69%)
CVA	1 (0.69%)
No	143(84.1%)
Non-infectious diseases	
Hypertension4 (13.3%)	
CLD4 (13.3%)	
COPD3 (10%)	
CKD3 (10%)	
CCF3 (10%)	
Diabetes mellitus3 (10%)	
Asthma2 (6.7%)	
Jaundice2 (6.7%)	
Cancer2 (6.7%)	

Characteristic	n (%)
Osteoarthritis2 (6.7%)	
Hepato +Splenomegaly1 (3.3%)	
Infestation caused by Entamoeba histolytica	1 (3.3%)

3.2. Antibiotic choice and Diagnosis

Cephalosporins accounted for 87 (32%) of all antibiotic prescriptions (mostly Ceftriaxone, which is a third-generation Cephalosporin taken orally), followed by Penicillins [82 (30.6%), Amoxicillin-Clavulanic acid fixed-dose combination], Quinolones [55 (20%)] Ciprofloxacin], Metronidazole 30 (17.6%), Macrolides [22 (8%), Clarithromycin]. The least-prescribed antibiotics were Myrin-P forte 3 (1.8%), Vancomycin 2 (1.2%), Nystatin 2 (1.2%), and Pipemedic acid 1 (0.58%) as illustrated by Table 2 and Table 3.

Table 2. Antibiotics prescribed and their corresponding diagnostics

Antibiotic	Diagnostic (n)	Diagnostic (n)
Amoxicillin–clavulanic acid	Otitis media (5) Acute Tonsillitis (4) Pneumonia (5)	LRTI (6) Hepatitis-B (3)
Amoxicillin	LRTI (1)	
Penicillin G	UTI (12) LRTI (1)	Meningoencephalitis (1)
Piperacillin	UTI (10)	
Cefixime	UTI (1)	
Levofloxacin	LRTI (1)	Sinusitis (1)
Ciprofloxacin	UTI (10) Acute Gastroenteritis (6)	Acute Cholecystitis (6)
Cefuroxime	Acute Pancreatitis (12)	
Metronidazole	Chronic Diarrhea (12) Septicemia (4) Hepatitis C (1) Acute Gastroenteritis (12)	Acute bronchitis (3) Acute cholecystitis (1) UTI (3) Aspiration Pneumonia (12)
Azithromycin	T.B (1)	RTI (12)
Ceftriaxone	Pneumonia (5) T.B(3) Hepatitis C (5) Septicemia (4) UTI (4) RTI (3) Gastric-enteritis (3) Chicken Pox (3) Sore Throat (12)	Chronic Diarrhea (10) Meningio-encephalitis (8) Bacterial meningitis (5) Acute pancreatitis (5) Acute cholecystitis (5) Cystitis (3)
Clarithromycin	Pneumonia (5)	Acute bronchitis (3)
Nystatin	UTI (1)	Meningoencephalitis (1)
Pipemidic acid	UTI (1)	
Cephradine	Sore throat (1)	Infected wound after burn (1)
Vancomycin	Acute Bacterial meningitis (12)	
Myrin-P Forte	T.B (3)	
Moxifloxacin	UTI (3)	

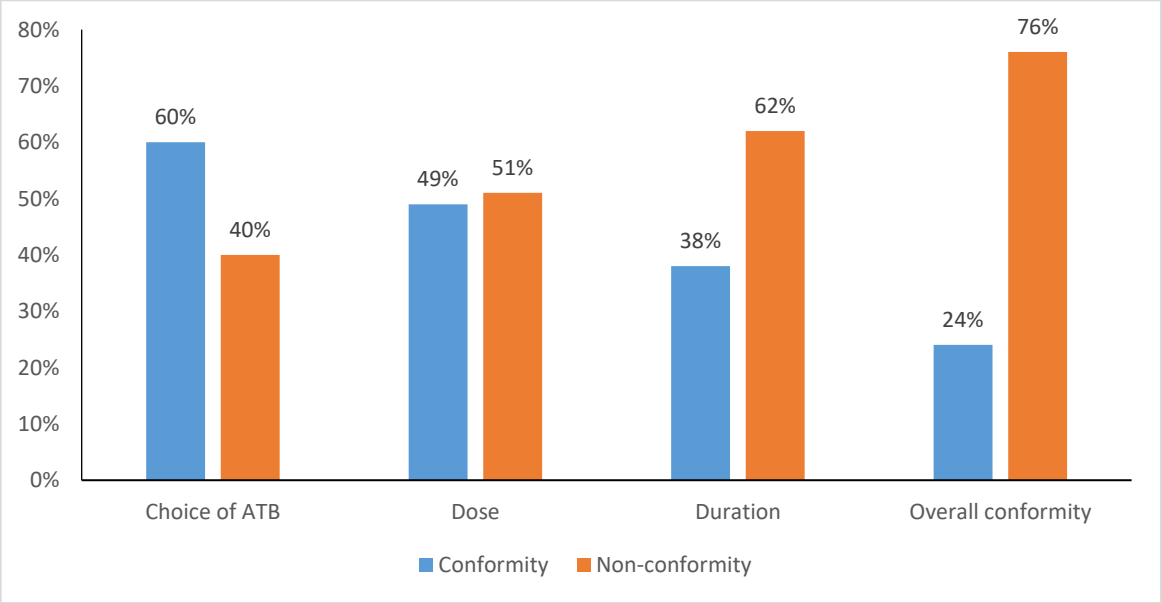
Table 3. List of prescribed antibiotics

Prescribed antibiotics	n (%)
Penicillins	82 (30.6%)
Amoxicillin–Clavulanic acid fixed combination	27 (15.9%)
Amoxicillin	1 (0.58%)
Penicillin-G	4 (2.35%)
Piperacillin	10 (5.9%)
Cephalosporins	87 (32%)
Cefixime	1 (0.58%)
Cephradine	2 (1.2%)
Ceftriaxone	72 (42.4%)
Cefuroxime	2 (1.2%)
Quinolones	55 (20%)
Levofloxacin	2 (1.2%)
Ciprofloxacin	22 (12.9%)
Moxifloxacin	3 (1.8%)
Macrolides (J01F)	22 (8%)
Azithromycin	3 (1.8%)
Clarithromycin	13(13%)
Metronidazole	30 (17.6%)
Vancomycin	2 (1.2%)
Myrin-P Forte	3 (1.8%)
Nystatin	2 (1.2%)
Pipemidic acid	1 (0.58%)

3.3. Conformity to guidelines

According to the current study, 60% of physicians prescribed the appropriate antibiotic, compared to 40% who did not. The dose that was prescribed in most of the cases that were studied seemed inappropriate (51%), and so was the duration of treatment, where incorrect antibiotic prescriptions regarding the right duration were made by 62% of doctors. When the aforementioned components were added up, it was revealed that 76% of the antibiotic prescriptions did not comply with guidelines (as shown in Fig. 1).

Figure 1. Percentages of conformity and non-conformity of antibiotic choice, dose, duration of treatment, and global conformity to Infectious Diseases Society of America guidelines.



According to Table 4, none of the following factors—doctor specialization, gender, the occurrence of fever, place of residence, the persistence of fever, plus tests performed in the laboratory—have demonstrated a difference in the choice of drug that seems to be statistically significant. Children between the ages of 1 till 11 had the least sufficient prescriptions (52% conformity), compared to other age groups, which revealed a statistically significant variation in compliance with guidelines (P=0.033). Moreover, statistical analysis has revealed a significant decline in the persistence of fever, from 48.8% (day 1 of fever) to 22.2% (week 1 of fever; where p=0.001).

Table 4. Choice of drug conformity to guidelines

		Conformity	Non-conformity	P
Doctors type	General practitioner	31 (15.5%)	54 (27%)	0.698
	Specialist practitioner	71 (35.5%)	44 (22%)	
Gender of patients	Male	40 (32%)	85 (68%)	0.057
	Female	35 (46.7%)	40 (53.3%)	
Age category	1–11	12 (48%)	13 (52%)	0.033
	12–21	21 (67.7%)	10 (32.2%)	
	22–50	28 (45.2%)	34 (54.8%)	
	≥51	25 (31.3%)	9 (11.5%)	
Residence	Paroa	29 (69.04%)	13 (30.9%)	0.300
	Kulachi	13 (38.2%)	21 (61.8%)	
	Pahar pur	32 (59.3%)	22 (40.7%)	
	D.I.Khan city	34 (48.6%)	36 (51.4%)	
Is there any fever?	Yes	45 (45.9%)	53 (54.1%)	0.286
	No	34 (41.5%)	48 (58.5%)	
How long did fever persist?	1 day	20 (48.8%)	21 (51.2%)	0.001
	2 days	17 (29.8%)	40 (70.2%)	
	3 days	12 (36.4%)	21 (63.7%)	
	1 week	2 (22.2%)	7 (77.8%)	
Laboratory culture	Yes	5 (41.6%)	7 (58.3%)	0.879
	No	168 (94.4%)	10 (5.6%)	

The patient's gender plus the presence of the patient's fever revealed a differentiation and it was statistically significant (such as p being equal to 0.057) when examining the dose prescribed as well as its compliance with the IDSA standards. In 32% of males, the dose was within the recommended range, compared to 46.7% of females. Patients with fever had a greater rate of compliance with the recommended dose (45.9%) than those without fever (41.5%) as shown in Table 5. No analyzed factor demonstrated statistically significant differences with regard to the duration of an antibiotic (such as P>0.05 for all; as shown in Table 6). Concerning general conformance, our study could not find any statistically significant differences (p being greater than 0.05 for all; as shown in Table 7).

Table 5. Dose conformity to guidelines

		Conformity	Non-conformity	P
Doctors	General practitioner	31 (15.5%)	54 (27%)	0.698
	Specialist	71 (35.5%)	44 (22%)	
Gender of patient	Male	40 (32%)	85 (68%)	0.057
	Female	35 (46.7%)	40 (53.3%)	
Age category	1–11	12 (48%)	13 (52%)	0.033
	12–21	21 (67.7%)	10 (32.2%)	

		Conformity	Non-conformity	P
	22–50	28 (45.2%)	34 (54.8%)	
	≥51	25 (31.3%)	9 (11.5%)	
Residence	Paroa	29 (69.04%)	13 (30.9%)	0.300
	Kulachi	13 (38.2%)	21 (61.8%)	
	Pahar pur	32 (59.3%)	22 (40.7%)	
	D.I.Khan city	34 (48.6%)	36 (51.4%)	
Is there any fever?	Yes	45 (45.9%)	53 (54.1%)	0.286
	No	34 (41.5%)	48 (58.5%)	
How long did the fever persist?	1 day	20 (48.8%)	21 (51.2%)	0.001
	2 days	17 (29.8%)	40 (70.2%)	
	3 days	12 (36.4%)	21 (63.7%)	
	1 week	2 (22.2%)	7 (77.8%)	
Laboratory culture	Yes	5 (41.6%)	7 (58.3%)	0.879
	No	168 (94.4%)	10 (5.6%)	

Table 6. Conformity of the duration of the antibiotic course to guidelines

		Conformity	Non-conformity	P
Doctors	General practitioner	33 (15.5%)	52 (27%)	0.698
	Specialist	44 (35.5%)	71 (22%)	
Age category	1–11	45 (32%)	80 (68%)	0.133
	12–21	36 (46.7%)	39 (53.3%)	
	22–50	13 (48%)	12 (52%)	
	≥51	21 (67.7%)	10 (32.2%)	
Gender of patients	Male	28 (45.2%)	34 (54.8%)	0.33
	Female	25 (31.3%)	9 (11.5%)	
Residence	Paroa	29 (69.04%)	13 (30.9%)	0.300
	Kulachi	13 (38.2%)	21 (61.8%)	
	Pahar pur	32 (59.3%)	22 (40.7%)	
	D.I.Khan city	34 (48.6%)	36 (51.4%)	
Is there any fever?	Yes	45 (45.9%)	53 (54.1%)	0.286
	No	34 (41.5%)	48 (58.5%)	
How long did the fever persist?	1 day	20 (48.8%)	21 (51.2%)	0.102
	2 days	20 (29.8%)	37 (70.2%)	
	3 days	14 (36.4%)	19 (63.7%)	
	1 week	2 (22.2%)	7 (77.8%)	
Laboratory culture	Yes	5 (41.6%)	7 (58.3%)	0.879
	No	168 (94.4%)	10 (5.6%)	

Table 7. Global conformity to guidelines

		Conformity	Non-conformity	P
Doctors	General practitioner	31 (15.5%)	54 (27%)	0.698
	Specialist	71 (35.5%)	44 (22%)	
Gender of patient	Male	40 (32%)	85 (68%)	0.057
	Female	35 (46.7%)	40 (53.3%)	

		Conformity	Non-conformity	P
Age category	1–11	12 (48%)	13 (52%)	0.033
	12–21	21 (67.7%)	10 (32.2%)	
	22–50	28 (45.2%)	34 (54.8%)	
	≥51	25 (31.3%)	9 (11.5%)	
Residence	Paroa	29 (69.04%)	13 (30.9%)	0.300
	Kulachi	13 (38.2%)	21 (61.8%)	
	Pahar pur	32 (59.3%)	22 (40.7%)	
	D.I.Khan city	34 (48.6%)	36 (51.4%)	
Is there any fever?	Yes	45 (45.9%)	53 (54.1%)	0.286
	No	34 (41.5%)	48 (58.5%)	
How long did the fever persist?	1 day	20 (48.8%)	21 (51.2%)	0.001
	2 days	17 (29.8%)	40 (70.2%)	
	3 days	12 (36.4%)	21 (63.7%)	
	1 week	2 (22.2%)	7 (77.8%)	
Laboratory culture	Yes	5 (41.6%)	7 (58.3%)	0.879
	No	168 (94.4%)	10 (5.6%)	

4. Discussion

Throughout this pilot study, it was revealed the majority of antibiotic prescriptions did not follow the IDSA guidelines. There were also high percentages of non-conformity to dosage (52%) as well as treatment duration (62%) to the recommendations for the prescribed antibiotics. This may be attributed to a variety of factors, including the absence of straightforward guidelines for dose as well as treatment duration, clinical trial's absence to determine the optimal length of treatment, the variability of medical knowledge, but also psychosocial factors that influence medical decision-making.

Also, our study's findings revealed found that nearly half (such as 45%) of the antibiotics given were utilized to treat RTI. These results are in line with research from Turkey, Sweden, as well as India that found antibiotics had been typically prescribed for RTI, an abbreviation of Respiratory Tract Infections. It's interesting to see that pneumonia as well as acute bronchitis was the RTIs that were treated the most frequently. Viruses and bacteria are typically the causes behind these infections. Results from multiple research revealed that antibacterial agents for acute bronchitis do not appreciably reduce the duration of the illness.

As for pneumonia, approximately 35–45% of cases in children are mixed infections with both bacteria and viruses as well as necessitate antibiotic treatment. Age appears to be the most useful factor for determining whether the cause is viral or is it bacterial: viral pneumonia seems to be more prevalent among children under 3 years old. While *Streptococcus pneumoneae* was isolated in nearly 50% of the cases. During our study, pneumonia was identified in 15 patients, of whom 80% (12 cases) were adults and 20% (3 instances) were children younger than 12 years old. Despite this, antibiotic treatment for these patients was recommended without excluding the potential of even a viral infection, being more typical in their situation. These are crucial results given that the improper usage of antibiotics for URT (abbreviation of the upper respiratory tract) infections tract has increased the prevalence of antimicrobial resistance.

The result of our study also showed that there were a lot of diseases that are caused by both Viruses and bacteria like Pneumonia, Meningoencephalitis, Meningitis, etc, but the physicians did not identify which causative agent is responsible for the disease. In the case of sore throat and diarrhea which are caused by viruses, there is a misuse of antibiotics in these diseases. This study also showed that there is misuse and overuse of antibiotics in case of non-infectious diseases without

using the drug of choice for these diseases, which is the main reason for the development of antibiotic resistance.

When the fever lasts more than a week, we also discovered that the selection of medication prescribed was more non-compliant with the standards (22.2%), which might be caused by the existence of a serious case that calls for a close follow-up. Amongst patients with fever (45.9%), the doctor's prescribed dose appeared to comply with guidelines to some extent, which might be explained by the fact that doctors treat such patients more thoroughly since they view fever as a sign of a severe infection. These findings are in line with research conducted in nine European countries, where the clinicians stated that fever affected the clinician's decision for prescribing antibiotics.

Various limitations to this study should be discussed. Because of the brief time frame (such as 4 months) utilized to conduct it, it was a pilot study, which means it might not accurately represent the D.I.Khan population. Non-significant results can potentially be explained by the small patient population. The study was also conducted during the summer when antibiotic prescriptions typically fall. It is necessary to do another research with a larger sample size as well as a longer period to fully analyze the patterns of antibiotic prescribing in D.I.Khan inside the outpatient setting. Despite the convenience of the hospital as well as pharmacy locations, all of the included patients met the inclusion criteria, which might lessen selection bias. Also, although infection symptoms are typically well-defined, the diagnoses indicated in this study had been either written on prescriptions or provided by individuals; in either case, inaccurate diagnoses are likely; in cases of missing diagnoses, the problem would be worse. Our recommendation is to carry out similar research at the physicians' offices, where it will be possible to find out details about the doctors' gender, age, and educational background as well as where they practice.

Notwithstanding these drawbacks, the study's main results would serve as the foundation for future interventional strategies in D.I.Khan to enhance antibiotic prescription. in DI Khan, Antibiotic prescription should be rationalized and changed since optimizing antibiotic usage is a challenge that merits taking on. To do this, we recommend taking several actions, such as having to implement local guidelines for choosing the appropriate drug in terms of its spectrum of activity as well as side effects, by the usage of optimal dose plus treatment duration, identifying patients who need antibiotic prescriptions, introducing stewardship programs to minimize inappropriate antibiotic prescribing amongst practicing physicians, but also implementing undergraduate courses that specifically address bacterial resistance. The adoption of consensual marketing standards to regulate the promotion of antibiotics to prescribers is likewise of the highest significance.

In conclusion, in Dera Ismail Khan Prescriptions frequently deviate from standards, regardless of the doctors' specialties. To determine the severity of the issue with greater accuracy, more research is required.

References

1. Buke AC, Ermertcan S, Hosgor-Limoncu M, Ciceklioglu M, Eren SJIjoaa. Rational antibiotic use and academic staff. 2003;21(1):63-6.
2. Gould IJIjoaa. Antibiotic resistance: the perfect storm. 2009;34:S2-S5.
3. Lu Y, Hernandez P, Abegunde D, Edejer TJGMeWHO. The world medicines situation 2011. 2011:35-8.
4. AYDIN S, YARIŞ F, ÖZÇAKIR A, AĞALAR CJTJoMS. Most common infections and antibiotic prescribing habits of residents: experience of three university hospitals. 2005;35(3):169-73.
5. Lundborg CS, Mölstad S, Olsson EJSjoid. Antibiotic prescribing in outpatients: a 1-week diagnosis-prescribing study in 5 counties in Sweden. 2002;34(6):442-8.
6. Pathak A, Mahadik K, Dhaneria S, Sharma A, Eriksson B, Lundborg CSJSjoid. Antibiotic prescribing in outpatients: Hospital and seasonal variations in Ujjain, India. 2011;43(6-7):479-88.
7. Gyssens ICJIjoaa. Quality measures of antimicrobial drug use. 2001;17(1):9-19.

8. McManus P, Primrose JG, Hammond ML, Whicker SD, Mant A, Fairall SRJMjoA. Antibiotic use in the Australian community, 1990-1995. 1997;167(3):124-7.
9. Metlay JP, Stafford RS, Singer DEJAoim. National trends in the use of antibiotics by primary care physicians for adult patients with cough. 1998;158(16):1813-8.
10. Organization WH. Global strategy for containment of antimicrobial resistance, 2012. 2014.
11. McCaig LF, Besser RE, Hughes JMJJ. Trends in antimicrobial prescribing rates for children and adolescents. 2002;287(23):3096-102.
12. McCaig LF, Hughes JMJJ. Trends in antimicrobial drug prescribing among office-based physicians in the United States. 1995;273(3):214-9.
13. de Sá Del FF, Lopes LC, de Toledo MI, Barberato-Filho SJRdSBdMT. Prescription patterns and antibiotic use in community-based infections. 2010;43(1).
14. Porta A, Esposito S, Menson E, Spyridis N, Tsolia M, Sharland M, et al. Off-label antibiotic use in children in three European countries. 2010;66(9):919-27.
15. Cheaito L, Azizi S, Saleh N, Salameh PJIjoph. Assessment of self-medication in population buying antibiotics in pharmacies: a pilot study from Beirut and its suburbs. 2014;59(2):319-27.
16. Fahey T, Stocks N, Thomas TJB. Quantitative systematic review of randomised controlled trials comparing antibiotic with placebo for acute cough in adults. 1998;316(7135):906-10.
17. Brookes-Howell L, Hood K, Cooper L, Coenen S, Little P, Verheij T, et al. Clinical influences on antibiotic prescribing decisions for lower respiratory tract infection: a nine country qualitative study of variation in care. 2012;2(3):e000795.
18. Pichichero MEJAoem. Group A streptococcal tonsillopharyngitis: cost-effective diagnosis and treatment. 1995;25(3):390-403.