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Assessing Antibiotic Dispensing Practices for Viral Infections in Community and Hospital Pharmacies: A Simulated Client Study

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Abstract

Background
Antibiotic misuse, particularly for viral infections, was a major global health issue that contributed significantly to antimicrobial resistance (AMR). Pharmacies played a crucial role in medication dispensing, but inappropriate practices worsened the problem. This study investigated antibiotic dispensing practices for viral infections in community and hospital pharmacies across the Mirpur, Bhimber, and Kotli districts of Azad Jammu & Kashmir (AJK), Pakistan.

Objectives of Study
This study aimed to evaluate community and hospital pharmacies' practices regarding the dispensing of antibiotics for viral infections and to assess pharmacy personnel's knowledge of the effectiveness of antibiotics against viral infections.

Methodology
A descriptive cross-sectional study design was used. A simulated client approach was employed, in which we, as researchers, visited pharmacies to assess the dispensing practices of pharmacy personnel regarding viral infections. This method provided a realistic evaluation of service quality and compliance with antibiotics dispensing regulations for viral infections. Direct interviews with dispensing personnel were conducted, and responses were recorded in a pre-designed questionnaire to maintain

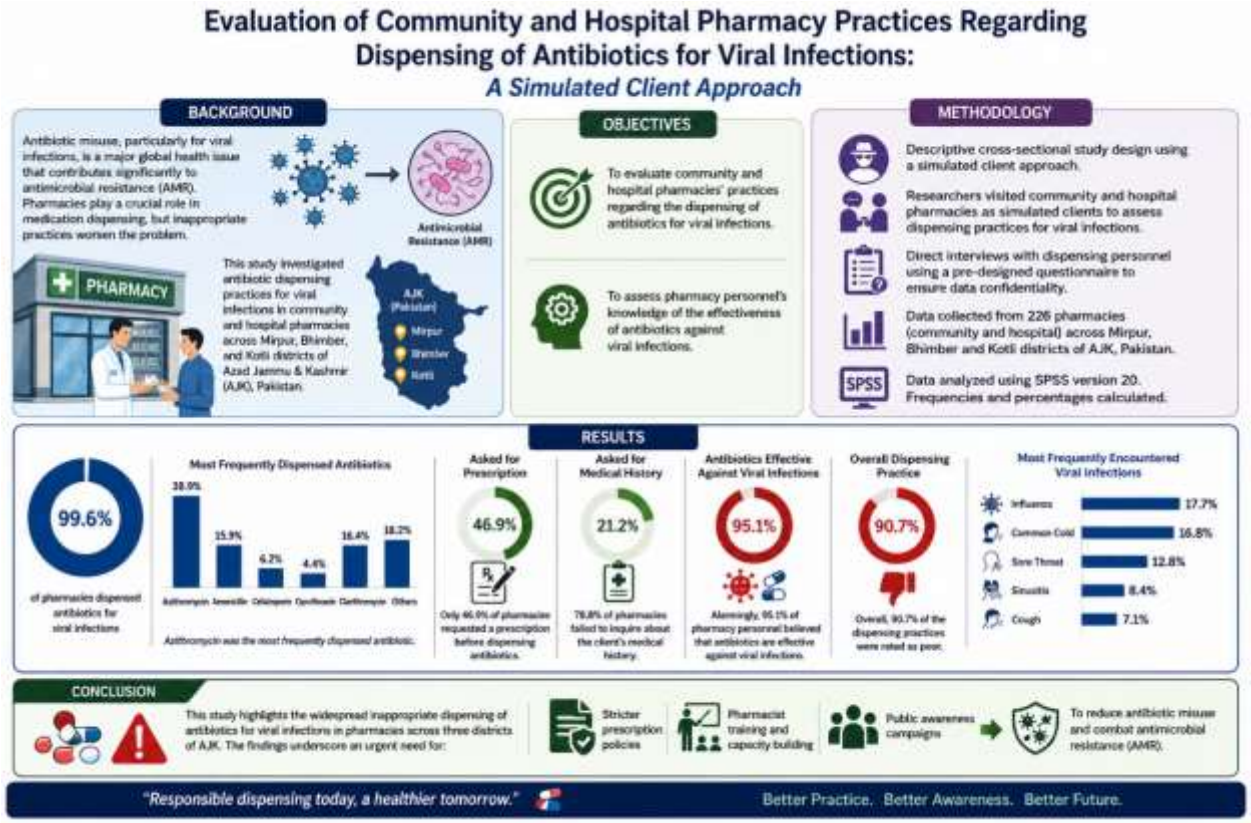
the confidentiality of the data. Data were collected from 226 community and hospital pharmacies. Percentages and frequencies were calculated using SPSS version 20.

Results

The results indicated significant gaps in adherence to proper dispensing practices. 99.6% of pharmacies dispensed antibiotics for viral infections, with Azithromycin being the most frequently dispensed (38.9%). Only 46.9% of pharmacies requested a prescription before dispensing antibiotics, while 78.8% failed to inquire about the client's medical history. Alarmingly, 95.1% of pharmacy personnel believed that antibiotics are effective against viral infections. Overall, 90.7% of the dispensing practices were rated as poor. Influenza (17.7%) and the common cold (16.8%) were the most frequently encountered conditions.

Conclusion

This study highlighted the widespread inappropriate dispensing of antibiotics for viral infections in pharmacies across three districts of AJK. The findings underscored an urgent need for stricter prescription policies, pharmacist training, and public awareness campaigns to reduce antibiotic misuse and combat AMR.



INTRODUCTION

The term "antibiotics" refers to naturally produced substances of various microorganisms such as bacteria or fungi, which are able to inhibit the growth of other microorganisms and destroy their cells. With the production of semi synthetic derivatives in modern era, the term "antibiotics" has been replaced by the term "antimicrobials" which refers to natural, semi synthetic and synthetic substances capable of inhibiting the proliferation of microbes and thus leading them to apoptosis. Antibiotics are not effective against viruses; drugs which inhibit viruses are termed antiviral drugs. Antiviral drugs are a class of medicines particularly used for the treatment of viral infections. Drugs that combat viral infections are called antiviral drugs. Viruses are among the major pathogenic agents that cause number of serious diseases in humans, animals and plants. Antivirals works by blocking viral entry into host cells, inhibiting viral replication interfering with viral protein synthesis and boosting immune response. Infectious diseases are well known since ancient time to

human civilization. Infectious disease are caused due to different microorganisms (bacteria, viruses and fungi). A viral infection is a disease caused by viruses, which are microscopic infectious agents that replicate only inside the living cells of a host organism. These infections can affect various parts of the body, including the respiratory system, gastrointestinal tract, liver, nervous system, and skin. Additionally, viruses use the host's cellular machinery for replication, hence are obligate intracellular pathogens. Such characteristics create the difficulties in developing drugs with selective toxicity against viruses. Viruses are Ultra microscopic agents having either DNA or RNA as the genetic material and are known to cause variety of diseases in humans, animals and plants. The fight between humans and viruses is continuous process, as both will adopt different strategies to fight against each other. Pharyngitis is the inflammation of the mucous membranes of the oropharynx. Viruses can cause direct invasion of the pharyngeal mucosa. Certain viruses like rhinovirus can cause irritation secondary to nasal secretions. In almost all cases, there is a local invasion of the pharyngeal mucosa which also results in excess secretion and edema. Associated symptoms often include coughing, rhinorrhea, conjunctivitis, headache, and a rash. Viral pneumonia is an infection of the lungs caused by various viruses, such as influenza, respiratory syncytial virus (RSV), and coronaviruses. Symptoms typically include cough, fever, difficulty breathing, and fatigue. Unlike bacterial pneumonia, viral pneumonia usually doesn't respond to antibiotics. Coronaviruses are enveloped, positive and single-stranded RNA viruses with a large, approximately 30 kilo base genome. The genome encodes for structural, non-structural, and accessory proteins. The four structural proteins, the spike (S), envelope (E), membrane (M), and nucleo capsid (N), form the virus particle. Common symptoms of COVID-19 include; Fever or chills, Cough, Shortness of breath or difficulty breathing, Fatigue Muscle or body aches, Headache, loss of taste or smell, Sore throat. Sinus infections are mainly viral infection caused by Rhinoviruses, influenza viruses, and parainfluenza viruses. Rhino sinusitis is clinically defined as the presence of nasal drainage (anterior or posterior), nasal congestion, facial pain/pressure, and/or reduced sense of smell. In acute rhino sinusitis, nasal symptoms last for less than 12 weeks and inflammation is often secondary to a viral or bacterial infection. Common symptoms include: Facial pain or pressure (especially around the eyes, cheeks, and forehead) Nasal congestion or blockage, Thick nasal discharge (yellow or green) Reduced sense of smell or taste, Cough (which may worsen at night) Fever, Fatigue, Ear pain or pressure. Tonsillitis is a common condition that affects mainly children, but can also affect adults. It is caused by both viral and bacterial infections, with streptococcal species being a common bacterial cause. Differentiation between bacterial and viral causes is important to prevent overuse of antibiotics and potential complications. Tonsillitis can be caused by adenovirus, Epstein barr virus Herpes simplex virus. Viral infections can present a range of symptoms, depending on the specific virus involved. Common general symptoms include: Fever, Fatigue, Muscle aches, Headache, Cough, Sore throat, Runny or stuffy nose, Nausea or vomiting, Diarrhea and Chills. Dengue viruses (DENVs) form dengue complex in genus Flavivirus, family Flaviviridae, and consists of four antigenically related but distinct DENV serotypes (DENV-1, DENV-2, DENV-2, DENV-3, and DENV-4). These DENV can cause a spectrum of illness ranging from asymptomatic dengue infection to dengue fever (DF) to dengue hemorrhagic fever (DHF) to dengue shock syndrome (DSS).Common symptom includes, fever, severe headache, nausea and vomiting, pain behind the eyes joint and muscle pain (Murugesan *et al*., 2020). Polio, short for poliomyelitis, is an infectious disease that is caused and transmitted by a virus called the polio virus. Polio can cause paralysis and the disease is therefore also known as "infantile paralysis". The name poliomyelitis is derived from Greek and translates to gray (polios) marrow (myelon), which refers to the tissue in the center of the spinal cord, which when

affected causes paralysis. Paralyzed limbs, such as arms or legs, waste away over time, this is why deformed legs are commonly associated with the disease. Chicken pox is a viral infection caused by Varicella –zoster virus (VZV); a herpes virus. It is acquired by inhalation of virus laden aerosols arising from respiratory secretions of patients in the late incubation period. The disease is characterized by appearance of classic lesions that can be described as “oval teardrop on an erythematous base” or a dew drop on a rose petal.1-3 Skin lesions initially appear on the face and trunk, beginning as red macules, progressing over 12-14 days to become papular, vesicular, pustular and finally crusted. The lesions predominate in central skin areas and proximal upper skin extremities with relative sparing of distal and lower extremities. Increasing issues of malpractice regarding dispensing of antibiotics for viral infections which is exacerbated by inappropriate antibiotics use. The simulated client practices/approach provides a unique and ethical method to observe real-world dispensing behaviors, allowing for a comprehensive analysis of factors influencing such practices. We conducted a rationale for the study evaluating community and hospital pharmacy practices regarding the dispensing of antibiotics in viral infections for several reasons. Unnecessary antibiotic use contributes to antibiotic resistance, making infections harder to treat. Unnecessary antibiotic exposure puts patients at risk of adverse effects and allergic reactions. Antibiotic overuse has significant public health implications, including increased healthcare costs and mortality. Limited information exists on pharmacy practices regarding antibiotic dispensing for viral infections in AJK. Antimicrobial resistance causes millions of deaths worldwide each year. antibiotic resistance may increase as a result of improper antibiotic prescriptions (e.g., overuse, insufficient use, or a decision that deviates from accepted practices). The purpose of this study was to identify the prevalence and effectiveness of prescribing and providing antibiotics for respiratory tract infections. Consumer abuse of antibiotics is a major public health concern in middle-income nations like Nigeria. This is lowering the efficiency of antibiotics against common diseases and adding to the concerning rise in antimicrobial resistance. Therefore, the purpose of this study was to evaluate the knowledge, attitudes, and variables related to antibiotic abuse among customers who visit particular community pharmacies. Antibiotics are often administered for unsuitable indications and are widely dispensed via community pharmacies. They are readily available without a prescription in many nations. The development of resistant bacterial strains as a result of improper antibiotic use poses a serious threat to public health, especially in developing nations. Antimicrobials are sold over-the-counter without a prescription in an estimated two-thirds of cases worldwide. Additionally, the most often sold medications in underdeveloped nations are antimicrobials. One of the main causes of the development of antimicrobial resistance is the overuse, abuse, or improper application of antibiotics. This puts these nations on a fast route to the pre-antibiotic era in addition to increasing morbidity and mortality, therapy failure, and healthcare expenses. Antimicrobial resistance is on the rise in Thailand. According to some research, this situation may be exacerbated by patients' and healthcare professionals' misinformation, misunderstandings, and malpractices surrounding the use of antibiotics and preventing the rise of antibiotic resistance. In particular, pharmacists may play a significant contribution in minimizing the development of resistance and justifying the community's usage of antibiotics. The overuse and incorrect administration of antibiotics, especially in primary care settings where most prescriptions are written, is a key contributing factor to antimicrobial resistance (AMR), a serious danger to world health. Antibiotic prescribing practices must be improved in order to combat AMR. This includes making sure that the appropriate agent, dose, and duration of antibiotics are given only when absolutely necessary. General practitioners (GPs) can address clinical uncertainties, share experiences, and reflect on issues like diagnostic ambiguity and patient pressure to

prescribe antibiotics through collaborative learning, which can be fostered by small group-based educational interventions. By combining current clinical information with real-world application, these interventions assist in changing long-standing prescribing practices. With the goal of educating the public, this thesis methodically assesses how well small group-based interventions might enhance the prescription of antibiotics in general practice. Antimicrobial resistance is largely caused by overuse of antibiotics, particularly in young patients. Antibiotics are frequently prescribed for viral infections in children. Pharmacies are a major source of easily accessible nonprescription antibiotics in poor nations. Furthermore, their inappropriate use is "everyday occurrence" in Pakistan. Therefore, the purpose of the study was to assess how children are given nonprescription antibiotics. All these issues provided valuable insights into pharmacy practices, informed evidence-based strategies to promote rational antibiotic use, and helped combat antibiotic resistance. The present study on the evaluation of community and hospital pharmacy practices regarding the dispensing of antibiotics in viral infections addressed critical issues in public health by evaluating the dispensing practices of antibiotics for viral infections in community and hospital pharmacies. This study helped improve patient outcomes by ensuring the appropriate use of antibiotics for bacterial infections and antivirals for viral infections. Furthermore, this study provided insights for policy and guideline development.

MATERIAL AND METHODS

Study Design

A descriptive cross-sectional study design was used.

Study Setting

The study was conducted at following study settings in District Mirpur, Bhimber and Kotli, AJK, Medical stores, community pharmacies and hospital pharmacies.

Study Duration

The study duration was conducted from April 2024 to February 2025.

Study Population

The study was comprised of pharmacists, dispensers, technician and salesman who were involved in dispensing medicine at medical stores, community and hospital pharmacies of targeted areas.

Sampling Technique

A simulated client approach with self-structured questionnaire was used to collect data from the above-mentioned study settings, which remained confidential from the relevant personals.

Sample Size

Sample size was calculated using Raosoft calculator at 95% confidence interval and 5% margin of error which was N=385, whereas the present study included N=226 through convenient sampling technique.

Data Collection Tool

Self-structured questionnaire containing questions regarding knowledge and dispensing practice of personnels was used to collect data.

Statistical Analysis

Data was analyzed using statistical package for social sciences (SPSS version 20). Descriptive statistics was used to calculate frequency, percentage and cross tabulation to evaluate the responses from respective personnel included in study

population

Ethical Consideration

This study was conducted with the permission of the relevant institutional authorities at Akson College of Pharmacy, in collaboration with Mirpur University of Science and Technology (MUST), Mirpur, Azad Jammu and Kashmir (AJK), under reference number 554/09/ACP/24. All procedures involved in the study were conducted in accordance with established ethical standards and institutional guidelines. The study protocol was reviewed and approved by the relevant institutional authorities prior to commencement, and all research activities were performed in compliance with applicable ethical principles.

RESULTS

Demographic Characteristics

The present study was comprised of total 226 study settings, among of which 32 (14.2%) were community pharmacies, 21(9.3%) were hospital pharmacies and 173(76.5%) were medical stores. Geographically, data was collected from the three districts of AJ&K including, District Mirpur, 92 (40.7%), District Bhimber, 70 (31.0%) and District Kotli, 64 (28.3%) settings respectively. Regarding pharmacist availability, only 23 (10.2%) settings had a pharmacist while 203 (89.8%) did not. The respondent dispensing medicines included 15 (6.6%) pharmacists, 126 (55.8%) dispensers, 72 (31.9%) salesmen, and 13 (5.8%) technicians. A detailed description given in the table 1 below.

Table 1. Demographic characteristics

Demographic characteristics		**Frequency (n)**	**Percentage (%)**
Study settings	Community pharmacy	32	14.2
	Hospital Pharmacy	21	9.3
	Medical store	173	76.5
District	Mirpur	92	40.7
	Bhimber	70	31.0
	Kotli	64	28.3
Pharmacist availability	Yes	23	10.2
	No	203	89.8
Who dispense	Pharmacist	15	6.6
	Dispenser	126	55.8
	Salesman	72	31.9
	Technician	13	5.8

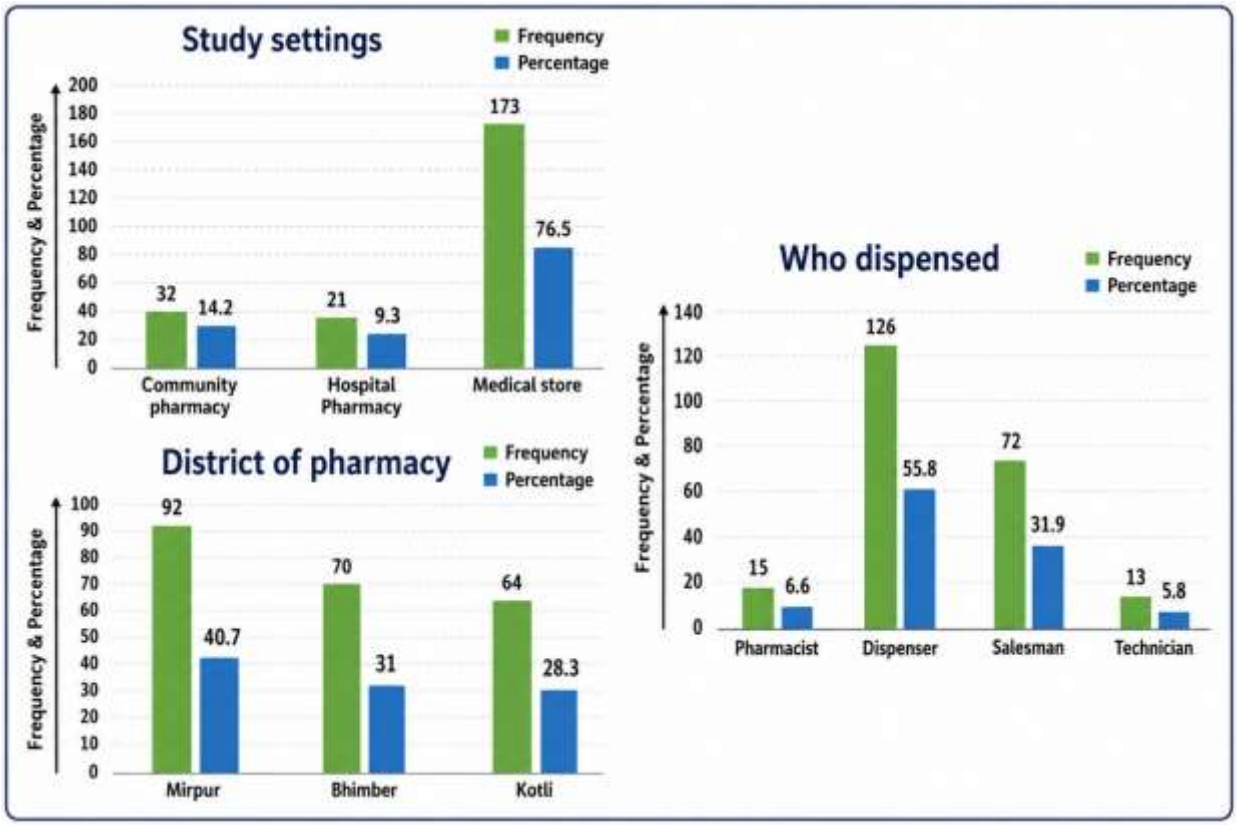


Figure 1. Indicating demographic characteristics of research areas

Types of Viral Infections

The study aimed to evaluate pharmacy practices concerning the management of viral infections. Among the cases dealed in pharmacies, influenza (flu) was the most frequently addressed, with 40 cases (17.7%), followed by the common cold, with 38 cases (16.8%), and bronchitis, with 34 cases (15.0%). Tonsillitis accounted for 31 cases (13.7%), while 26 cases (11.5%) involved viral pneumonia and 23 cases (10.2%) were related to pharyngitis. Sinus infections were treated in 20 cases (8.8%), dengue fever in 10 cases (4.4%), and Covid-19 in 4 cases (1.8%). A detailed description given in the table 2 below.

Table 2. Types of viral infections

Viral infections	**Frequency (n)**	**Percentage (%)**
Influenza (Flu)	40	17.7
Pharyngitis	23	10.2
Sinus infection	20	8.8
Common cold	38	16.8
Covid-19	4	1.8
Dengue fever	10	4.4
Viral pneumonia	26	11.5

Bronchitis	34	15.0
Tonsillitis	31	13.7

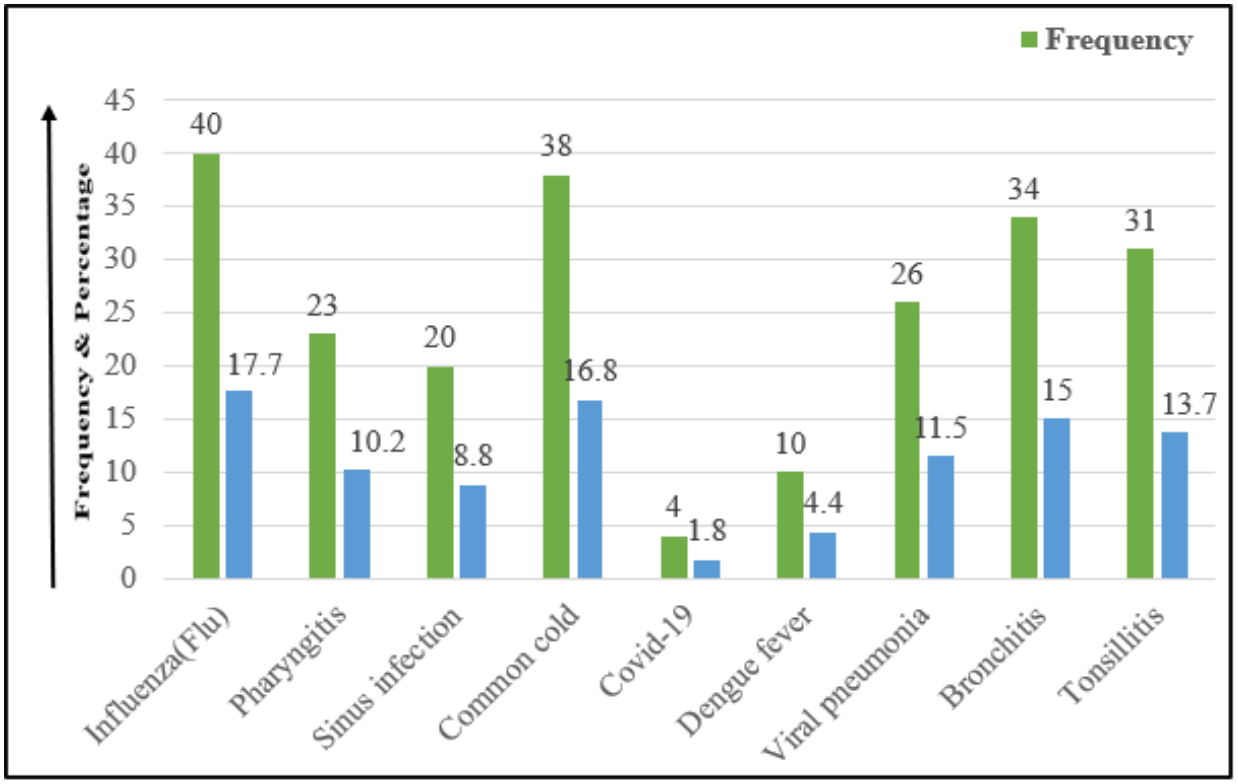


Figure 2. Displaying the types of viral infections predominant in research areas

Dispensing Characteristics

The dispensing characteristics revealed key trends in practices. Among pharmacies, 106 (46.9%) asked for prescription, while 120 (53.1%) did not. Only 48 (21.2%) asked for medical history, and 3 (1.3%) requested lab reports, leaving 178 (78.8%) and 223 (98.7%) not addressing these aspects, respectively. Just 1 (0.4%) pharmacy identified bacterial or viral infections, while 225 (99.6%) did not. Antibiotics were dispensed in 225 (99.6%) cases, with the most common being Azithromycin (88 cases, 38.9%), Clarithromycin (37 cases, 16.4%), and Amoxicillin (36 cases, 15.9%). Quantities dispensed varied, with >5 tablets provided in 146 cases (64.6%). Symptomatic treatment was offered in 217 cases (96.0%), with Panadol being the most frequently dispensed (136 cases, 60.2%). Antivirals, like Acyclovir, were dispensed in only 6 cases (2.7%). Frequently demanded antibiotics for viral infections in 91 cases (40.3%), and 215 (95.1%) pharmacies believed antibiotics were effective against viral infections. Usage instructions were provided in 206 cases (91.2%), yet the overall awareness of proper antibiotic dispensing was rated as poor in 205 cases (90.7%). A detailed description given in the table 3 below.

Table 3. Dispensing characteristics

Dispensing characteristics		**Frequency (n)**	**Percentage (%)**
Were we asked for prescription	Yes	106	46.9
	No	120	53.1
Asked for medical history	Yes	48	21.2

	No	178	78.8
Asked for lab reports	Yes	3	1.3
	No	223	98.7
Did they recognize Infection being bacterial or viral	Yes	1	0.4
	No	225	99.6
Antibiotics dispensed	Yes	225	99.6
	No	1	0.4
Which antibiotics was dispensed for viral infection	Amoxicillin	36	15.9
	Cephalosporin	14	6.2
	Ciprofloxacin	10	4.4
	Clarithromycin	37	16.4
	Azithromycin	88	38.9
	Tetracycline	4	1.8
	Levofloxacin	17	7.5
	Co-Amoxiclav	18	8.0
	Vibramycin	1	0.4
	Did not dispensed	1	0.4
Quantity dispensed	1-2 Tabs	1	4
	2-5 Tabs	78	34.5
	>5 Tabs	146	64.6
	Zero Tabs	1	0.4
Symptomatic treatment	Yes	217	96.0
	No	9	4.0
Panadol	Yes	136	60.2
	No	90	39.8
Pulmonol	Yes	40	17.7
	No	186	82.3
Rigix	Yes	55	24.8
	No	170	75.2
Betamethasone	Yes	13	5.8
	No	213	94.2
Artifen	Yes	3	1.3
	No	223	98.7

Ibuprofen	Yes	18	8.0
	No	208	92.0
Provas N forte	Yes	7	3.1
	No	219	96.9
Arinac forte	Yes	10	4.4
	No	216	95.6
Salbutamol	Yes	1	0.4
	No	225	99.6
Nuberol forte	Yes	8	3.5
	No	218	96.5
Montelokast	Yes	15	6.6
	No	211	93.4
Rhinosone	Yes	5	2.2
	No	221	97.8
Nimesulide	Yes	29	12.8
	No	197	87.2
Acefyl	Yes	31	13.7
	No	195	86.3
Loratadine	Yes	8	3.5
	No	218	96.5
Siroline	Yes	13	5.8
	No	213	94.2
Doxyfylline	Yes	3	1.3
	No	223	98.7
Piroxicam	Yes	3	1.3
	No	223	98.7
Cefoparazone Sodium+Salbactum Sodium	Yes	3	1.3
	No	223	98.7
Strepsils	Yes	8	3.5
	No	218	96.5
Which antiviral dispensed	Acyclovir	6	2.7
	Did not dispensed	220	97.3
Clients demanding antibiotics for	Frequently	91	40.3

viral infections	Occasionally	130	57.5
	Rarely	5	2.2
Did they believe antibiotics are effective against viral infections	Yes	215	95.1
	Un sure	11	4.9
Did they provide any usage instructions	Yes	206	91.2
	No	20	8.8
Overall awareness of dispensing of antibiotics	Average	19	8.4
	Moderate	2	0.9
	Poor	205	90.7

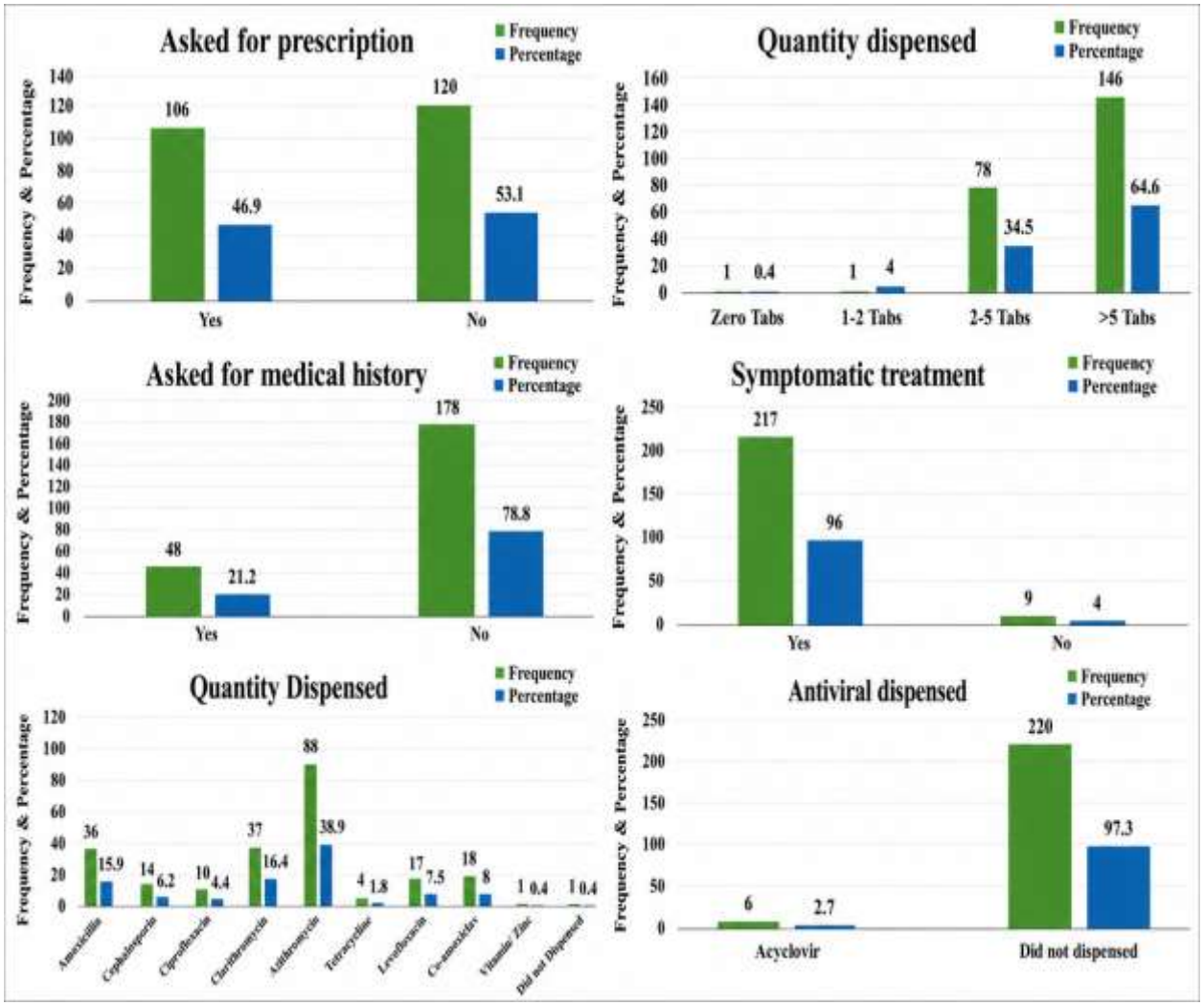


Figure 3. Displaying results of dispensing characteristics

Cross Tabulation

Dispensing Practices against Study Settings

The comparison between dispensing variables and type of pharmacies gives detailed insight. Community and hospital pharmacies were more likely to require prescriptions before dispensing medications, with 18 and 13 cases, respectively, compared to medical stores, which required prescription in 75 cases. Similarly, community pharmacies checked medical history more frequently (15 cases) than hospitals (4 cases), while medical stores only performed checks in 29 cases, leaving the majority

(144 cases) unchecked. Requests for lab reports were minimal across all types, with just one request in community pharmacies, none in hospitals, and two in medical stores. Antibiotics were almost universally dispensed, with medical stores dispensing the highest number (172 cases) compared to 32 in community and 21 in hospital pharmacies. Among antibiotics, Azithromycin was the most commonly dispensed, particularly in medical stores (67 cases), while community and hospital pharmacies dispensed a narrower range, reflecting stricter dispensing practices. Medical stores also stood out for dispensing larger quantities of medications, with 110 cases involving more than five tablets, compared to 23 in community and 13 in hospital pharmacies. Over-the-counter medications, such as Panadol, were most frequently dispensed in medical stores (104 cases) compared to community pharmacies (20 cases) and hospitals (12 cases). Furthermore, medical stores showed a broader and less selective approach in dispensing medications like Pulmonal and Rigix.

A major concern was the high frequency of clients in medical stores demanding antibiotics for viral infections (75 cases), compared to 11 cases in community pharmacies and 5 in hospitals. This correlates with a widespread misconception about the effectiveness of antibiotics against viral infections, particularly in medical stores, where 164 cases demonstrated this belief. Usage instructions were more consistently provided by community (28 cases) and hospital pharmacies (21 cases) than by medical stores (157 cases), where they were often inconsistent. Regarding viral infections, medical stores reported higher cases of influenza (36) and the common cold (30), while community pharmacies managed more cases of viral pneumonia (9). These findings highlight significant disparities in dispensing practices across pharmacy types. Community and hospital pharmacies exhibited better adherence to prescription protocols and patient education, while medical stores displayed more lenient and less regulated practices, emphasizing the urgent need for stricter oversight, better training, and public education to ensure the safe and effective use of medications. A detailed description is given in the table 4 below.

Table 4. Dispensing practices verses study settings

Dispensing variables		**Type of pharmacy**		
		Community	**Hospital**	**Medical store**
Asked for Prescription	Yes	18	13	75
	No	14	8	98
Medical history	Yes	15	4	29
	No	17	17	144
Did they asked for lab report	Yes	1	0	2
	No	31	21	171
Infection being bacterial or viral	Yes	0	0	1
	No	32	21	172
Antibiotic Dispense	Yes	32	21	172
	No	0	0	1
Types of antibiotic	Amoxicillin	2	1	33
	Cephalosporin	4	0	10

	Ciprofloxacin	0	1	9
	Clarithromycin	9	5	23
	Azithromycin	11	10	67
	Tetracycline	0	0	4
	Levofloxacin	3	2	12
	Co Amoxiclav	3	2	13
	Vibramycin	0	0	1
	did not dispensed	0	0	1
Quantity dispensed	1-2 Tabs	0	0	1
	2-5 Tabs	9	8	61
	More than 5	23	13	110
	0	0	0	1
Panadol	Yes	20	12	104
	No	12	9	69
Pulmonol	Yes	5	6	29
	No	27	15	144
Rigix	Yes	8	2	46
	No	24	19	127
Betamethasone	Yes	3	2	8
	No	29	19	165
Artifen	Yes	1	0	2
	No	31	21	171
Ibuprofen	Yes	0	3	15
	No	32	18	158
Provas N Forte	Yes	3	0	4
	No	29	21	169
Arinac Forte	Yes	2	0	8
	No	30	21	165
Salbutamol	Yes	0	0	1
	No	32	21	172
Nuberol Forte	Yes	0	0	8
	No	32	21	165
Montilokast	Yes	1	6	8

	No	31	15	165
Rhinosone Drop	Yes	0	1	4
	No	32	20	169
Nimesulide	Yes	0	3	26
	No	32	18	147
Acefyl	Yes	5	4	22
	No	27	17	151
Loratadine	Yes	1	1	6
	No	31	20	167
Siroline	Yes	2	1	10
	No	30	20	163
Doxyfylline	Yes	0	1	2
	No	32	20	171
Piroxicam	Yes	2	0	1
	No	30	21	172
Cefoperazone Sodium+Salbactum Sodium	Yes	0	0	3
	No	32	21	170
Strepsils	Yes	1	0	7
	No	31	21	166
Dispensed any Antiviral	Acyclovir	6	0	0
	Did Not Dispensed	26	21	173
Clients demanding antibiotic for viral infection	Frequently	11	5	75
	Occasionally	21	16	93
	Rarely	0	0	5
Antibiotics are effective against viral infection	Yes	32	19	164
	Unsure	0	2	9
Provide any usage instructions	Yes	28	21	157
	No	4	0	16
Viral Infections	Influenza (Flu)	1	3	36
	Pharyngitis	3	1	19
	Sinus Infection	5	2	13
	Common Cold	5	3	30
	Covid 19	1	1	2

	Dengue Fever	1	0	9
	Viral Pneumonia	9	1	16
	Bronchitis	4	7	23
	Tonsillitis	3	3	25

Dispensing Practice Against the person who dispense

While comparing dispensing variables with who dispense, 68 dispensers had inquired about prescription while this number is 12 in case of pharmacist, 6 in case of technicians and 5 salesmen. Regarding medical history inquiries, Pharmacists had asked for medical history in 11 cases, followed by dispensers in 28, salesmen in 9, and technicians in none. Lab report requests were extremely rare, with only three occurrences, all involving salesmen. Infection identification, whether bacterial or viral, was addressed by only one dispenser, while other providers did not inquire about it. Antibiotics were dispensed in nearly all cases, with Azithromycin being the most commonly dispensed (46 cases by dispensers and 34 by salesmen), highlighting a tendency to overuse antibiotics. When it came to the quantity of medications dispensed, dispensers mostly provided more than five tablets (77 cases), with fewer instances of dispensing smaller quantities.

Symptomatic treatments such as Panadol (69 cases by dispensers) were also commonly co-dispensed, alongside other drugs like Pulmonal and Rigix. A significant issue observed was the low awareness regarding the effectiveness of antibiotics against viral infections, with dispensers (118 cases) and salesmen (69 cases) most often incorrectly believing antibiotics could treat viral infections. Additionally, the provision of usage instructions was inconsistent, with only a few cases where instructions were provided, particularly by salesmen and technicians. Viral infections like influenza and bronchitis were the most commonly encountered conditions, but overall, the data revealed substantial gaps in dispensing practices, especially in the improper dispensing of antibiotics and lack of proper medical assessments, underscoring the need for better training, regulation, and adherence to medical guidelines in pharmaceutical settings. A detailed description is given in the table 5 below;

Table 5. Dispensing Practices versus who Dispense

Dispensing variables		**Who Dispense**			
		Pharmacist	**Dispenser**	**Sales man**	**Technician**
Asked for Prescription	Yes	12	68	20	6
	No	3	58	52	7
Medical history	Yes	11	28	9	0
	No	4	98	63	13
did they asked for lab report	Yes	0	0	3	0
	No	15	126	69	13

infection being bacterial or viral	Yes	0	1	0	0
	No	15	125	72	13
Antibiotic Dispense	Yes	15	125	72	13
	No	0	1	0	0
Types of antibiotics	Amoxicillin	0	30	5	1
	Cephalosporin	1	8	5	0
	Ciprofloxacin	0	7	2	1
	Clarithromycin	5	13	17	2
	Azithromycin	4	46	34	4
	Tetracycline	0	4	0	0
	Levofloxacin	2	11	4	0
	Co Amoxiclav	3	5	5	5
	Vibramycin	0	1	0	0
	Did not dispensed	0	1	0	0
Quantity dispensed	1-2 Tabs	0	0	1	0
	2-5 Tabs	6	48	20	4
	More than 5	9	77	51	9
	0	0	1	0	0
Dispensed any others drugs for symptomatic treatment	Yes	14	119	71	13
	No	1	7	1	0
Panadol	Yes	10	69	47	10
	No	5	57	25	3
Pulmonol	Yes	1	27	10	2
	No	14	99	62	11
Rigix	Yes	5	30	18	3

	No	10	96	54	10
Betamethasone	Yes	1	8	4	0
	No	14	118	68	13
Artifen	Yes	0	2	1	0
	No	15	124	71	13
Ibuprofen	Yes	0	9	5	4
	No	15	117	67	9
Provas N forte	Yes	1	2	4	0
	No	14	124	68	13
Arinac forte	Yes	0	7	2	1
	No	15	119	70	12
Salbutamol	Yes	0	0	1	0
	No	15	126	71	13
Nuberol forte	Yes	0	6	2	0
	No	15	120	70	13
Montilokast	Yes	1	5	9	0
	No	14	121	63	13
Rhinosone drop	Yes	1	3	1	0
	No	14	123	71	13
Nimesulide	Yes	0	14	13	2
	No	15	112	59	11
Acefyl	Yes	3	14	13	1
	No	12	112	59	12
Loratadine	yes	0	6	2	0
	No	15	120	70	13

Siroline	Yes	1	5	7	0
	No	14	121	65	13
Doxyfylline	Yes	1	0	2	0
	No	14	126	70	13
Piroxicam	Yes	0	0	3	0
	No	15	126	69	13
Cefoperazne sodium+salbactum sodium	Yes	0	1	2	0
	No	15	125	70	13
Strepsils	Yes	1	2	5	0
	No	14	124	67	13
Dispensed any Antiviral	Acyclovir	5	0	1	0
	Did not dispensed	10	126	71	13
clients demanding antibiotic for viral infection	Frequently	3	50	34	4
	Occasionally	12	72	37	9
	Rarely	0	4	1	0
antibiotics are effective against viral infection	Yes	15	118	69	13
	Unsure	0	8	3	0
Provide any usage instructions	Yes	14	117	63	12
	No	1	9	9	1
Viral infections	Influenza (Flu)	1	23	12	4
	Pharyngitis	1	12	10	0
	Sinus Infection	3	7	8	2
	Common Cold	1	23	11	3
	Covid 19	0	4	0	0
	Dengue fever	0	8	2	0

	viral pneumonia	5	14	6	1
	Bronchitis	2	19	12	1
	Tonsillitis	2	16	11	2

DISCUSSION

A descriptive cross-sectional study using a simulated client approach was conducted to assess the dispensing practices of antibiotics for viral infections in 226 registered pharmacies and medical stores in the three districts of AJK including Mirpur, Bhimber, and Kotli. The results of this study revealed that a large proportion of providers lack knowledge about the appropriate dispensing of antibiotics for viral infections. Similarly, a cross-sectional study conducted in Vietnam revealed that the inappropriate dispensing of antibiotics for self-limiting viral infections remains prevalent in private pharmacies. This common practice in Vietnam has been identified as a key contributor to the country's high rates of antimicrobial resistance (AMR). Both contexts underscore the misuse of antibiotics (Zawahir *et al*., 2022). In present study, medical stores were the least likely to follow proper practices, with only **43.4% asking for prescriptions,** compared to **56.3% in community pharmacies**. A similar study was conducted in a **Thailand,** where medical stores had the highest rates of inappropriate antibiotic dispensing. In contrast, hospital pharmacies in Thailand followed stricter rules and better dispensing practices (Siltrakool, 2018). These findings show that medical stores often have weaker controls, which leads to the misuse of antibiotics. Similarly, a study conducted in **Hazara, Pakistan**, reported that rural retail medical stores had significantly higher rates of non-prescription antibiotic dispensing compared to urban pharmacies, reflecting a similar pattern to the one observed in this research (Ahmad *et al.*, 2022).

In this cross-sectional study, influenza (17.7%) and the common cold (16.8%) were the most frequently managed conditions, followed by bronchitis (15%) and tonsillitis (13.7%). Comparatively, a study conducted in Egypt highlighted respiratory tract infections, including influenza and the common cold, as leading reasons for antibiotic dispensing. However, the Egyptian study reported that 70% of prescriptions for these conditions were deemed appropriate (Sabry *et al.*, 2014). In contrast, our findings indicate a significant proportion of inappropriate antibiotic use, particularly in cases of viral infections like the common cold and influenza. In the present study, **53.1% of pharmacies did not ask for prescriptions**, and an overwhelming **99.6% dispensed antibiotics**, with **Azithromycin (38.9%)** being the most commonly provided. Alarmingly, only **0.4% of pharmacies correctly identified infections as bacterial or viral**, highlighting a significant gap in diagnostic practices. Similar issues were observed in **Guangzhou, China,** where **63.1% of antibiotics were dispensed without prescriptions**, and broad-spectrum antibiotics such as **Azithromycin (39%)** and **Amoxicillin (44.1%)** were frequently dispensed (Kuang et al., 2020). Another study was conducted in Nigeria found widespread misuse of antibiotics by both consumers and pharmacists (Huneif et al., 2022), with over-the-counter antibiotics easily accessible to the public (Mahnashi et al.). This highlights that inappropriate antibiotic dispensing is a global problem caused by weak regulatory enforcement and insufficient pharmacist training, which increases the risk of antimicrobial resistance (Alkhaldi *et al.,* 2021). In this study, more than **64.6% of antibiotics were given in quantities of more than five tablets**, and **91.2% of cases included usage instructions** (Waheed et al., 2022), showing some effort by pharmacies to guide patients. However, overall awareness about proper antibiotic use was poor in **90.7% of cases**, pointing to big gaps in knowledge and practices (Ahmad et al., 2019).

Similarly, a study in **Saudi Arabia** found that only **5% of pharmacists managed infections effectively,** and most failed to give proper advice or instructions, leading to poor medication use by patients (Alnezary *et al.*, 2024). In this study, 95.1% of pharmacies believed that antibiotics work against viral infections, showing a common misunderstanding (Shahzadi et al., 2023). Similarly, in Vietnam, antibiotics were wrongly given for 92% of viral infections due to customer requests and a lack of knowledge among pharmacists (Zawahir *et al*., 2022). Another study in Bangladesh, found that rural children were 60% more likely to receive antibiotics for respiratory infections, also showing false beliefs about antibiotics being effective for viral illnesses (Hassan *et al.*, 2021).

CONCLUSION

The results & findings of this study achieved those significant gaps in the dispensing practices of antibiotics in pharmacies and medical stores across Mirpur, Bhimber, and Kotli districts in AJK. A majority of pharmacies were found to have dispensed antibiotics for viral infections without proper prescriptions, medical history, or lab report verification. Alarmingly, 99.6% of the settings had dispensed antibiotics, with Azithromycin being the most frequently provided. Furthermore, misconceptions regarding the effectiveness of antibiotics against viral infections were prevalent, with 95.1% of respondents believing that antibiotics were effective for such conditions. Based on finding of the study the overall awareness of proper antibiotic dispensing was rated as poor in 90.7% of cases. These practices contributed to the misuse of antibiotics and were likely to exacerbate the global challenge of antimicrobial resistance (AMR).

FUTURE RECOMMENDATIONS

Based on the findings of this study, several recommendations can be made to address the inappropriate dispensing practices of antibiotics in pharmacies and medical stores. Firstly, there is a critical need for stricter enforcement of prescription-only policies to prevent the sale of antibiotics without valid prescriptions. Regulatory authorities must conduct regular inspections and penalize non-compliance. Secondly, ensuring the presence of qualified pharmacists in all pharmacies is essential to improve oversight and promote responsible dispensing practices. Additionally, training and educational programs should be implemented for dispensers, sales staff, and technicians to enhance their knowledge about proper antibiotic use and the dangers of misuse, including antimicrobial resistance (AMR). Public awareness campaigns are also vital to educate individuals on the ineffectiveness of antibiotics against viral infections and the risks of self-medication. Lastly, ongoing research and monitoring of antibiotic dispensing patterns should be prioritized to assess progress and identify areas for further improvement. Collaborative efforts among healthcare authorities, pharmacy management, and public health organizations are necessary to tackle these challenges effectively and curb the rising threat of AMR.

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CONFLICT OF INTEREST

All authors have NO CONFLICT OF INTEREST in publication of this research work.

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