

# A Questionnaire Based Survey Among Community Pharmacy Personnel to Evaluate the Level of Knowledge Towards Antimicrobial Prescriptions and Adverse Drug Reactions

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## Abstract:

### Introduction:

Antibiotics, which have revolutionized medicine and saved millions of lives worldwide, are losing their efficacy because of the rapid emergence of antimicrobial resistance (AMR). Moreover, growing rates of AMR are now increasing morbidity, mortality, and costs. Rational use of medicines is essential as it ensures patient safety, optimizes therapeutic outcomes, prevents the development of drug-related problems, and reduces the overall cost of healthcare. The role of the pharmacist has a great potential to promote the proper use of antibiotics in the community, as they have the ability for effective and rational prescribing.

**Objective:** To conduct a questionnaire based survey among Community pharmacists to evaluate the level of knowledge and antimicrobial prescriptions and adverse drug reactions in community pharmacies located in Coimbatore.

**Method:** A cross-sectional study was conducted by distributing a self-administered questionnaire among community pharmacists in Coimbatore. A convenience sample of 113 community pharmacies who gave their written consent were surveyed.

**Results:** A total number of 150 community pharmacies were visited of which only 113 pharmacies provided their written consent and agreed for the survey. The entire study population included 75% of male and 25% of female. Qualified community pharmacists running a community pharmacy was very low, only 20 pharmacies out of 113 pharmacies were run by pharmacist. Graduates with other UG and PG degrees are running the pharmacies on high proportion. Non-Pharmacy professionals were found on a high ratio even people with secondary and higher secondary education are running the pharmacies. About 12 community pharmacy personnel had knowledge on ADR, only 10 had knowledge on Pharmacovigilance and 60 of them came across antibiotic induced ADR. Only 5 of the community pharmacy personnel had reported ADR and 7 of them had knowledge on AMC. Even though, pharmacists felt ADR monitoring is very much essential and were willing to report, they are unaware about the National Pharmacovigilance Program of India and their initiatives towards reporting ADR's by healthcare professionals.

**Keywords:** Community Pharmacists, Antimicrobials, Adverse drug reactions

## INTRODUCTION

India is a developing nation that is home to over 142 crore people. Rapidly growing, the country accounts for 2.4% of the world's surface but is home to 16.7% of the world's population. Throughout its 28 states and 7 union territories, 22 national languages have been recognized and upwards of 400 mother tongues and 800 different dialects is in common use. The genesis of community pharmacy practice in India can be traced back to British India when allopathic drugs were introduced and were made available through drug stores towards the end of the nineteenth century. During the colonial period, the pharmacy vocation remained business oriented and those trained to sell drugs were called drug sellers or sometimes dispensers. The pharmacy practice scenario and especially community pharmacy practice during pre-independence era was highly unregulated and there were no restrictions on the practice of pharmacy in India. The practice of prescribing and dispensing was normally a function performed by doctors<sup>1</sup>. In addition, most doctors trained their clinic assistants to dispense medicines and assist in the compounding of medicinal preparations. The assistants were popularly known as "compounders", whose status, functions and duties were ill defined and improperly understood.

A community pharmacy, often referred to as retail pharmacy or retail drug outlets, is places where medicines are stored and dispensed, supplied or sold. The general population usually calls community pharmacies "medical stores." Pharmacists working in the community practice setting are either diploma pharmacists or graduate pharmacists with B. Pharm degrees. Throughout this paper the word "Pharmacist" has been used to describe both types. Pharmacists are registered under the clause (i) and section (ii) of the Pharmacy Act 1948, and their presence is legally required during the dispensing and selling of medicines according to Rule 65(15) of the Drugs and Cosmetics Rules 1945<sup>2</sup>.

The Drugs & Cosmetic Act/Rules provides for two categories of sale licenses (Retail and Wholesale) for supply chain management. Every retail sale licensee or pharmacy is required to have the services of a 'registered pharmacist' who may be the owner or employee of the pharmacy/licensee. 'Registered pharmacists' are governed under the provisions of the 'Pharmacy Act', 1948 as far as their qualifications and registration as a 'pharmacist' is concerned. In India, a license for retail pharmacies is given to people with a diploma or degree in pharmacy. Indian drug laws categorize certain drugs as Scheduled G, H, H-1 and X drugs which cannot be dispensed without the prescription of a 'Registered Medical Practitioner' (Rule 65). There is no list of medicines defined like 'OTC drugs' under Indian law. However, antibiotics are clearly defined as prescription drugs under Schedule H and H1. Therefore, the dispensing of antibiotics by a pharmacist to a customer/patient without a valid prescription or on his/her advice is illegal and generally termed as an OTC sale of antibiotics<sup>3</sup>. It is a common practice that retail pharmacies employ some sales people who may not be trained in pharmacy (informal dispensers) to run the store and dispense medications. All these pharmacies are private pharmacies and no medicine is available for free. Patients visit these pharmacies to purchase medication directly and avoid visiting a professionally trained doctor to save time and money.

The role of pharmacists in proving their significant value in the community and their possible interventions as first-line healthcare professionals, who are known to be easy to-approach by the patients. A qualitative study showed that pharmacists perceived themselves as "antibiotic gatekeepers", stating that the promotion of rational use of antibiotics is essential in their jobs hence, they have the ability to make an impact. Many elements, such as the tendency towards self-medication in many countries, contribute directly to the misuse of antimicrobial agents. Some are related to the wrong prescribing behaviors of physicians, which also might be due to several reasons and factors, such as the

pressure added by the community and/or the patients. Because they are expecting a treatment, physicians may prescribe the antibiotic to meet patient expectations<sup>4</sup>. The role of the pharmacist has a great potential to promote the proper use of antibiotics in the community, as they have the ability for effective and rational prescribing. The pharmacist's role is vital in providing knowledge and advising patients about the importance of the recommended treatment regimens.

Self-medication practices and the purchase of antibiotics without prescription, especially in low-income countries, contribute to inappropriate use of antibiotics. Globally, 62% of antibiotics dispensed in community pharmacy do not have a prescription. Dispensing antibiotics without prescription for the treatment of minor/common illnesses that typically do not require antibiotic therapy (such as upper respiratory tract infection and diarrhea) is associated with inappropriate use and sub-therapeutic dosing, which could lead to microbial resistance. Community pharmacists dispense antibiotics without a prescription for several reasons including lack of awareness about its prohibition, patient pressure, complacency and fear of losing clients<sup>5</sup>.

Rational use of medicines is essential as it ensures patient safety, optimizes therapeutic outcomes, prevents the development of drug-related problems, and reduces the overall cost of healthcare. The World Health Organization (WHO) defines rational use of medication as the provision of "right medicine to the right patient, in the right dose, for the right duration of time, at the most economical cost to the patients and their community". According to the WHO, it is estimated that over half of all medicines are not properly prescribed, dispensed, or taken, leading to adverse patient outcomes. Irrational use of medications has become a global problem. This problem includes practices such as prescribing medications by brand names, polypharmacy, overprescribing of antibiotics, and excessive use of injections among others. Periodic assessment of prescribing and dispensing practices helps in checking and improving upon these practices. In addition, this assessment can help in providing feedback to the healthcare providers, leading to more appropriate and effective medication use.

Antibiotics are some of the major contributors to drug hypersensitivity and represent the most frequently used drugs in hospital practice. Although spontaneous reporting is, among the several different methods that can be used to detect ADRs, the only surveillance system capable of routinely monitoring these events, it alone cannot provide sufficient guarantee that a particular adverse event is a true ADR. Therefore, this approach has to be integrated with other procedures using retrospective data based on clinical trials and medical reports, in order to define ADRs which are either not time-related or associated with chronic drug administration<sup>6</sup>. In clinical trials, medications are typically tested on a small number of patients for a short period of time in a controlled environment. The drug's safety profile with various co-morbid conditions and unique populations has not been fully established with various co-morbid diseases and distinct populations. The elderly, the very young, and patients with co-morbidities are occasionally excluded from these trials, even though the approval procedure includes comprehensive safety assessment. Those using various medications as well as those with impaired liver and kidney function are frequently excluded. Any potential ADRs in this patient cohort won't be caught when they are monitored during research investigations. Clinicians have a very tough time predicting patients' prescription behaviour.

Community pharmacists are better suited to report adverse events to Pharmacovigilance programmes because they have a greater understanding of patient needs, their struggles with medications, and their professional qualifications. Several research findings indicate that personal barriers to reporting and a

lack of knowledge about where to report and how to disclose can be addressed via ongoing education and motivation<sup>7</sup>.

### **AIM OF THE STUDY:**

To conduct a questionnaire based survey among Community pharmacists to evaluate the level of knowledge towards antimicrobial prescriptions and adverse drug reactions.

### **OBJECTIVES OF THE STUDY:**

**Primary Objective:** The primary objective of the study is to assess the knowledge of pharmacists practicing in the community about antimicrobial resistance and their awareness and understanding in pharmacotherapy of diseases.

**Secondary Objective:** The secondary objective is to assess the confidence of practicing pharmacists on the information about adverse drug reactions.

### **METHODOLOGY**

#### **Study design**

A cross-sectional study was conducted by distributing a self-administered questionnaire among community pharmacy personnel in Coimbatore.

#### **Consent from the Pharmacists**

A written consent was obtained from the Community Pharmacy personnel after explaining the need of the study and their importance in public health. It was ensured that any data collected are used only to conduct the research and any data collected is treated confidentially.

#### **Study population**

The study population included community pharmacy personnel of the study site and the data was collected by convenience sampling. The calculated sample size was 150 of which only 113 responded.

#### **Data collection**

Responses were collected by previously validated survey questionnaire which were divided into sections: Demographics including the area of practice, Knowledge of antibiotic resistance, Knowledge of appropriate antibiotic therapy, Training in Antibiotic resistance and awareness about adverse drug reactions.

#### **Validation of the questionnaire**

Two academics and field experts were invited to review the structure and content validity of the questionnaire. A pilot study was conducted among pharmacists, a total of n=113 participants were included.

#### **Inclusion Criteria**

Community Pharmacists practicing in the study site and not less than 5 years of experience in Pharmaceutical product selling.

#### **Exclusion Criteria**

Hospital Pharmacists and Pharmacists who are in the market less than 5 years and who have not registered in the state pharmacy council were excluded.

### **METHOD:**

A cross sectional study was conducted by distributing a self administered questionnaire among commun-

unity pharmacies in Coimbatore. The questionnaire was validated by academics and field experts. A pilot study was conducted for a period of ten days to know the problems encountered during the study. After adequate analysis of the pilot study, required modifications were incorporated. Pilot study was conducted in 17 pharmacies and the results of the study was analysed. A written consent was obtained from the community pharmacy personnel along with the seal of the pharmacy. An information form was given along with the consent form and questionnaire. The community pharmacy personnel was asked to fill the questionnaire after providing a detailed information about the study.

The questionnaire contains various sections details of the community pharmacy personnel, demographics of the area of practice, data on prescriptions dispensed at the community pharmacy, community pharmacy personnel knowledge on antibiotics dispensing, response to side effect or adverse reaction and knowledge on ADR.

Data on community pharmacy personnel include the age, gender, qualification and experience of the personnel in the community pharmacy. Qualification of the personnel is required to know whether the personnel is a community pharmacist or some other graduate with community pharmacy work experience. Experience of the personnel is needed for the exclusion criteria since community pharmacy personnel with less than 5 years of experience are excluded from the study. Demographics of the area of practice of the community pharmacy investigates whether the pharmacy's geographical location (rural or urban) and the category of the community pharmacy (independent or chain pharmacy). Data on prescriptions dispensed at the community pharmacy includes the average number of prescriptions dispensed every day, number of prescriptions received with antibiotics and whether the patients purchase antibiotics in the prescribed quantity.

Antimicrobial resistance (AMR) is a critical public health problem, which can shake the foundation of modern health-care. Infections caused by drug-resistant organisms could lead to increased mortality and prolonged duration of hospitalization, causing a huge financial burden to the affected persons, health-care systems, and hinder the goals of sustainable development. With this note community pharmacy personnel knowledge on antibiotics dispensing was assessed, this section incorporated the antibiotics commonly dispensed, information on the other drugs prescribed along with antibiotics. This section also contains questions related to AMR and the patients purchasing antibiotics on their own without consulting the physicians.

One of the most important role of a community pharmacist is patient counselling, Next section of the questionnaire that enquires the community pharmacy personnel on the response to side effects and the quality of patient counselling in the process of dispensing drugs.

The final section assesses the knowledge of the community pharmacy personnel on ADR, Pharmacovigilance, antibiotic induced ADR and ADR monitoring centres (AMC). About 150 community pharmacies in Coimbatore was visited and the data was collected from 113 community pharmacies who gave their written consent. Some pharmacies refused to give written consent such pharmacies were excluded from the study. Community pharmacy personnel who were not aware of the term AMR was educated about it and the importance of ADR reporting process along with the details of ADR Monitoring Centres were informed to them orally.

## RESULTS AND DISCUSSION

The study entitled "A questionnaire based survey among community pharmacy personnel to evaluate the level of knowledge and confidence towards antimicrobial prescriptions and adverse drug reactions" was



carried out in selected community Pharmacies in Coimbatore. The major aim of the study was to conduct a survey to evaluate the level of knowledge and confidence in the people working in community Pharmacy, towards antimicrobial prescriptions and adverse drug reactions. A pilot study for a period of ten days was conducted to know the problems encountered during the study. After adequate analysis of the pilot study, required modifications were incorporated. The study was carried out for a period of 6 months from October 2023 to March 2024. A total number of 150 community pharmacies were visited among which only 113 pharmacies provided their written consent and agreed for the survey.

Age of the community pharmacy personnel was analysed in which 34.51% of the community pharmacy personnel's were in the age group of 40-49, this observation contradicted from the study conducted by Randa N. Haddin et al(2019)<sup>8</sup> in which 43.33% of the community pharmacy personnel were in the age group of 26-31. The entire study population included 75% of male and 25% of female which is similar to the study conducted by Syed Wasif Gillani et al(2021)<sup>9</sup> where 70.9% were male and 29.1% were female.

After the enforcement of provisions of the Pharmacy Act 1948, pharmacists working in India must have a pharmacist registration certificate issued by the state in which they wish to practice. To obtain a registration certificate, the prospective pharmacist must acquire the minimum diploma (D. Pharm.) from a pharmacy institute that is recognized by the Pharmacy Council of India (PCI). Both D. Pharm. and B. Pharm. holders are allowed to practice in any sector of pharmacy<sup>10</sup>. Qualification of the community pharmacy personnel was surveyed which revealed disappointing results. Qualified community pharmacists running a community pharmacy was very low i.e only 20 pharmacies out of 113 pharmacies were run by pharmacist. Graduates with other UG and PG degrees are running the pharmacies on high proportion :Non-Pharmacy professionals were found on a high ratio and even people with secondary and higher secondary education are running the pharmacies. Pharmacists are registered under the clause (i) and section (ii) of the Pharmacy Act 1948, and their presence is legally required during the dispensing and selling of medicines according to Rule 65(15) of the Drugs and Cosmetics Rules 1945.

The survey indicated that in 28.31% community pharmacies the experience of the personnel was around 16 to 20 years , in 3.53% pharmacy the experience of the personnel was around 41 to 45 years and in 24.77% pharmacy the experience of the personnel was around 5 to 10 years.

Out of the pharmacies visited 88% were independent pharmacy and 12% were chain pharmacy. Among these 76% of the community pharmacy were located in urban area and 24% were located in rural area.

In 56.63% of the community pharmacies average number of prescriptions every day were around 16-20 prescriptions and in 2.65% pharmacy around 141-160 prescriptions were dispensed. The number of prescriptions with antibiotics range from 1-10 in 43.36% community pharmacies.

Study on whether patients purchase antibiotics as prescribed or not , the results revealed that, in 58% of Community pharmacies they have agreed that the prescribed regimen of antibiotics were purchased by the patients as prescribed whereas in 42% of pharmacies they disagreed the same. These findings are of particular public health relevance considering India reports high antibiotic resistance in bacteria that cause certain common infections. In turn, the emergence of antibiotic resistance fuels changes in consumption patterns, as more costly broad-spectrum antibiotics become required to manage even common conditions.

Since 58% of pharmacies it is informed that patients not purchasing antibiotics as prescribed by the physician the reason for the same was inquired. The reasons were increased cost(81%) ,cost + due to increased quantity of tablets(1%), cost + lack of knowledge(13%) and feeling of wellness(5%). These

reasons again proves the lack of knowledge among the patients about development of antimicrobial resistance.

Kopacz K et al<sup>11</sup> described in his article that Probiotics have been tested for a number of clinical uses such as the prevention of antibiotic-associated diarrhea (AAD). AAD has been the most indicated therapeutic use for probiotics. AAD is a common side effect of antibiotic usage, which affects up to 30% of patients. The hypothesis behind using probiotics for AAD is that they help normalize an unbalanced flora. With this background pre or probiotics prescribed with antibiotics were questioned in the community pharmacies and it was found that 87% of pharmacies responded that they could regularly see that pre-probiotics are prescribed along with antibiotics.

The study results on whether vitamin preparations are given along with antibiotics revealed that in 76% of community pharmacies it was accepted that along with antibiotics vitamin preparations are also prescribed. Max BL et al(2009)<sup>12</sup> discussed about the effect of vitamins on antibiotics which describes that studies have reported significant synergistic effect of some vitamins like vitamins A, B1, B2, B12, C, K, E, and D when used as adjunct treatment along other antibiotics even to resistant strains while others have reported that some vitamins including vitamins C and E can act independently on their own as effective antibiotic agents.

Jahye Kim et al(2023)<sup>13</sup> in his study reported that Concomitant administration of certain fluoroquinolone antimicrobials and nonsteroidal antiinflammatory agents (NSAIDs) induces serious convulsion in humans. As there were lot of reports that fluoroquinolone antibiotics should not be given along with analgesics as it may cause epilepsy in patients, an attempt was made to know the number of prescriptions containing these combinations. The study revealed that in 63% of community pharmacies it was mentioned that this combination is seen in the prescription received by them.

Survey questionnaire contains 3 questions for identifying the pattern of antibiotic dispensing in community pharmacies. Patients purchasing antibiotics without consulting doctor with old prescription was enquired in which 49.55% of community pharmacies 1-5 such prescriptions are dispensed every day.

Self-medication is a global phenomenon and potential contributor to human pathogen resistance to antibiotics. The adverse consequences of such practices should always be emphasized to the community and steps to curb it. Rampant irrational use of antimicrobials without medical guidance may result in greater probability of inappropriate, incorrect, or undue therapy, missed diagnosis, delays in appropriate treatment, pathogen resistance and increased morbidity, with this note number of patients purchasing antibiotics on their own without consulting doctors was questioned; in 69.91% of community pharmacies every day 1-5 patients purchase antibiotics on their own.

Non-prescription drugs such as somebody prescribing by mobile phones and social media are increasing day by day so number of patients purchasing non-prescription drugs were enquired and in about 80.53% of community pharmacies 1-5 patients purchase non-prescription drugs every day. In 63.71% of community pharmacies the community pharmacy personnel recommend antibiotics

Antibiotics commonly prescribed by the physicians were questioned to the community pharmacy personnel and about 19 antibiotics of 9 different categories were commonly prescribed. The 9 categories of drugs are penicillins, cephalosporins, fluoroquinolones, quinolones, fluoroquinolones+quinolones, fluoroquinolones+nitroimidazoles, macrolides, ansamycins and tetracyclines. Among which penicillins, cephalosporins, macrolides, quinolones and fluoroquinolones are highly prescribed drug categories.

Amoxicillin, amoxicillin+potassiumclavunate, cefixime, cepodoxime and ofloxacin are found to be the highly prescribed drugs.

Community pharmacy personnel knowledge on AMR was assessed and only 8% of community pharmacy personnel had knowledge on AMR and 97% community pharmacy personnel wanted that the patient to be educated about AMR.

Based on the definition created by the World Health Organization, an adverse drug reaction (ADR) is—a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modifications of physiological function. While up to 80% of ADRs are considered predictable and dependent on the administered dose, about 20% are dose independent and unpredictable. When any side effects are experienced by the patients all the community pharmacies advise the patients to go to doctor immediately. ADRs represent a common clinical problem and can be responsible for an increased number. 67.25% of the Community pharmacy personnel came across ADR. The way in which community pharmacy personnel respond to ADR was also examined and 79% of them reported that they would refer the patient to physician this result was similar to the study conducted by Mansour Adam Mahmud et al(2014)<sup>14</sup> in which he reported the same observation.

Patients often approach a pharmacist instead of visiting a doctor for minor ailments such as cough, cold, allergies, pain, fever, acidity, diarrhea, and skin-related conditions. Purchase of specific medicines over the counter is legally recognized in most countries. 'Over-the-Counter (OTC) Medicines' means drugs which are legally allowed to be sold by pharmacists without need for a prescription. The term does not have a legal definition in India. Technically, drugs are OTC unless they are specifically stated as prescription only drugs. OTC drugs allow faster and cheaper access to healthcare; however, their misuse and adverse health effects cause concerns. Thus community pharmacy personnel knowledge about counselling patients on ADR was assessed in which all the community pharmacy personnel reported that they ask about drug allergies, female patients whether they are pregnant or lactating before dispensing drugs to the patients. They also counsel patients about side effects, drug dosage and frequency while dispensing drugs. Mansour Adam Mahmud et al(2014)<sup>14</sup> also had similar reports in the study conducted in Saudi Arabia.

Community pharmacy personnel knowledge on ADR and ADR reporting process was assessed. 10.61% of community pharmacy personnel had knowledge on ADR, only 8.84% of them had knowledge on Pharmacovigilance this again proves the lack of awareness among community pharmacy personnel. 14.5% of community pharmacy personnel came across ADR, almost 53.42% of the community pharmacy personnel came across antibiotic induced ADR like diarrhoea, itching, redness. 93.80% of the community pharmacy personnel didn't have any knowledge on AMC and only 4.42% have reported ADR.

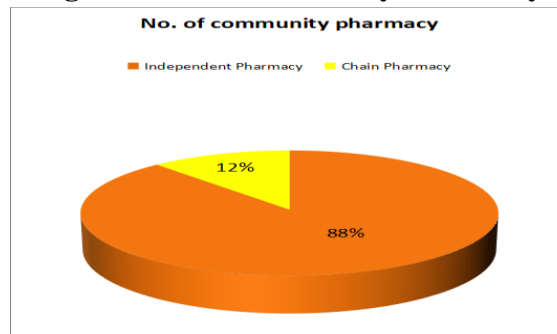
**Table 1: Experience of the community pharmacy personnel (n=113)**

<b>Experience of the community pharmacy personnel (years)</b>	<b>No. of staff</b>	<b>Percentage (%)</b>
5 to 10	28	24.77
11 to 15	12	10.61
16 to 20	32	28.31
21 to 25	13	11.50

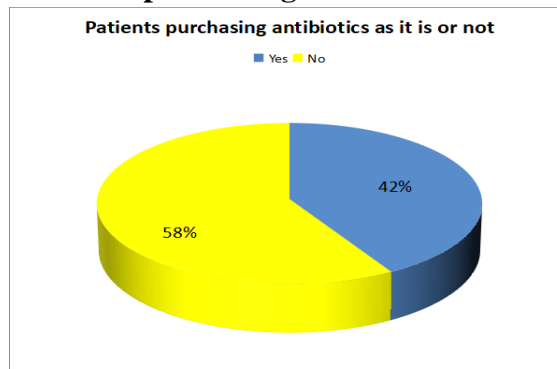


26 to 30	12	10.61
31 to 35	9	7.96
36 to 40	3	2.65
41 to 45	4	3.53

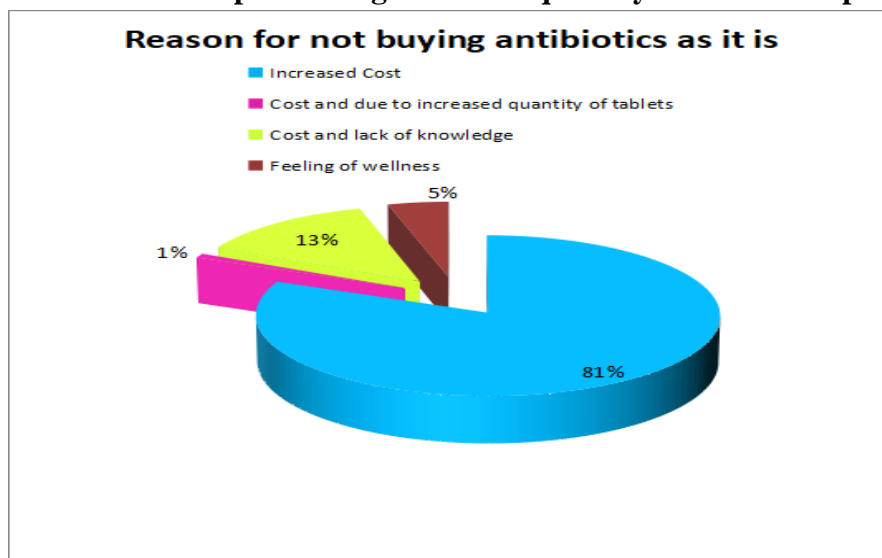
**Fig 1 Status of Community Pharmacy**



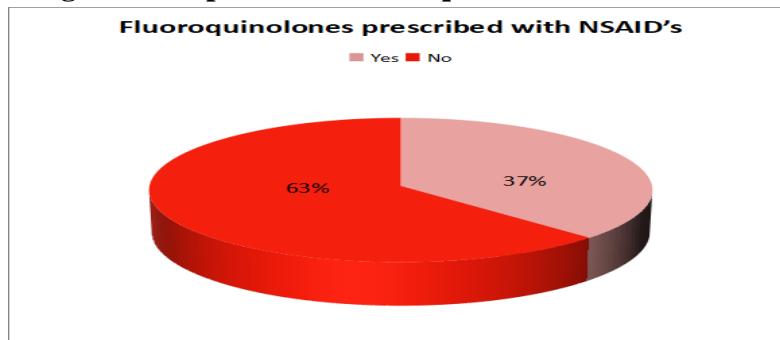
**Fig 2 Patients purchasing antibiotics as it is or not**



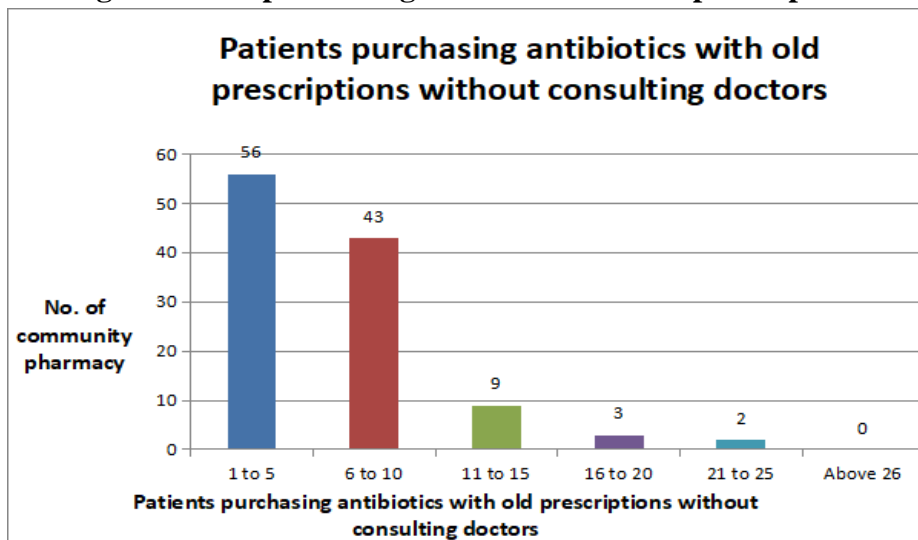
**Fig 3: Reason for not purchasing the entire quantity of antibiotics prescribed**



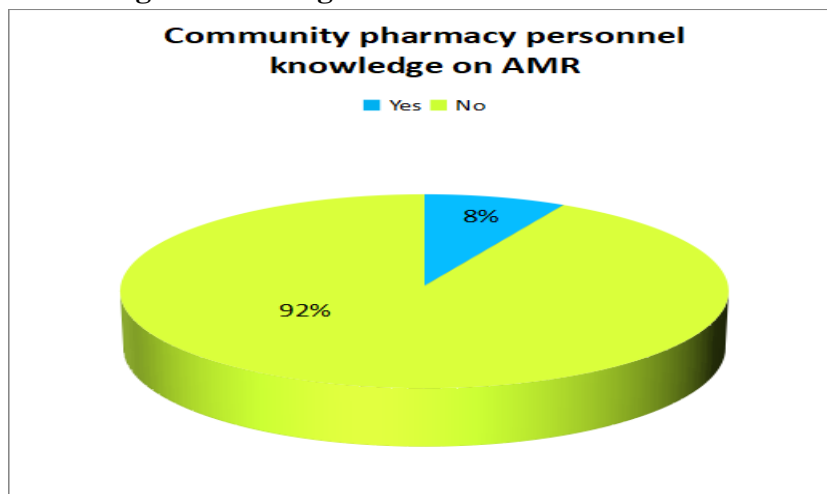
**Fig 4 Prescriptions with fluroquinolones with NSAIDs**



**Fig 5 Patients purchasing antibiotics with old prescriptions**



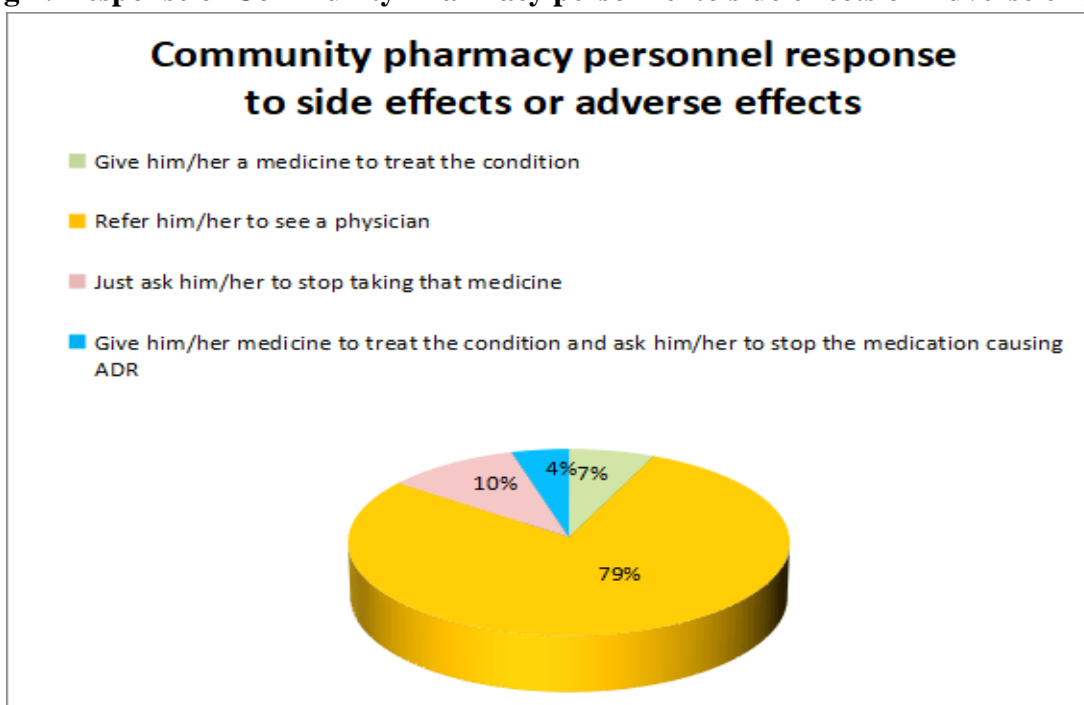
**Fig 6: Knowledge on Antimicrobial Resistance**



**Table 2: Community pharmacy personnel opinion on whether patients should be aware of AMR (n=113)**

Community pharmacy personnel opinion on whether patients should be aware of AMR	No. of community pharmacy	Percentage(%)
Yes	110	97
No	3	3

**Fig 7: Response of Community Pharmacy personnel to side effects or Adverse effects**



**Table 3 : Community pharmacy personnel knowledge on ADR (n=113)**

Question No.	Community pharmacy personnel knowledge on ADR	Yes	Percentage(%)	No	Percentage(%)
1.	Any idea on what is ADR?	12	10.61	101	89.38
2.	Anything you know about pharmacovigilance?	10	8.84	103	91.15
3.	Have you ever come across any ADR?	16	14.50	97	85.84
4.	Any report on antibiotic induced ADR(like diarrhoea/redness/itching)?	60	53.09	53	46.90
5.	Have you ever reported any ADR?	5	4.42	108	95.57
6.	Any idea about AMC?	7	6.19	106	93.80

**CONCLUSION**

The role of the pharmacist has a great potential to promote the proper use of antibiotics in the community, as they are barefoot doctors serving the community. The pharmacist’s role is vital in providing knowledge and advising patients about the importance of the recommended treatment

regimens. Indian pharmacists have a relatively better attitude towards ADR reporting. However, they have a limited knowledge and practice with regard to ADR reporting and pharmacovigilance. Even though, pharmacists felt ADR monitoring to be essential and were willing to report, they are unaware about the National Pharmacovigilance Program of India. They lacked knowledge about the location of the nearest ADR reporting centers. Lack of adequate number of ADR reporting centers was also a significant finding. This can be improved by creating awareness among the health care professionals and placing an ADR drop boxes in each ward and appreciating the reporters through thank you letters.

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