

Review Article

**Common Adverse Drug Reactions of Antibiotics and the Role of Pharmacovigilance in Patient Safety**

Pranav.V.Pawar*, Priya.S.Shinde, Prajakta.A.Shingade, Sheetal.S.Patil, Sampada.P.Deshmukh, Kiran.A.Junghare, Akanksha.B.Sapkal, Amruta.B.Bhagat
Yashoda Technical Campus, Faculty of Pharmacy, Satara, Dist-Satara, Maharashtra, India.

*Corresponding author's E-mail: pawarpranav2020@gmail.com

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ABSTRACT

When medications are taken at standard therapeutic dosages, they might cause adverse drug reactions (ADRs), which are dangerous and unexpected side effects. Due to their broad and perhaps inappropriate use, antibiotics are among the most regularly prescribed drugs and are frequently linked to a variety of adverse drug reactions (ADRs). The adverse drug reactions (ADRs) associated with widely used antibiotics such as amoxicillin, ceftriaxone, azithromycin, ciprofloxacin, and doxycycline are reviewed in this paper. Nausea, vomiting, diarrhea, allergic reactions, skin rashes, dizziness, photosensitivity, and superinfections are among the commonly reported adverse drug reactions (ADRs). In certain people, severe responses such as organ poisoning and anaphylaxis may also happen. Important causes of adverse drug reactions (ADRs) are also included in the study, including overdose, self-medication, polypharmacy, drug interactions, unfinished treatment courses, and patient-related factors like age, allergies, and pre-existing conditions. To gauge awareness of safe drug use and ADR reporting, a survey was also carried out. The results demonstrated that there is still a need for increased public awareness and education, even though many participants had a basic understanding of medication safety. The study comes to the conclusion that decreasing adverse drug reactions and enhancing healthcare outcomes require sensible antibiotic usage, appropriate patient counseling, active ADR reporting, and robust pharmacovigilance systems.

Keywords: Adverse Drug Reactions (ADRs), Antibiotics, Pharmacovigilance, Safe Drug Use, Antibiotic Resistance, Drug Safety, ADR Reporting, Rational Use of Medicines, Patient Awareness, Healthcare Monitoring.

INTRODUCTION

When medications are taken at standard therapeutic dosages for the prevention, diagnosis, or treatment of illnesses, adverse drug reactions (ADRs) might happen. Because ADRs can result in patient morbidity, extended hospital stays, higher healthcare expenses, and in extreme situations, mortality, they are regarded as a serious public health concern. Monitoring and avoiding adverse drug reactions (ADRs) has become a crucial component of contemporary healthcare systems due to the swift increase in medication use globally.^{1,2}

Due to their efficacy in treating bacterial infections and lowering infection-related consequences, antibiotics are among the most often prescribed drugs. Amoxicillin, Ceftriaxone, Azithromycin, Ciprofloxacin, and Doxycycline are among the frequently used antibiotics. These medications are essential for preventing infectious diseases and saving lives, but they are also often linked to a variety of negative side effects. Concerns about patient safety and antibiotic resistance have increased due to the growing and occasionally unjustified usage of antibiotics.^{3,4} Antibiotics can have minor to severe side effects. In addition to allergic reactions such as skin rashes, itching, and urticaria, common adverse drug reactions (ADRs) include gastrointestinal problems like nausea, vomiting, diarrhea, and stomach pain. Additionally, some antibiotics may result in injection site reactions, tendon damage, disorientation, and photosensitivity. Life-threatening illnesses like anaphylaxis, hepatotoxicity, nephrotoxicity, and superinfections can develop under extreme circumstances. Therapeutic results

and patient compliance may suffer as a result of these reactions.^{5,6}

ADRs are caused by a number of reasons. These include patient-related factors like age, gender, allergies, genetic variation, and current illnesses; drug-related factors like dosage, length of therapy, and pharmacological characteristics of medications; and external factors like polypharmacy, self-medication, irrational prescribing, and drug interactions. Antibiotic abuse and overuse not only raise the risk of adverse drug reactions (ADRs), but they also play a major role in the development of antimicrobial resistance, a major worldwide health concern.⁷

In order to ensure the safety of medications, pharmacovigilance the science of identifying, evaluating, comprehending, and preventing adverse drug reactions is essential. In order to improve patient care, healthcare professionals such as physicians, pharmacists, and nurses are in charge of keeping an eye on adverse drug reactions (ADRs), advising patients, and reporting drug-related issues. In order to reduce the hazards associated with medications, public knowledge of safe drug usage and ADR reporting is equally crucial.^{1,8} The purpose of this study is to examine the adverse drug reactions linked to widely used antibiotics, determine their causes and preventative strategies, and assess public knowledge of safe drug use and ADR reporting. In order to promote safer healthcare practices, the study also highlights the significance of patient education, sensible antibiotic use, and efficient pharmacovigilance systems.



MATERIAL AND METHODS

Study Design

The current study on adverse drug reactions (ADRs) linked to frequently used antibiotics and knowledge of safe drug usage was carried out as a review-based and survey-based investigation. Information from published works, pharmacology textbooks, pharmacovigilance standards, and survey answers from an online questionnaire were all gathered for the study.^{1,9}

Materials Used

Pharmacology textbooks, research publications, review papers, and official guidelines pertaining to adverse drug reactions (ADRs), antibiotics, and pharmacovigilance were among the materials used in this study. Information was gathered from published scientific publications, the World Health Organization (WHO), and the Pharmacovigilance Programme of India (PvPI).^{10,11} Based on their frequent clinical use and documented side effects, commonly used antibiotics such as amoxicillin, ceftriaxone, azithromycin, ciprofloxacin, and doxycycline were chosen for the study.^{9,12}

Google Forms was used to create an online survey questionnaire to gauge participants' knowledge of safe drug usage and ADR reporting.¹³ Data collection, literature study, graph and pie chart creation, and survey response analysis were all done on a PC with internet access. Additionally, a variety of online databases and web resources were used to collect pertinent data and references for the study.^{11,14}

Selection of Antibiotics

Commonly used antibiotics were selected for the study based on their frequent clinical use and reported adverse drug reactions. The selected antibiotics included: Amoxicillin, Ceftriaxone, Azithromycin, Ciprofloxacin, Doxycycline.^{9,15}

Data Collection Method

Textbooks, scholarly journals, pharmacovigilance reports, and official healthcare websites were among the secondary sources from which information about adverse medication reactions, causes, risk factors, and prevention strategies was gathered.^{11,12}

To assess participants' knowledge of safe drug use and ADR reporting, an online survey was administered using Google Forms.¹³ Demographic information, medication consumption habits, side effect experiences, actions following adverse drug reactions, and knowledge of pharmacovigilance and safe medication practices were all included in the questionnaire.^{9,12}

Survey Methodology

Participants received the survey electronically via web channels.¹³ Pie charts were used to collect and evaluate responses so that the data could be easily understood and interpreted.¹⁶ The primary focus of the poll was Frequent usage of medications, finishing the course of recommended medication, Adverse medication reaction experience,

Knowledge of responsible drug use, Knowledge of the Pharmacovigilance Programme of India (PvPI) and ADR reporting.^{10,11}

Data Analysis

Pie charts and percentage-based computations were used to arrange and evaluate the survey data.¹⁶ The results were analyzed to determine the participants' awareness of safe drug usage and adverse drug reactions.^{12,17}

Ethical Consideration

Participants' information was kept private and the survey was voluntary. Only scholarly and research uses were made of the replies that were gathered.^{12,18}

RESULT AND DISCUSSION

The current study examined the adverse drug reactions (ADRs) linked to widely used antibiotics and employed a poll to gauge public knowledge of safe drug usage and ADR reporting. The results demonstrated that side effects such as nausea, vomiting, diarrhea, allergic reactions, dizziness, photosensitivity, and superinfections are frequently linked to antibiotics like amoxicillin, ceftriaxone, azithromycin, ciprofloxacin, and doxycycline. Serious responses like anaphylaxis and tendon injury were less prevalent but clinically significant, while gastrointestinal disturbances were found to be the most commonly reported adverse drug reactions. Irrational antibiotic usage, self-medication, overdose, insufficient treatment courses, polypharmacy, and drug interactions are among the significant causes of adverse drug reactions (ADRs) that were identified by the study. Adverse reaction risk was also found to be increased by patient-related factors, including age, allergies, liver or renal diseases, and pre-existing medical illnesses. Antibiotic resistance and medication-related problems have been identified as being largely caused by antibiotic misuse and overuse.

According to the survey analysis, the majority of participants were graduates and most were between the ages of 19 and 25. Of those surveyed, 47.4% said they usually utilized medications, while 52.6% said they did not. Antibiotics, cough and cold remedies, and painkillers were the most often used medications. A moderate level of awareness of appropriate medication use is shown by the majority of participants' statements that they finish the recommended course of medication.

Many individuals reported experiencing minor adverse reactions (ADRs), including nausea, vomiting, dizziness, and other side effects. After suffering adverse effects, a sizable percentage of responders sought medical assistance, and some discontinued taking medications on their own initiative. This emphasizes the necessity of better patient counselling and education on the significance of reporting adverse drug reactions (ADRs) and seeking medical advice.

Additionally, the results demonstrated a reasonably high degree of knowledge regarding safe drug use procedures. Before taking medications, the majority of participants said



they checked their expiration dates and read the labels. Many of the responders knew that abusing medications could have negative consequences. The majority of participants indicated a desire to report side effects in the future, and awareness of the Pharmacovigilance Programme of India (PvPI) and ADR reporting was moderate. Nonetheless, some respondents continued to have awareness gaps, highlighting the necessity of ongoing educational initiatives and public health campaigns.

Overall, the study shows that antibiotic-related adverse medication reactions continue to be a significant health concern. Reducing adverse drug reactions (ADRs) and encouraging safer and more efficient use of antibiotics require careful monitoring, sensible prescribing, patient education, and robust pharmacovigilance systems.

CONCLUSION

In conclusion, adverse drug reactions (ADRs) linked to widely used antibiotics continue to be a major problem in the medical field. Widely used to treat infections, antibiotics like amoxicillin, ceftriaxone, azithromycin, ciprofloxacin, and doxycycline are also linked to a number of side effects, from minor gastrointestinal issues to serious allergic and organ-related problems. The risk of adverse drug reactions (ADRs) and antibiotic resistance are increased by irrational antibiotic usage, self-medication, overdosing, inadequate treatment courses, and ignorance.

The study emphasizes how crucial pharmacovigilance is to the identification, tracking, avoidance, and reporting of adverse drug reactions. Safe and efficient medication therapy depends on the active participation of medical experts and appropriate patient counselling. The results of the poll show that there is still a need to raise public awareness of sensible antibiotic usage and medication safety, even if many participants are aware of safe drug use guidelines and ADR reporting.

Therefore, to reduce adverse medication reactions and enhance overall patient safety and healthcare outcomes, it is essential to promote responsible antibiotic use, patient education, frequent monitoring, and robust pharmacovigilance systems.

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