CME LIVE OPEN ACCESS

Journal of
Epidemiology and Public Health

Research Article

ISSN: 3065-9078

Knowledge, Attitude and Practices of Community Pharmacists About Reporting of Adrs In Lahore

Tuaha Ayub, Aroosh, Ali Akhtar, Waqas Akram*, Mahtab Ahmad Khan, Aqeel Majeed, Muhammad Rohan Shahjahan, Nayyer Shamim, Wajiha Arshad, Shehroz Ali , Saira Naeem, Sami-ul-Hassan and Hassan Irfan

Faculty of Pharmaceutical Sciences, University of Central Punjab, Lahore, Pakistan

Corresponding Author: Waqas Akram, faculty of Pharmaceutical Sciences, University of Central Punjab, Lahore, Pakistan.

Received: 2025 July 25 **Accepted:** 2025 Aug 13 **Published:** 2025 Aug 25

Abstract

Background

Adverse Drug Reaction (ADR) reporting is a fundamental element of pharmacovigilance, playing a critical role in identifying, documenting, and preventing drug-related problems. Community pharmacists, due to their frequent interaction with patients and accessibility, are well-positioned to contribute significantly to the ADR reporting process. Despite the availability of formal reporting mechanisms in Pakistan, including systems established by the Drug Regulatory Authority of Pakistan (DRAP), underreporting remains a major challenge. This study was conducted to evaluate the knowledge, attitude, and practices (KAP) of community pharmacists in Lahore regarding ADR reporting and to identify barriers that hinder their participation in pharmacovigilance efforts.

Methodology

A descriptive, cross-sectional study was conducted using a structured questionnaire administered to 120 community pharmacists operating in various urban areas of Lahore. The questionnaire, adapted from a validated Saudi Arabian study, included sections on demographics, knowledge of ADR processes, attitudes towards ADR reporting, actual reporting practices, and patient counseling behavior. Data were analyzed using SPSS version 27. Descriptive statistics were performed to analyze the data (frequency and percentages).

Results

The majority of respondents were young (85% aged 20–30) and early-career professionals (90.8% with 1–5 years of experience), with most holding Pharm-D degrees (91.6%). Although 62.5% of participants reported being familiar with ADR reporting, only 50.7% correctly identified DRAP as the relevant authority and just 46.7% were aware of online reporting platforms. Only 25.8% had ever reported an ADR, and significant barriers to reporting included lack of awareness (44.3%), not encountering reportable ADRs (12.5%), and absence of internal systems (11.4%). Patient counseling practices varied, with 55.8% routinely asking about pregnancy before dispensing high-risk medications and 43.3% frequently discussing potential ADRs. The most commonly encountered ADRs included gastrointestinal issues and allergic reactions, primarily linked to antibiotics and NSAIDs.

Conclusion

The study reveals a concerning gap between knowledge and actual practice of ADR reporting among community pharmacists in Lahore. Although attitudes toward reporting are generally positive, the lack of structured systems, digital awareness, and professional training undermines effective pharmacovigilance. Addressing these gaps through targeted educational initiatives, implementation of streamlined reporting tools, and fostering a culture of interprofessional communication can significantly enhance ADR reporting rates. Strengthening the role of community pharmacists in pharmacovigilance is crucial for ensuring patient safety and improving overall healthcare outcomes in Pakistan.

keywords: Pharmacovigilance, Underreporting, Descriptive, Interprofessional, NASIDs, ADRs

1. Introduction

ADR reporting is the systematic process of reporting Adverse Drug Reactions arising as an unwanted consequence of Medication therapy. This process ensures addressing of diverse kinds of drug related problems thus significantly impacting patient safety and healthcare costs [1]. WHO standards also imply that the ADRs reported should be 200 among 1000000 people [2]. According to WHO, Healthcare Professionals like Doctors, Pharmacists and Nurses are in the best position to report ADRs as part of their daily patient care [3]. Community Pharmacists, as rightly identified by research conducted in Portugal, are at an exceptional place to report ADRs given their direct contact with the drug consumers [4]. For community Pharmacists to contribute to the process, there needs to be a user friendly and efficient reporting system existing in the first place. Such systems are in place in the Western Hemisphere in countries like USA [5]. Almost all of these systems have online channels and certain forms to report ADRs to relevant bodies [6].

Similarly, in Pakistan, Community Pharmacists can report ADRs via website, online application and Email to Pakistan's National Pharmacovigilance Centre [7]. ADRs can also be reported to the manufacturer who can subsequently report to National Pharmacovigilance Centre. It is noteworthy to mention that the ADRs are accessed via Uppsala Monitoring Centre designated by WHO [8]. The reports and data of ADR's if reported to Pharmacovigilance Centre set up by WHO, can result in measures taken place on an international scale. Despite of all the facilities present, it is globally observed that there is underreporting by community Pharmacists contributed by multifarious factor [9,10]. Some key factors identified by previous researches indicate lack of time, limited knowledge of ADR reporting methods and systems, dissatisfaction with ADR reporting methods and approach of the community Pharmacists towards ADR reporting [11]. The low rates of ADR reporting pose a significant challenge to takin regulatory actions and policy changes both at the national and international scale. These contribute to significant hike in healthcare costs due to hospitalizations as well as increased mortality and morbidity [12]. In countries like Pakistan, where population is growing exponentially and there is extensive utilization of medications, it is crucial to access whether ADRs get reported or not at community pharmacies.

Due to lack of pharmacovigilance awareness and infrastructure, the ratio of ADR reporting is considerably less to the one prescribed in Pakistan. This is understandable in rural settings but in urban centers like Lahore, this is not justified. With a sufficient quantity of Healthcare Professionals and up to date healthcare facilities, ADR reporting is not meeting the standard as indicated by the previous researches that have been conducted. Adding upon, there are more than 3000 registered community pharmacies in Lahore catering for a population of more than 15 million. Hypothesizing that there is a severe lack of ADR reporting in Pakistan given that community pharmacy practice is at its nascent phase, we deemed it necessary to assess the knowledge, attitude and approach of Community Pharmacists towards ADR reporting in Lahore, Pakistan. The purpose of the study is to not only access awareness but also bring to light the factors contributing to underreporting via community pharmacists as per our hypothesis.

2. Methodology

2.1. Study Design

The cross sectional was used to estimate the knowledge, attitude and practices of community pharmacists about reporting of adverse drug reactions.

2.2. Study Setting

This study was organized in urban areas of Lahore, Pakistan.

2.3. Study Population and Sample

The study was organized among community pharmacist with sample size of 380, only 120 Pharmacist responds.

2.4. Sampling Method

Community pharmacies from random areas and from the DRAP official website were approached.

2.5. Data Collection

The questionnaire was adapted from the similar study that was organized in Saudi Arabia [13]. The questionnaire includes two portions, first one comprised of demographic data and the second one compromised of four sections. The first section contains two questions, one close ended and one open ended. This part was designed to understand the knowledge of community pharmacist about ADR reporting process. The second section consisted of four questions, two open ended and two close-ended which uses four-pointer scale ranging from never to frequently. This part was designed to understand the attitude of community pharmacist towards ADR reporting process. The third section contains the four open-ended and one close-ended question. This part was designed to understand the practices of community pharmacist with ADR reporting process. In the fourth section patients' knowledge regarding counseling about ADRs was measured with a five-pointer scale ranging from never to always.

2.6. Data Analysis

Descriptive data were performed to analyze the data (frequency and percentages). Statistical analysis was performed using the Statistical Package for Social Science (SPSS) Software for Windows, (version 27)

2.7. Ethical Considerations

Ethical approval was obtained from the ethical committee of University of Central Punjab, Lahore. A pharmacy student visited each pharmacy and invited community pharmacists to participate in the study after explaining the aims of the study. An oral consent form was obtained from each participant who wished to participate in the study. Participants were told that all information provided was completely confidential and the results would be presented anonymously.

3. Results

3.1. Demographic Characteristics

The demographics of 120 community pharmacists partici-

pated in the study is shown in the table 1. The majority of the pharmacists (85%) were among the 20-30 years of age, 11.7% were among the age of 31-40 years and small number of pharmacists was above 40 years of age. Majority pharmacists (90.8%) had the work experience of 1-5 years. Majority pharmacies (85%) dispensed the prescriptions ranging between1-2500 and only small proportion dispensed the higher no. of prescriptions. 91.6% respondents had the Pharm-D degree while 8.3% held master's degree in pharmacy and no one had any other qualifications. Discussing about type of pharmacy, most pharmacies (50%) belongs to chain pharmacies, 40% falls under the category of independent pharmacy and only small proportion (10%) are hospital-affiliated. All the respondents graduated from Pakistan. The above demographic results have shown that the majority respondents are young pharmacists having early-career with standard education, majority of them working in chain pharmacies.

TABLE 1
DEMOGRAPHIC CHARACTERISICS OF 120 COMMUNITY PHARMACITS

	FREQUENCY	(%)
1. What is your age?		
20-30	102	85.00
31-40	14	11.7
41-50	3	2.5
51-60	1	0.8
2. For how long you are working as a community pharmacist in Lahore?		
1-5	109	90.8
6-10	10	8.3
16-20	1	0.8
3. What is the approximate number of prescriptions dispensed per week in this pharmacy?		
1-2500	102	85.0
2501-5000	12	10.0
5001-7500	2	1.7
7501-10000	4	3.3
4. What is you qualification?		
Pharm D	110	91.6
Masters in pharmacy	10	8.3
Others	0	0.0
5. How will you categorize your pharmacy?		
Independent pharmacy	48	40.0
Chain Pharmacy	60	50.0
Hospital affiliated	12	10.0
Others	0	0.0
6. What is Country of graduation?		
Pakistan	120	100

Table 1: Demographic Characterisics of 120 Community Pharmacits

3.2. Community Pharmacist Knowledge about ADR Patient Counseling

The results show that majority of pharmacists (62.5%) are familiar with reporting process of adverse drug reactions in Pakistan. Although, upon questioning about regulatory body responsible for ADR reports collection, only 50.7% respondents indicate the DRAP and 25.3% mentioned the Pharmacovigilance Center. 46.7% community pharmacists were acknowledged about online reporting system while 31.7% were not acknowledged and 21.7% showed uncertainty. When discussing the patient counseling 55.8% pharmacists frequently asked about pregnancy and 43.3% frequently asked about lactation before dispensing the high-risk medicines. In addition to that 43.3% of community pharmacists frequently involved in patient counseling about adverse drug reactions that indicates the involvement of community pharmacists with counseling moderately.

Community Pharmacist Knowledge about ADR Reporting

Question	Yes	No
Are you familiar with ADR reporting process (i.e. how and where to submit an ADR report) in Pakistan?	75 (62.5%)	45 (37.5%)

Table 2: Familiarity of Community Pharmacists with the ADR Pakistan Reporting Process in Pakistan

Question	Pharmacovigilance center	Drug regulatory authority website	Internal institutional systems of ADRs reporting	Irrelevant responses	Did not respond
If (Yes)what is the regulatory body responsible for collecting ADR reports?	19 (25.3%)	38 (50.7%)	2 (2.7%)	4 (5.3%)	12 (16%)

Table 2.1: Awareness of Regulatory Bodies Responsible for ADR Reporting

Question	Yes	No	I don't know
Can community pharmacist submit adverse drug reaction (ADRs) by electronic (online) reporting in Pakistan?	56 (46.7%)	38 (31.7%)	26 (21.7%)

Table 2.2: Knowledge of Electronic (Online) ADR Reporting Possibilities in Pakistan

Questions	Never	Rarely	Sometimes	Frequently	Always
How often do you ask your patient if he/she is allergic to medications	1 (0.8%)	21 (17.5%)	51 (42.5%)	35 (29.2%)	12 (10%)
How often do you ask a female if she is pregnant when dispensing teratogenic/ abortive medication	8 (6.7%)	9 (7.5%)	27 (22.5%)	67 (55.8%)	9 (7.5%)
How often do you ask a female if she is lactating when dispensing medication that is excreted in the mother milk and might harm the baby	9 (7.5%)	20 (16.7%)	27 (22.5%)	52 (43.3%)	12 (10%)
How often do you counsel your patients about ADRs that they may experience from their medication?	2 (1.7%)	10 (8.3%)	48 (40%)	52 (43.3%)	8 (6.7%)

Table 2.3: Community Pharmacist Knowledge About ADR Patient Counseling

3.3. Community Pharmacist Attitude about ADRs Reporting System

Table 3 indicates the attitude of community pharmacists about reporting of ADRs. This has shown that only 25.8% pharmacists told that they submit the ADRs. 28.1% uses the institutional systems to report ADRs, 18.8% submit to the DRAP or Pharmacovigilance Centre. Lack of awareness (44.3%), never encountering an ADR (12.5%) and no availability of internal systems (11.4%) are the major obstacles to not report the ADRs. In addition to that 9.1% of respondents do not need to report the ADRs. The results reveal that in spite of having a good attitude in reporting of ADRs there are significant obstacles in effective reporting of ADRs.

To Identify Community Pharmacist Attitude about ADRs Reporting System

Question	Yes	No
Do you report ADRs that you come across?	31 (25.8%)	89 (74.2%)

Table 3: ADR Reporting Behavior Among Community Pharmacists

Question	Pharmacovigilance center	Drug regulatory authority website	Internal institutional systems of ADRs reporting	Irrelevant responses	Did not respond
If (Yes), where did you submit the report?	6 (18.8%)	6 (18.8%)	9 (28.1%)	5 (15.6%)	6 (18.8%)

Table 3.1: Reporting Channels Used by Pharmacists for ADR Submission

Question	Lack of awareness regarding ADRs or ADRs reporting system in place	Never encountered an ADR	No in-house reporting system in place	Felt no need to report ADRs	Did not respond
If (No), why did you not report it? (what are the main reasons?)	39 (44.3%)	11 (12.5%)	10 (11.4%)	8 (9.1%)	20 (22.7%)

Table 3.2: Reasons for Not Reporting ADRs Among Community Pharmacists

Questions	Never	Rarely	Sometimes	Frequently
How often do you discuss an ADR with your pharmacist colleague?	7 (5.8%)	23 (19.2%)	58 (48.3%)	32 (26.7%)
How often do you discuss an ADR with the prescriber?	41 (34.2%)	42 (35.0%)	28 (23.3%)	9 (7.5%)

Prescribers

Table 3.3: Frequency of Pharmacists' Discussions About ADRs With Colleagues and Prescribers

3.4. Community Pharmacist Practices with ADRs Reporting System

Concerning the practices, 63.3% community pharmacists outlined that they did not encountered any ADR in the last month, and 62.5% outlined that they did not encountered ADRs in the last 6 months, which could indicate the understating of ADRs. 48.3% of the participants sometimes discussed ADRs with their pharmacist colleague, while 26.7% discussed frequently with pharmacist colleague. On the other hand, 7.5% communicate frequently with prescriber that indicates less communication with prescriber. Gastrointestinal issues (32.2%), allergic reactions (29.5%) and headaches (9.3%) are frequently narrated ADRs. Most frequently involved drug classes were antibiotics (33.1%) and NSAIDs (17.7%). In consideration to patients submitting their side effects, 65% of community pharmacists referred them to physician and 37.5% told to stop the medication and the symptoms, showing that management techniques are good.

To Identify Community Pharmacist Practices with ADRs Reporting System

Questions	0	1-7	8-14	15-21
In last month, how many ADRs you have encountered?	76 (63.3%)	34 (28.3%)	5 (4.2%)	5 (4.2%)
In the last SIX months, how many serious ADRs you have encountered?	75 (62.5%)	29 (24.2%)	8 (6.7%)	8 (6.7%)

Table 4: Frequency of ADRs Encountered by Pharmacists in the Past Month and Six Months

Questions	GIT issues	Allergic/ hypersensitivity reactions	CVS Issues	Uncontrolled sugar levels	Headache	Swelling /Edema	Fatigue	Drowsiness	Blood clotting	UTI issues	Body pain	Bleeding
What are the five most common ADRs that you come across in your practice?	59 (32.2%)	54 (29.5%)	14 (7.7%)	2 (1.1%)	17 (9.3%)	3 (1.6%)	4 (2.2%)	13 (7.1%)	1 (0.5%)	6 (3.3%)	4 (2.2%)	6 (3.3%)

Table 4.1: Commonly Observed Types of ADRs in Community Pharmacy Practice

Questions	Antibiotics	Anti-Histaminergic	Anxiolytics	Anti-Diarrheal	Anti-hypertensives	Anti-coagulants	Anti-diabetics	Anti-epileptics	Anti-psychotics	NSAIDs	Nutraceuticals	Skin/Derma products
What are the 5	58 (33.1%)	7 (4.00%)	17 (9.7%)	5 (2.9%)	18 (10.3%)	9 (5.1%)	10 (5.7%)	3 (1.7%)	5 (2.9%)	31 (17.7%)	7 (4.00%)	5 (2.9%)
most common classes of drugs that you												

Citation: Ayub, T., Aroosh., khtar, A., Akram, W., Khan, M. A. et all. (2025). Knowledge, Attitude and Practices of Community Pharmacists About Reporting of Adrs In Lahore. *J Epidemiol Public Health*, 3(3), 1-9.

think are associated with ADRs?												

Table 4.2: Drug Classes Most Commonly Associated with ADRs According to Pharmacists

If a patient comes to you in the pharmacy complaining of a side effect or adverse reaction what measures you adopt to comfort the patient?	YES	NO
Give him a medicine to treat his condition	25 (20.8%)	95 (79.2%)
Refer him/her to see a physician	78 (65%)	42 (35%)
Just ask him to stop taking that medicine	40 (33.3%)	80 (66.7%)
Give him/her a medicine to treat the condition and ask him/her to stop the medication causing the ADRs	45 (37.5%)	75 (62.5%)

Table 4.3: Management Approaches Adopted by Pharmacists When a Patient Reports an ADR

4. Discussion

In the light of the KAP study that we conducted in the Urban Center of Lahore, Pakistan; we found that Pharmacists working in community pharmacies lack the knowledge regarding the ADR Reporting systems in place as per indicated by studies done in other countries [14,15]. Inadequacy of the knowledge of different channels and bodies responsible for ADR Reporting was evident from the data collected (Table 2, 2.1, 2.2). Even those who affirmed of having knowledge about ADR Reporting procedure (62.5%), 21.3 % were dismissed because of giving either no or irrelevant answer to when they were asked about their familiarity with different bodies to whom ADRs are to be reported. The disparity among these results showcases a sense of false confidence among Pharmacists of having knowledge but not justifying their claim. This represents the lack of educational programs to address ADR reporting processes to qualified pharmacists, whether during the course of their studies or while practicing in community pharmacies [16,17]. More than 50 percent admit having no familiarity with online reporting channels available in Pakistan meanwhile such systems are already in place for instance the Drug Regulatory Authority online application and website which is easily accessible to the healthcare professionals to report ADRs [18].

On the flipside, previous studies have reported significant rise in the rates of ADRs reported due to the enhanced knowledge about online ADR reporting systems [19]. Table 2.3 depicts the trends towards addressing and educating patients about serious ADRs in comparison to more common and less severe ADRs. The claim is substantiated by the fact that more than 55.8% pharmacists had the prior awareness about the importance of inquiring women either they are pregnant or not while dispensing teratogenic or abortive medications. On the other hand, significantly fewer pharmacists (29.2%) frequently asked patients whether they are allergic to the medications dispensed to them [20]. This depicts a lack of Knowledge about the significance of ADR reporting protocols [16].

Further delving into the attitude of Community Pharmacists, we prioritized assessing the reporting behavior of community pharmacists. For this purpose, we asked them whether they reported or not the ADRs they came across in their practice. If yes then via which platform and if not, then what was the underlying cause or reason behind it. The data suggested the importance of having in house reporting system in aligning the process of ADR reporting with pharmacovigilance centers [21]. Moreover, those who did not report the ADRs cited the lack of knowledge of ADR reporting systems which shows the correlation between the knowledge ADR reporting process and the attitude of Pharmacists towards reporting ADRs encountered as highlighted by the previous studies [22]. Furthermore, Table 3.3 depicts the frequency of consultations among the pharmacists upon receival of an ADR representing strong professional ties among them which can be a contributing factor towards an increased awareness and better attitude about ADR reporting by the virtue of informed discourse and discussion. A bridge between the medication prescribers and the community pharmacists who are informed by the patients about the ADRs observed by them upon undergoing therapy is evident. This shows a lack of communication and professional disconnect among the community pharmacists and prescribers [23]. Conducting awareness programs and joint training sessions for Community Pharmacists and

Medical Practitioners can certainly help the cause [24].

Table 4 suggests that a large majority of community pharmacists had encountered none, or not more than 7 ADRs which is indicative of lack of communication and counselling among the patient and pharmacists. Given the high influx of patients in community pharmacies such severe lack of ADRs encountered does not seem plausible until unless there is a clear communication barrier or lack of incentive and acknowledgement for community pharmacists upon reporting ADRs [25]. The trends of underreporting highlight the need for conducting effective educational program regarding ADR reporting [26]. Most of the side effects encountered are related to Gastro intestinal problems include nausea, vomiting diarrhea etc. Alongside the major medication class behind ADRs were antibiotics which represents that most ADRs are caused by commonly dispensed medications i.e., anti-infectives, anxiolytics etc [27,28]. Another essential feature of the practice of community pharmacists was that a majority of pharmacists opted to refer the patient to see a physician upon encountering ADR which shows that they did not choose to resolve them on their own by taking measures or advising the patient. (Table 4.3). Meanwhile those who stopped medication use or advised the use of a medication to treat ADR can be attributed to commonly encountered ADRs which can be alleviated by Over-the-Counter medication. It also suggests that stopping the use of a medication causing ADRs can be an appropriate measure to ensure patients health if the pharmacist deems it necessary [29,30].

5. Conclusion

This study highlights a significant underutilization of ADR reporting mechanisms by community pharmacists in Lahore, despite the availability of national systems like those provided by DRAP. Although pharmacists generally exhibit a positive attitude towards ADR reporting, there is a disconnect between their knowledge and actual practices. Key challenges include limited awareness of reporting procedures, insufficient use of online systems, and lack of communication with prescribers. Addressing these gaps through structured training programs, integration of reporting tools at pharmacies, and interprofessional collaboration can empower pharmacists to play a more active role in pharmacovigilance. Strengthening this framework is essential for improving medication safety and protecting public health in Pakistan.

Acknowledgement

We acknowledge our supervisors, Dr Wawss Akram and Dr Ali Akhtar for guiding us throughout the process of our research and ensuring that we accomplish this paper in the best possible manner. We also express gratitude to our institute, University of Central Punjab in facilitating and approving our research.

References

1. Bouvy, J. C., De Bruin, M. L., & Koopmanschap, M. A. (2015). Epidemiology of adverse drug reactions in Europe: a review of recent observational studies. *Drug safety, 38*, 437-453.
2. Bahri, P., Bowring, G., Edwards, B. D., Anton, C., Aronson, J. K., Caro-Rojas, A., ... & Sultana, J. (2023). Communicating for the safe use of Medicines: progress and directions for the 2020s promoted by the Special Interest Group of the International Society of Pharmacovigilance. *Drug Safety, 46*(6), 517-532.
3. Ferreira-da-Silva, R., Alves, J. M., Vieira, C., Silva, A. M., Marques, J., Morato, M., ... & Ribeiro-Vaz, I. (2023). Motivation and Knowledge of Portuguese Community Pharmacists Towards the Reporting of Suspected Adverse Reactions to Medicines: A Cross-Sectional Survey. *Journal of Community Health, 48*(2), 295-308.
4. PH, L., MT, M., & PLGC, L. (2025). Effectiveness of mobile applications in enhancing adverse drug reaction reporting: a systematic review. *BMC Digital Health, 3*(1), 1-15.
5. Ali, I., Ahmad, W., Ullah, A. R., Khan, F., Ijaz, M., Khan, S., & Khan, T. M. (2021). Knowledge, attitude, and barriers toward ADRs reporting among health-care professionals at tertiary care health settings in Peshawar, Pakistan: a web based study. *Hospital Pharmacy, 56*(4), 384-391.
6. Lindquist, M. A. R. I. E., & Edwards, I. R. (2001). The WHO Programme for International Drug Monitoring, its database, and the technical support of the Uppsala Monitoring Center. *The Journal of rheumatology, 28*(5), 1180-1187.
7. Paut Kusturica, M., Tomas, A., Rašković, A., Gigov, S., Crnobrnja, V., Jevtić, M., & Stilinović, N. (2022). Community pharmacists' challenges regarding adverse drug reaction reporting: a cross-sectional study. *Current Medical Research and Opinion, 38*(7), 1229-1236.
8. Shamim, S., Sharib, S. M., Malhi, S. M., Muntaha, S. U., Raza, H., Ata, S., ... & Hussain, M. (2016). Adverse drug reactions (ADRS) reporting: awareness and reasons of under-reporting among health care professionals, a challenge for pharmacists. *Springerplus, 5*, 1-8.
9. Geer, M. I., Koul, P. A., Tanki, S. A., & Shah, M. Y. (2016). Frequency, types, severity, preventability and costs of Adverse Drug Reactions at a tertiary care hospital. *Journal of pharmacological and toxicological methods, 81*, 323-334.
10. Patel, T. K., & Patel, P. B. (2018). Mortality among patients due to adverse drug reactions that lead to hospitalization: a meta-analysis. *European journal of clinical pharmacology, 74*, 819-832.
11. Hussain, R., Akram, T., Hassali, M. A., Muneswarao, J., Rehman, A. U., Hashmi, F., & Babar, Z. U. D. (2022). Barriers and facilitators to pharmacovigilance activities in Pakistan: A healthcare professionals-based survey. *Plos one, 17*(7), e0271587.
12. Mustafa, Z. U., Salman, M., Asif, N., Rao, A. Z., Khan, Q. U., Nawaz, A. S., ... & Hussain, K. (2021). Knowledge, attitude, practices, and barriers of pharmacovigilance among healthcare workers: a cross-sectional survey from Lahore, Pakistan. *Bulletin of Faculty of Pharmacy Cairo University, 59*(1), 33-43.
13. Mahmoud, M. A., Alswaida, Y., Alshammari, T., Khan, T. M., Alrasheedy, A., Hassali, M. A., & Aljadhey, H. (2014). Community pharmacists' knowledge, behaviors and

experiences about adverse drug reaction reporting in Saudi Arabia. *Saudi pharmaceutical journal, 22*(5), 411-418.
14. Alwidyan, T., Odeh, M., Ibrahim, A. H., Harahsheh, E., & Banat, A. (2025). Knowledge, attitude, and practice among community pharmacists toward adverse drug reaction reporting and pharmacovigilance: A nationwide survey. *Exploratory Research in Clinical and Social Pharmacy, 18*, 100578.
15. Khardali, A. (2024). Exploring the knowledge, perception, and practice of community pharmacists in Saudi Arabia toward pharmacovigilance and adverse drug reaction reporting. A nationwide survey. *Scientific Reports, 14*(1), 4819.
16. Al Meslamani, A. Z. (2023). Underreporting of adverse drug events: a look into the extent, causes, and potential solutions. *Expert Opinion on Drug Safety, 22*(5), 351-354.
17. Khalili, M., Mesgarpour, B., Sharifi, H., Golozar, A., & Haghdoost, A. A. (2021). Estimation of adverse drug reaction reporting in Iran: correction for underreporting. *Pharmacoepidemiology and drug safety, 30*(8), 1101-1114.
18. Khan, M. A. A., Hamid, S., Ur-Rehman, T., & Babar, Z. U. D. (2022). Assessment of the current state of pharmacovigilance system in Pakistan using indicator-based assessment tool. *Frontiers in Pharmacology, 12*, 789103.
19. Fossouo Tagne, J., Yakob, R. A., Dang, T. H., Mcdonald, R., & Wickramasinghe, N. (2023). Reporting, monitoring, and handling of adverse drug reactions in Australia: scoping review. *JMIR Public Health and Surveillance, 9*, e40080.
20. Bukic, J., Rusic, D., Mas, P., Karabatic, D., Bozic, J., Seselja Perisin, A., ... & Modun, D. (2019). Analysis of spontaneous reporting of suspected adverse drug reactions for non-analgesic over-the-counter drugs from 2008 to 2017. *BMC Pharmacology and Toxicology, 20*, 1-7.
21. Whyte, E., Hussain, N., & Anwar, M. (2025). Adverse drug reaction reporting by New Zealand pharmacists: a cross-sectional investigation of community and hospital pharmacists. *International Journal of Pharmacy Practice, 33*(3), 308-315.
22. Vigneshwaran, E., Harichandana, V., Sadiq, M. M. J., Alavudeen, S. S., Khan, N. A., & Ahmed, T. (2020). Knowledge, attitude and practice of community pharmacists towards adverse drug reactions reporting. *Journal of Young Pharmacists, 12*(1), 75.
23. Löffler, C., Koudmani, C., Böhmer, F., Paschka, S. D., Höck, J., Drewelow, E., ... & Altiner, A. (2017). Perceptions of interprofessional collaboration of general practitioners and community pharmacists-a qualitative study. *BMC health services research, 17*, 1-7.
24. Snyder, M. E., Zillich, A. J., Primack, B. A., Rice, K. R., McGivney, M. A. S., Pringle, J. L., & Smith, R. B. (2010). Exploring successful community pharmacist-physician collaborative working relationships using mixed methods. *Research in social and administrative pharmacy, 6*(4), 307-323.
25. Suleiman, A. K. (2025). Improving ADR reporting in Jordan: a qualitative exploration of pharmacists' perspectives. *Frontiers in Medicine, 11*, 1513611.
26. Khan, T. M. (2013). Community pharmacists' knowledge and perceptions about adverse drug reactions and barriers towards their reporting in Eastern region, Alahsa, Saudi Arabia. *Therapeutic advances in drug safety, 4*(2), 45-51.
27. Nyame, L., Xue, H., Yu, J., Fiagbey, E. D., Thomford, K. P., & Du, W. (2025). Characteristics and trends in adverse drug reactions in Ghana—evidence of spontaneous reports, 2005—2021. *Naunyn-Schmiedeberg's Archives of Pharmacology, 398*(1), 657-672.
28. Vardakas, K. Z., Kalimeris, G. D., Triarides, N. A., & Falagas, M. E. (2018). An update on adverse drug reactions related to β-lactam antibiotics. *Expert opinion on drug safety, 17*(5), 499-508.
29. Ha, D., Song, I., Park, S., & Lee, E. K. (2019). Factors associated with the management of adverse drug reactions among community pharmacists in South Korea. *Journal of Patient Safety, 15*(2), 143-149.
30. Osemene, K. P., Ayeni, M. I., & Afolabi, M. O. (2012). The role of community pharmacists in monitoring adverse drug reactions in Nigeria. *Journal of Pharmaceutical Health Services Research, 3*(4), 197-204.