

A CROSS-SECTIONAL STUDY ON PHARMACOVIGILANCE KNOWLEDGE, ATTITUDE, AND PERCEPTION AMONG HEALTHCARE STUDENTS IN PAKISTAN

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Keywords:

Pharmacovigilance, Adverse Drug Reaction, Healthcare Students, Knowledge, Attitude, Practice, Pakistan, Drug Safety

Received on 26 Mar 2026

Accepted on 04 May 2026

Published on 23 May 2026

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Abstract

Background

Pharmacovigilance is important for the safety of drugs by detecting, assessing, and preventing adverse drug reactions. Despite the adoption of pharmacovigilance practices worldwide, adverse drug reaction underreporting is still an issue, usually due to inadequate knowledge and training among health care practitioners. It is therefore important to comprehend the students' level of awareness, attitudes, and perceptions about pharmacovigilance.

Methods

The survey was performed in the form of a cross-sectional study on undergraduate students pursuing health care in Pakistan by means of a structured questionnaire that was scientifically validated. The questionnaire focused on demographics, pharmacovigilance-related

knowledge, attitudes, perception, and practice, as determined through 11 items and a 5-point Likert scale. Overall, 475 pharmacy students responded.

Results

The findings showed that there was adequate knowledge about pharmacovigilance with 53.1% knowing the meaning of pharmacovigilance and 75.4% knowing what adverse drug reactions are. On the other hand, only 29.7% were knowledgeable on causality assessments. Regarding attitudes, the results showed high levels of positivity, where 96% believed in the significance of adverse drug reaction reporting and 82.1% related it to patient safety. Perception showed that 67.5% perceived themselves as competent in adverse drug reaction reporting but at the same time, 78.9% agreed that they needed more training in this field.

Conclusion

Although healthcare students in Pakistan demonstrate a positive attitude and moderate theoretical understanding of pharmacovigilance, there is a marked deficiency in their practical abilities and training. Incorporation of a thorough and practical approach to pharmacovigilance in the curriculum of healthcare institutions is critical for adverse drug reaction reporting.

INTRODUCTION

Medicine safety and pharmacovigilance are vital elements of modern health care systems because these are essential aspects that help detect, assess, understand, and prevent adverse effects or any problems associated with medications (1). According to the World Health Organization (WHO), "pharmacovigilance is the science and activities aiming at the detection, assessment, understanding and prevention of adverse effects or any other medicine-related problem (1, 2).

Pharmacovigilance programs have emerged in many countries of the world with the purpose of ensuring the safety of medicines used in clinical practice (1, 2). In spite of the presence of various drug safety programs all over the world, underreporting of adverse drug reactions remains one of the key problems in most health care systems (1, 3).

It was proved that poor knowledge and lack of adequate training among healthcare providers and healthcare trainees are linked to underreporting of adverse drug reactions (1). There are several studies that confirm that healthcare students do not possess enough knowledge in relation to pharmacovigilance and adverse drug reaction reporting, as pharmacovigilance is poorly addressed in most health education programs (1, 4).

Moreover, previous studies suggest that students studying in pharmacy schools possess higher levels of knowledge and awareness regarding pharmacovigilance than students from other medical fields such as doctors, dentists, and nurses (1, 5). It is very important to know about the students' knowledge, attitudes, and perceptions related to pharmacovigilance, as healthcare students are future healthcare professionals responsible for ensuring the safety of medicines.

Therefore, there is a need to conduct an assessment of knowledge, attitudes, and perceptions concerning adverse drug reaction reporting; it is essential because this issue will make it possible to identify some gaps in the education of healthcare professionals. For this reason, the present study aims to investigate the levels of knowledge, attitudes, and perceptions regarding pharmacovigilance and adverse drug reaction reporting among Pakistani medical school students (1).

Methodology

Study Design:

The study uses a cross-sectional design with questionnaire data collection to assess knowledge, attitudes, and perceptions of pharmacovigilance and adverse drug reactions reporting among healthcare students (6). The cross-sectional survey is in agreement with the other pharmacovigilance research studies performed on healthcare students (1).

Study Population:

The target population was composed of undergraduate healthcare students taking part in programs associated with medicine. For instance, all of the participating individuals were in pharmacy-related courses.

Data Collection Instrument:

A questionnaire survey was conducted in order to gather data about knowledge, attitude, and perception regarding pharmacovigilance and adverse drug reactions reporting. The questionnaire design was based on previously validated survey tools used for pharmacovigilance studies (7) (8).

The survey was made up of several parts that included demographics, pharmacovigilance knowledge, and attitudinal measures with the Likert Scale, and questions regarding pharmacovigilance education and practices.

Questionnaire Structure:

The first part was based on demographic data like gender, age category, course of study, level of education, and the selected pharmacy institutions were exclusively from the private sector. The second part assessed the knowledge of students on pharmacovigilance which includes the definition of pharmacovigilance, functions of pharmacovigilance systems, and definitions of adverse drug reactions, adverse drug reaction classification, and procedure for reporting adverse drug reaction. Part three was related to the evaluation of the attitude of the respondents about pharmacovigilance and reporting of adverse drug reactions by applying a five-point Likert scale. The fourth part of the study examined pharmacovigilance procedures in medical colleges, specifically, whether pharmacovigilance is part of the syllabus and if the students have been trained to report adverse drug reaction. The last part focused on the opinions and requirements of the students regarding their training in pharmacovigilance and adverse drug reaction reporting.

Data Collection Procedure:

The questionnaire survey was distributed among the students after getting consent from the respondents. Research participation was voluntary and confidential in nature.

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DOI: <http://doi.org/10.5281/zenodo.20354400>**Measures:****Dependent Variables**

The variables of this study include knowledge, attitudes, perceptions, and practices on pharmacovigilance and adverse drug reactions of the students of the health care institutions. Students' knowledge on pharmacovigilance and adverse drug reactions was measured through eleven questions in which only one response was right. Each correct response had a score of one, whereas no score was given for the wrong response. The maximum score could be 11, whereas the minimum score could be zero. The responses of the students in relation to perception of pharmacovigilance and adverse drug reaction reporting were analyzed using three questions and scoring according to it. The maximum possible score was 3, and the minimum possible score was zero. Attitudes of the respondents about pharmacovigilance and adverse drug reaction reporting were tested using a five-point Likert scale, which included options like strongly agree (1), agree (2), uncertain (3), disagree (4), and strongly disagree (5). Thus, the maximum score was 20, whereas the minimum was 4.

Independent Variables

Demographic characteristics of the respondents, including their age, gender, year of level (year 3, year 4, and year 5), and college (private).

Data Analysis:

The data gathered on knowledge, attitudes, and perceptions on pharmacovigilance by students was statistically analyzed using SPSS.

Results**Demographic Information**

The total number of healthcare students participating in this research was 475. All the students belonged to pharmacy discipline. Among them, 20.4%, 39.8%, and 39.8% were students of year 3,

year 4, and year 5 respectively. The prevalent gender among the participating students was male (50.3%). Demographics of this research are given in Table I.

Table I: Description of the Study Sample

	Total/ Pharmacy N (%)
Total	475(100)
Gender	
Male	239(50.3)
Female	236(49.7)
Year of Study	
3 rd	97(20.4)
4 th	189(39.8)
5 th	189(39.8)
Type of University	
Private	475(100)

Knowledge about Pharmacovigilance and Adverse Drug Reaction Reporting

From the results obtained from this study, it was seen that 53.1 and 75.4 percent of healthcare students were able to correctly define pharmacovigilance and adverse drug reaction, respectively. Details can be further read in Table II below.

Table II: Healthcare Students' Knowledge of Pharmacovigilance and Adverse Drug Reaction

Q No.		% correct answer
		Total / Pharmacy
1.	Definition of Pharmacovigilance?	53.1
2.	Functions of Pharmacovigilance?	50.3
3.	Definition of Adverse Drug Reaction?	75.4
4.	Adverse Drug Reaction classified based on	56.4
5.	A scale used to assess the cause of Adverse Drug Reaction named	29.7
6.	Hypersensitivity reactions are Adverse Drug Reaction	64.4
7.	The governmental monitoring agency for Adverse Drug Reaction in Pakistan is	76.8
8.	Pakistan Vigilance system	80.6
9.	Which type of Adverse Drug Reaction should be reported?	67.4
10.	Adverse Drug Reaction that should be reported are related to	61.9
11.	Before reporting an Adverse Drug Reaction, confirmation that the Adverse Drug Reaction is related to a particular drug is	78.9

Attitude towards Pharmacovigilance and Adverse Drug Reaction Reporting

Students' attitude towards the reporting of adverse drug reaction was positive; 96% and 82.1% of them believed that reporting of adverse drug reaction helps in significantly improving the reporting system and enhancing patient safety respectively. Moreover, 75.6% of the students believed that reporting of adverse drug reaction should be made compulsory among health care professionals (Table III).

Table III: Healthcare Students' Attitudes toward Pharmacovigilance and Adverse Drug Reaction Reporting

Q No.		% Agreed
		Total/ Pharmacy
1	Reporting Adverse Drug Reaction contribute significantly in reporting system	96
2.	Reporting Adverse Drug Reaction contribute significantly towards patient safety	82.1
3.	Reporting Adverse Drug Reaction is a responsibility of me	81.4
4.	Reporting Adverse Drug Reaction should become mandatory for all health professionals	75.6

Perception of Pharmacovigilance and Adverse Drug Reaction Reporting

It was observed that less than 67.5% of healthcare students felt they knew enough about adverse drug reactions. Moreover, almost 78.9% of the students agreed that there is a need for pharmacovigilance and adverse drug reaction reporting system education among the students at their respective institutions. Furthermore, 80.2% of students were willing to attend such education classes (Table IV).

Table IV: Healthcare Students' Perception of Pharmacovigilance and Adverse Drug Reaction Practice

Q No.		Correct answer (%)
		Total/ Pharmacy
1.	Are you prepared enough to report Adverse Drug Reactions in the future?	67.5
2.	Do you think all pharmacy students require education regarding pharmacovigilance and the Adverse Drug Reaction reporting system?	78.9
3.	If you were offered an opportunity to undertake education in pharmacovigilance and the Adverse Drug Reaction reporting system, would you be willing to participate?	80.2

Current Pharmacovigilance and Adverse Drug Reaction Practice

It was observed that only 52.2% of healthcare students revealed having received pharmacovigilance education. In addition, 66% of the participants revealed pharmacovigilance as well-covered topic within their institution's curriculum (Table V). Furthermore, only 45.6% of respondents agreed that their fellow students are taught how to report adverse drug reactions. Only 41.2% of the students agreed that their fellows can report adverse drug reactions during clerkship.

Table V: Healthcare Students' Current Pharmacovigilance and Adverse Drug Reaction Practice

Q No.		Correct answer (%)
		Total/ Pharmacy
1.	Pharmacovigilance is properly taught at college level curriculum	66
2.	Training provided to students regarding Adverse Drug Reaction reporting in your college	45.6
3.	Clerkship training provided to students regarding Adverse Drug Reaction reporting in your college	41.2
4.	Have you undergone any sort of Pharmacovigilance education before?	52.2

Discussion

Current results indicated the presence of moderate knowledge and positive attitude towards pharmacovigilance amongst the selected sample of students at an educational institution in Pakistan. Moreover, despite the presence of positive perceptions towards the topic, poor practical skills and deficient pharmacovigilance knowledge were evident from this sample of healthcare students in senior year at academic institutions. Overall results obtained from the current study are similar to other national and international studies, indicating insufficient pharmacovigilance knowledge in students and inability to implement acquired skills practically (1, 4).

As for the knowledge part of the research, a majority of participants demonstrated their ability to define pharmacovigilance. More than half of participants could provide the accurate definition of ADRs. However, there are evident deficiencies in specialized parts of the topic, such as ADR causality assessments, ADR classification and reporting. Only 29.7% could name the methods used to conduct ADR causality assessment, indicating insufficient knowledge about one of the most crucial parts of pharmacovigilance practice. Similar results were provided by another study conducted by

Elkalmi et al. (2011), where students demonstrated basic theoretical awareness but did not have sufficient practical knowledge about ADR reporting systems and pharmacovigilance procedures. Similarly, Beckmann et al. (2014) observed that students of healthcare usually demonstrate fragmented knowledge when talking about pharmacovigilance due to lack of practical experience acquired in their undergraduate program.

However, it was evident from the current results that students demonstrated quite satisfactory level of awareness regarding national ADR surveillance system and pharmacovigilance monitoring organization. These results can suggest that students receive general information about medication safety in terms of the curriculum and public health discussions. Consistent results were obtained by Alharf et al. (2018), where students from Saudi Arabia demonstrated knowledge about the concept of national pharmacovigilance but lacked necessary knowledge regarding reporting process and its documentation. Thus, it can be stated that, despite conceptual knowledge being satisfactory, it lacks practical application of pharmacovigilance.

Finally, it should be mentioned that attitudes of students towards the topic in the current research were rather positive. Almost all participants indicated the necessity of pharmacovigilance as one of the means of improvement in quality of patient care. Moreover, a significant number of respondents agreed that ADR reporting is a responsibility of healthcare professional and should become mandatory in the future. Such results coincide with those obtained in research conducted in Saudi Arabia, India, and Malaysia which showed a positive attitude towards pharmacovigilance practices of healthcare students (3, 7). Such an attitude on behalf of the target population is possibly connected to the growing realization of the necessity of the issue of patient medication safety and healthcare accountability.

Though, it is important to note that despite the positive attitudes, actual involvement in pharmacovigilance practices is very low. The inconsistency between favorable attitude and underdeveloped practice has been repeatedly described in other sources. For example, Khan et al. (2012) revealed that healthcare professionals and students have a positive attitude towards ADR

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DOI: <http://doi.org/10.5281/zenodo.20354400>

reporting while lacking practical experience due to insufficient preparation. As a result, similar conclusions can be made about the importance of developing skills and practices in pharmacovigilance beyond attitudes only.

The perception area identified another discrepancy – between being confident and being competent enough. Though most of the participants felt they were ready to conduct pharmacovigilance and ADR reporting, a considerably larger number of respondents said that they needed to attend relevant trainings to increase their knowledge and develop necessary skills. Such results show that students were aware of their limitations and understood the necessity of additional practical training. Similar findings were obtained by Goel et al. (2018) stating that healthcare students often underestimated their readiness despite knowing their shortcomings. Reumerman et al. (2018) also argued that specific educational interventions, such as simulation-based learning and case studies, effectively increased competence in pharmacovigilance among health professionals.

Finally, it is possible to note that the practice area was characterized by numerous shortages in terms of pharmacovigilance in Pakistani students. Despite half of respondents having education in pharmacovigilance as part of their university program, few of them had experience with ADR reporting during clerkship/internships and even less actively participated in pharmacovigilance activities. This information shows that the process of preparing future healthcare professionals for pharmacovigilance practices is mostly theoretical in Pakistan. A similar situation was described by Alwhaibi et al. (2020) showing a gap between theory and practice in ADR reporting among healthcare students. It was also confirmed by Beckmann et al. (2014) that inadequate experience negatively affects the level of students' readiness for pharmacovigilance responsibilities.

Comparison of the present results with previous literature suggests the existence of common pattern in many developing countries wherein healthcare students display satisfactory level of awareness and favorable attitude, but insufficient practical competencies regarding pharmacovigilance. There might be several reasons for this issue: a lack of practical training on this topic, a lack of access to ADR reporting system, no pharmacovigilance-related clinical activity, no appropriate mentorship during

internship period (8). Additionally, low level of ADR underreporting in developing countries may limit the possibilities of the students to observe and engage in pharmacovigilance-related activity when receiving medical education.

From the point of view of the improvement of the educational process, the main conclusion from the present study could be that there is a need to incorporate pharmacovigilance in health care curriculums of Pakistani universities. Various educational strategies including conducting workshops on pharmacovigilance, simulation-based learning, discussion of case examples, ADR reporting and supervised internships involving pharmacovigilance activities will significantly increase the competency and self-assessed confidence of students. Previously conducted research proved that practice-based educational strategy was significantly more efficient compared to lecturing approach in increasing pharmacovigilance related knowledge and reporting behavior (9, 10).

It can be assumed that integration of pharmacovigilance curricula into undergraduate courses of healthcare based on the recommendations of World Health Organization and the International Society of Pharmacovigilance can be considered an appropriate measure for the improvement of pharmacovigilance education in developing countries, especially Pakistan. According to WHO guidelines, introducing pharmacovigilance in early stages of healthcare education is very important for creation of effective medication safety system and promotion of the reporting activity among health care practitioners (2). It is possible that involvement of pharmacovigilance activities in clinical training may improve the level of students' competencies and professional confidence.

Strengths of this study include multidimensional analysis of pharmacovigilance among healthcare students. The study brings some new information about pharmacovigilance status in Pakistan and can add valuable information to existing literature in the region. However, several limitations must be mentioned. First, it is a cross-sectional study that used self-reported measures and might be biased by overestimating students' competencies. Second, it is impossible to establish the causality of educational exposure and pharmacovigilance activity based on cross-sectional research. Third, only

pharmacy students were included in this study. In the future, further research involving different healthcare majors may be conducted.

In summary, the results of the current research show that pharmacovigilance knowledge among the health care students in Pakistan is promising, although technical skill levels remain low. The above observations are similar to those noted in other studies carried out in other regions, indicating that there is a general need for pharmacovigilance training to be shifted from purely theoretical teaching to practical competency-based models of learning. Pharmacovigilance training can be greatly enhanced through various educational initiatives aimed at promoting pharmacovigilance and improving ADR reporting.

Practice Implications

Several implications arise from the findings of this research. About the importance of reporting and pharmacovigilance in the detection of adverse effects, training for pharmacovigilance and adverse drug reaction reporting requires more attention. Literature suggests that workshops and lectures on pharmacovigilance and adverse drug reaction reports can positively influence knowledge, attitude, and practice (10). The students should be exposed to pharmacovigilance and adverse drug reaction concepts together with approaches that can be used to evaluate the causality and severity of adverse drug reaction. Thus, a need is identified for the inclusion of pharmacovigilance and adverse drug reaction reporting in the curricula of health sciences colleges (9). Basic elements of pharmacovigilance training programs designed by the WHO and the ISoP can prove useful in this context.

Strengths and Limitations

The significance of the current research work is its contribution to the knowledge on current levels of awareness, attitudes, and perceptions of healthcare students concerning pharmacovigilance and adverse drug reactions in Pakistan. In addition, a larger number of samples were included in the

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DOI: <http://doi.org/10.5281/zenodo.20354400>

study to achieve accurate results. Furthermore, the study examines a vital research question that might be used in enhancing pharmacovigilance education among healthcare students. However, like any other study, there are certain limitations. First, most study participants were pharmacy students, implying that the diversity of our participants was not wide from an academic perspective, which could have affected the results. Secondly, the study is based on self-reporting, so it is impossible to eliminate the effects of recall bias. In addition, no regression analysis was performed in this study, and therefore, no attempt was made to control for potential confounders, which poses a significant threat to inference validity.

Conclusions

From the findings of this research, it has been found that pharmacy students have high levels of knowledge and attitude towards pharmacovigilance and ADRs. Hence, it can be said that there is a definite need to integrate pharmacovigilance education into Pakistani healthcare institutions' curricula.

Acknowledgements

The authors would like to thank the students of healthcare disciplines for making themselves available to participate in this study. The authors wish to acknowledge the help provided by the Faculty of Pharmaceutical Sciences, University of Central Punjab, Pakistan, in conducting this research study. The authors would also like to thank all those who assisted in collecting and reviewing data in this study.

Conflict of Interest

The authors hereby state that there is no conflict of interest in publication of this paper.

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DOI: <http://doi.org/10.5281/zenodo.20354400>

Funding Statement

There are no specific grants or funding sources for this research from any organization, public, private or non-profit sectors.

Ethical Approval

Ethical clearance for this study was obtained from the concerned institution, and informed consent was also obtained from all the subjects.

References

1. Alwhaibi M, Alhindi G, Alshamrani M, Essa M, Al Alooka N, Alhawassi T. Pharmacovigilance in healthcare education: students' knowledge, attitude and perception: a cross-sectional study in Saudi Arabia. BMC Medical Education. 2020;20.
2. World Health O. The Importance of Pharmacovigilance: Safety Monitoring of Medicinal Products: World Health Organization; 2002.
3. Alharf A, Alqahtani N, Saeed G, Alshahrani A, Alshahrani M, Aljasser N, et al. Saudi Vigilance Program: Challenges and lessons learned. Saudi Pharm J. 2018;26(3):388-95.
4. Reumerman M, Tichelaar J, Piersma B, Richir MC, van Agtmael MA. Urgent need to modernize pharmacovigilance education in healthcare curricula: review of the literature. Eur J Clin Pharmacol. 2018;74(10):1235-48.
5. Khan L, Al-Harthi S, Saadah O, Al-Amoudi A, Sulaiman M, Ibrahim I. Impact of pharmacovigilance on adverse drug reactions reporting in hospitalized internal medicine patients at Saudi Arabian teaching hospital. Saudi medical journal. 2012;33:863-8.
6. Alhamoudi A, Alnattah A. Pharmacy education in Saudi Arabia: the past, the present, and the future. 2018.

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7. Elkalmi R, Hassali M, Mohamed Ibrahim MI, Widodo R, Alefan Q, Abdul Hadi M. Pharmacy Students' Knowledge and Perceptions About Pharmacovigilance in Malaysian Public Universities. *American journal of pharmaceutical education*. 2011;75:96.
8. Prakasam A, Nidamanuri A, Kumar S. Knowledge, perception and practice of pharmacovigilance among community pharmacists in South India. *Pharm Pract (Granada)*. 2012;10(4):222-6.
9. Beckmann J, Hagemann U, Bahri P, Bate A, Boyd IW, Dal Pan GJ, et al. Teaching pharmacovigilance: the WHO-ISoP core elements of a comprehensive modular curriculum. *Drug Saf*. 2014;37(10):743-59.
10. Goel D. Impact of educational intervention on knowledge, attitude, and practice of pharmacovigilance among nurses. *Archives of Medicine and Health Sciences*. 2018;6:32.