

# A Descriptive Cross-Sectional Study Exploring Perceptions and Attitude of Pharmacists towards Adverse Drug Reporting in Pakistan

Madeeha Malik\*, Aneela Amin and Azhar Hussain

<sup>1</sup>Director and Professor, Hamdard Institute of Pharmaceutical Sciences, Hamdard University, Islamabad, Pakistan

<sup>2</sup>Hamdard Institute of Pharmaceutical Sciences, Hamdard University Islamabad, Pakistan

<sup>3</sup>Dean and Professor, Hamdard Institute of Pharmaceutical Sciences, Hamdard University, Islamabad, Pakistan

Received: July 11, 2018; Accepted: August 08, 2018; Published: August 31, 2018

\*Corresponding author: Madeeha Malik, Professor and Director, Hamdard Institute of Pharmaceutical Sciences, Hamdard University Islamabad, Pakistan, Email: madeehamalik15@gmail.com

## Abstract

**Objective:** The main objective of the study was to explore the perceptions' and attitudes of pharmacists regarding ADR reporting in the 2 major cities of Pakistan: Islamabad (the national capital) and Rawalpindi (its twin city).

**Methodology:** A validated semi-structured questionnaire was distributed to a random sample of 382 pharmacists. Data was cleaned, coded and analyzed using SPSS vs. 16.

**Results:** The results showed that 83.2% of the pharmacists were familiar with the term pharmacovigilance and 95.2% thought that it is important to report an ADR. On the other hand, only 38.7% of the pharmacists were of the view that pharmacist is well trained to report an adverse drug reaction in Pakistan. Only 7% of the pharmacists agreed on effective and efficient working of current pharmacovigilance centre's in Pakistan and 91.3% strongly emphasized on improvement of current pharmacovigilance practice in Pakistan.

**Conclusion:** The findings concluded that concept of ADR monitoring is still not matured in Pakistan and there is need to develop monitoring systems to implement the idea of pharmacovigilance seriously in Pakistan.

**Keywords:** Attitude; Adverse drug reporting; Pharmacist; Perceptions;

## Introduction

Monitoring of drug safety has become an integral part of clinical care and has increased responsibility on pharmacist to manage medication therapy by providing effective pharmaceutical care. Pharmacists have been working as an important link between prescriber and patients from centuries and their roles have recently become more diversified and patient oriented than just dispensing and inventory management [1]. They have been currently involved in disease prevention and health promotion, improving treatment outcomes through patient counseling, avoiding drug interactions and detecting

adverse drug reactions [2]. They are the key players of healthcare team to ensure safe drug use and should be actively involved in surveillance of drug related issues [3]. Pharmacist's knowledge of drugs and clinical therapeutics place them in a better position to identify ADRs [4]. Pharmacist led monitoring system at the hospital are effective in detecting ADRs of newly marketed drugs, where as pharmacy computer system, as not designed to be patient focused, is not able to identify patients taking newly marketed drugs which should be under strict surveillance [5]. Meta analysis of literature reveals that pharmacist has helped to improve outcomes including reduction in ADRs and medication errors by providing their services as a clinical pharmacist which in turn has improved medication adherence. Besides this patient counseling at the time of discharge and telephone follow up has resulted in identification of preventable ADEs [6-10]. The concept of Pharmacovigilance is in its initial stages in Pakistan. An ADR reporting form is available at Drug Regulatory Authority of Pakistan (DRAP) website. More than 500 national pharmaceutical industries and 20 multinational pharmaceutical companies are working in Pakistan meeting approximately 70% of the country's medicinal needs but no pharmaceutical participation towards pharmacovigilance has been reported by them [11-13]. A cross sectional study from Lahore shows that 80% of the hospitals have no proper ADR monitoring system, only 1 hospital is having online reporting system, 4 hospitals are targeting specific ADRs, while few of the hospitals have only ADR monitoring policy [14]. Another study from Karachi concluded that senior pharmacy students are motivated to practice pharmacovigilance activities during clerkship as well as during their professional career [15]. Pharmacists can play an important role in preventing adverse drug reactions and ensuring safe use of drugs by actively participating in ADR monitoring activities, but for this it is necessary to evaluate perceptions and attitudes of pharmacists regarding ADR monitoring. Thus, the present study has been designed to explore the perceptions' and attitudes of pharmacists regarding ADR reporting in twin cities of Pakistan.

## Methodology

### Study design

A descriptive cross-sectional study design was used to evaluate the perceptions among different groups of pharmacists towards ADR reporting in twin cities of Pakistan. National bioethical committee is present in the country for granting permission for survey research and it states that only institutional head approval is needed for this type of study. However, approval was obtained for the study from the Ethical Committee of Hamdard University. Beside this, approval for the data collection was also taken from MS of hospitals, chief executives of pharmaceutical industries, proprietors of community pharmacies, director of pharmacy institutions and respective heads of regulatory authorities.

### Study population, sample size and sampling of respondents

This study was conducted from September to December 2015. The sampling frame was comprised of professionally qualified pharmacists working in private and public sector in twin cities (Islamabad and Rawalpindi) of Pakistan. Due to the absence of a database indicating the exact number of registered pharmacists in the country, as a general rule of thumb for sample size calculation, the current population of registered pharmacist was considered ( $N = 20,000$ ), a sample size of 382 was required to achieve 95% confidence level with 5% margin of error using Raosoft® sample size calculator. Six groups of pharmacists were formed (academia, hospital, industry, regulatory authority, community pharmacy and marketing) composed of 60-80 respondents in each group. Pharmacists working in fields of academia from five academic institutions, hospitals pharmacists working in eight public and 13 private hospitals, community pharmacists working at fifty community pharmacies, pharmacists working at twenty industries, marketing and regulatory authority were included as study respondents for data collection.

### Study tool

A semi-structured questionnaire was developed through extensive literature review and focus group discussions. Two focus group discussions were carried out at different time intervals with 4 different groups of experts including academicians from pharmaceutical and management sciences, hospital and community pharmacists. Each group comprised 3-4 participants for the development, finalization, face and content validity of the data collection tool. Pilot testing was carried out on 38 pharmacists (10%) of the total sample size representing all the groups of pharmacist from academia, hospital, industry, regulatory authority, community pharmacy and marketing before conduction of the final study. A Cronbach alpha value of 0.682 confirmed the reliability and internal consistency of the questionnaire. The questionnaire consists of five sections.

The first section included information regarding pharmacist's demographic characteristic. Section two includes questions to evaluate knowledge and perceptions of pharmacists regarding ADR monitoring and reporting, fourteen questions have been used to evaluate how pharmacists perceive their role in ADR monitoring. Five point liker scale from strongly agree to strongly disagree was used to assess responses in tool. Section three includes questions to evaluate attitudes of pharmacist regarding ADR reporting, how often they are involved in ADR reporting. Four point scale from never to frequently have been used to evaluate involvement of pharmacists in ADR reporting. Section four evaluates the causes of under reporting of ADRs. Section five consists of open ended question regarding suggestions of respondents for improving ADR reporting in Pakistan.

### Data collection and analysis

Two teams, one in each city, with 10 data collectors in each team, were trained by the group of experts including the principal investigator. The questionnaire was hand-delivered to pharmacists by the data collectors. Informed and verbal consent for participation was taken from the respondents. The questionnaires were self-completed by the pharmacists and were collected from them on the same day. After data collection, data was cleaned, coded and entered in SPSS version 16. Skewness tests were performed and histograms with normal curves were used to check the normal distribution of data. Descriptive statistics of frequency and percentage were calculated.

## Results

### Demographics

Out of the total 382 pharmacists, 62.83% ( $n=240$ ) were males and 37.17% ( $n=142$ ) were females. In terms of qualification 78.3% ( $n=299$ ) were B-Pharm/Pharm-D, 19.9% ( $n=76$ ) were having MPhil degree and 1.83% ( $n=7$ ) were PhD. Twenty two percent ( $n=85$ ) of the respondents were working in pharmaceutical industry, 16.23% ( $n=62$ ) were engaged in academia, 27.55% ( $n=105$ ) were working in hospitals, 12.3% ( $n=47$ ) in marketing, 20.68% ( $n=79$ ) at community pharmacies and 1.05% ( $n=4$ ) were from regulatory authority [Table 1].

### Perceptions of pharmacists regarding adverse drug reactions reporting in twin cities of Pakistan:

Most of the pharmacists, 83.25% ( $n=318$ ) were familiar with the term pharmacovigilance and 95.29% ( $n=364$ ) thought that it is important to report an ADR. Ninety three percent ( $n=356$ ) of them agreed on involvement of pharmacist as the chief personnel in development of adverse drug reaction reporting system and thought that adverse drug reporting should be made mandatory for practicing pharmacists.. Only few of the respondents 7.07% ( $n=27$ ) agreed that current pharmacovigilance centers are working effectively and efficiently in Pakistan [Table 2].

**Table 1: Demographics**

Indicators		Rawalpindi n (%)	Islamabad n (%)	Total n (%)
Gender	Male	71 (61.74)	169 (63.29)	240 (62.83)
	Female	44 (38.26)	98 (36.70)	142 (37.17)
Qualification	B-Pharm/Pharm-D	98 (85.21)	201 (75.28)	299 (78.3)
	MPhil	15 (13.04)	61 (22.84)	76 (19.9)
	PhD	2(1.74)	5(1.87)	7(1.83)
Occupation	Industry	12(10.43)	73(27.34)	85(22.25)
	Academia	5(4.35)	57(21.35)	62(16.23)
	Hospital	38(33.04)	67(25.09)	105(27.5)
	Marketing	26(22.61)	21(7.86)	47(12.3)
	Community Pharmacy	34(29.56)	45(16.8)	79(20.68)
	Regulatory	0	4(1.49)	4(1.05)
Sector	Public	11(9.56)	26(9.73)	37(9.68)
	Private	104(90.43)	241(90.26)	345(90.3)
Experience	< 1year	55(47.82)	116(43.44)	171(44.76)
	1 – 5 years	47(40.86)	127(47.56)	174(45.55)
	6-10 years	10(8.69)	19(7.12)	29(7.59)
	>10 years	3(2.61)	5(1.87)	8(2.1)

**Table 2: Perceptions of pharmacists regarding adverse drug reactions reporting in twin cities of Pakistan**

Indicators	Rawalpindi			Islamabad			Total		
	Strongly Disagree + Disagree n (%)	Neutral n (%)	Strongly Agree+ Agree n (%)	Strongly Disagree+ Disagree n (%)	Neutral n (%)	Strongly Agree+ Agree n (%)	Strongly Disagree+ Disagree n (%)	Neutral n (%)	Strongly Agree+ Agree n (%)
Are you familiar with the term pharmacovigilance?	5 (4.35)	10(8.69)	100(86.95)	18(6.74)	31(11.61)	218 (81.64)	23(6.02)	41(10.7)	318 (83.25)
Do you think reporting of adverse drug reaction is important?	0	6(5.22)	109(94.78)	6(2.24)	6(2.24)	255(95.50)	6(1.57)	12(3.14)	364 (95.29)
Do you think Pharmacists are the chief personnel to be involved in development of adverse drug reaction reporting system?	7(6.08)	0	108(93.91)	9(3.37)	10(3.74)	248(92.88)	16(4.19)	10(2.62)	356 (93.2)
Do you think that adverse drug reporting should be made mandatory for practicing pharmacists?	0	4(3.48)	111(96.52)	4(1.5)	15(5.62)	248(92.88)	4(1.05)	19(4.97)	359(94)
Do you think that reporting an Adverse drug reaction is a pharmacist's duty?	6(5.22)	12(10.43)	97(84.35)	14(5.24)	33(12.36)	220(82.4)	20(5.23)	45(11.78)	317 (82.98)
Do you think current pharmacovigilance centers are working effectively and efficiently in Pakistan?	86(74.78)	21(18.26)	8(76.52)	207(77.53)	41(15.35)	19(7.12)	293(76.70)	62(16.23)	27(7.07)
In your opinion does the current pharmacovigilance practice needs to be improved in Pakistan?	1(0.87)	6(5.22)	108(93.91)	13(4.87)	13(4.87)	241(90.26)	14(3.66)	19(4.97)	349 (91.36)

In your opinion, do you think Pharmacist is well educated to report an adverse drug reaction in Pakistan?	26(22.61)	22(19.13)	67(58.26)	57(21.35)	73(27.34)	137(51.31)	83(21.73)	95(24.87)	204 (53.40)
In your opinion, do you think Pharmacist is well trained to report an adverse drug reaction in Pakistan?	36(31.30)	24(20.87)	55(47.82)	96(35.95)	78(29.21)	93(34.83)	132(34.55)	102(26.7)	148 (38.74)
Do you think health care professionals needs to work in collaboration for facilitating adverse drug reaction reporting?	1(9.56)	4(3.48)	110(95.65)	13(4.49)	21(7.86)	233(87.26)	14(3.66)	25(6.54)	343 (89.79)
Do you think that there should be an adverse drug reaction monitoring centre in every hospital in Pakistan?	0	5(4.35)	110(95.65)	11(4.12)	13(4.86)	243(91.01)	11(2.9)	18(4.71)	353 (92.41)
In your opinion, do you think drug regulatory authority of Pakistan should initiate training programs on adverse drug reaction reporting?	2(1.74)	4(3.48)	109(94.78)	8(2.99)	10(3.74)	249(93.26)	10(2.60)	14(3.66)	358 (93.72)
Do you know that there is adverse drug reaction reporting form available at drug regulatory authority of Pakistan website?	45(39.13)	32(27.83)	38(33.04)	73(27.34)	91(34.08)	103(38.57)	118(30.89)	123(32.2)	141 (36.91)
Are you interested in participating in adverse drug reaction reporting system?	2(1.74)	14(12.17)	99(86.08)	7(2.62)	19(7.12)	241(90.26)	9(2.36)	33(8.64)	340 (89.00)

### Attitudes of pharmacists regarding adverse drug reactions reporting practices in twin cities of Pakistan

The frequency of discussing an adverse drug reaction with their pharmacist colleague was: never 10.73% (n=41), rarely 24.34% (n=93), sometimes 46.6% (n=178) and frequently 18.32% (n=70). Out of the total respondents, only 9.95% (n=38) of the pharmacists frequently discuss an adverse drug reaction with the prescriber, 28.27% (n=108) sometimes, 37.43% (n=143) rarely discuss and 24.34% (n=93) never discuss an adverse drug reaction with the prescriber. Ten percent of pharmacists (n=40) never counsel patient about ADR, while 23.82% (n=91) rarely, 34.82 (n=133) sometimes and 30.9% (n=118) of pharmacists frequently counsel patient about adverse drug reactions [Table 3].

### Opinions of pharmacists regarding improving the current practices for ADR reporting

Only twenty seven percent (n=108) of the pharmacists ever

reported an ADR they came across, while 71.73% (n=274) of pharmacists never reported an ADR. Five percent (n=20) of pharmacists submit the report to supervisor/chief pharmacist, 1.83% (n=7) of pharmacists submit the report to drug regulatory authority, 12.30% (n=47) of pharmacists submit the report to prescribers, 4.71 (n=18) of pharmacists submit the report to concerned authority within organization in which they were working, while 3.93% (n=15) of pharmacists didn't answer the question. The suggestions given by the pharmacists for effective ADR reporting in Pakistan were: training (n = 206, 31.69%), establishment of proper ADR reporting system (n=259, 39.85%), need to improve interaction between healthcare workers (n=107, 16.46%), recognition of role of pharmacist in healthcare system (n=61, 9.38%), improvement of overall healthcare system (n=11, 1.69) and publication of reported ADR's by the concern authority (n=6, 0.92) [Table 4].

**Table 3:** Attitudes of pharmacists regarding adverse drug reactions reporting practices in twin cities of Pakistan

Indicators	Rawalpindi				Islamabad				Total			
	Never n (%)	Rarely n (%)	Sometimes n (%)	Frequently n (%)	Never n (%)	Rarely n (%)	Sometimes n (%)	Frequently n (%)	Never n (%)	Rarely n (%)	Sometimes n (%)	Frequently n (%)
How often do you discuss an adverse drug reaction with your pharmacist colleague?	9(7.82)	28(24.35)	59(51.30)	19(16.52)	32(11.98)	65(24.34)	119(44.57)	51(19.10)	41(10.73)	93(24.34)	178(46.6)	70(18.32)
How often do you discuss an adverse drug reaction with the prescriber?	24(20.87)	43(37.39)	36(31.30)	12(10.43)	69(25.84)	100(37.45)	72(26.97)	26(9.74)	93(24.34)	143(37.43)	108(28.27)	38(9.95)
How often do you counsel patient about adverse drug reactions?	10(8.69)	27(23.48)	36(31.30)	42(36.52)	30(11.23)	64(23.97)	97(36.33)	76(28.46)	40(10.47)	91(23.82)	133(34.82)	118(30.9)

**Table 4:** Opinions of pharmacists regarding improving the current practices for ADR reporting

Indicators	Rawalpindi n(%)	Islamabad n(%)	Total n(%)	
Do you report adverse drug reactions that you came across?	Yes	29(25.21)	79(29.59)	108(28.27)
	No	86(74.78)	188(70.41)	274(71.73)
If yes, where did you submit the report?	To supervisor/chief pharmacist	5(4.34)	15(5.62)	20(5.23)
	To drug regulatory authority	0	7(2.62)	7(1.83)
	To prescriber	14(12.17)	33(12.36)	47(12.30)
	To concerned authority within organization	7(6.087)	11(4.12)	18(4.71)
	Not applicable	87(75.65)	188(70.41)	275(71.99)
	No comment	2(1.74)	13(4.87)	15(3.93)
If No, why you did not report it? (What are the main reasons?)	Unawareness of how to report an ADR	19(15.45)	30(10.79)	49(12.22)
	Workload	6(4.88)	10(3.60)	16(3.99)
	No ADR reporting center	38(30.89)	98(35.25)	136(33.91)
	Never came across an ADR	12(9.78)	27(9.71)	39(9.72)
	Out of scope of respective field of work	8(6.50)	13(4.68)	21(5.24)
	Not applicable	28(22.76)	78(28.06)	106(26.43)
	No answer	12(9.76)	22(7.91)	34(8.48)
What measures you suggest to be taken for effective Adverse Drug reporting in Pakistan?	Initiate training programs for healthcare staff	60(31.58)	146(31.74)	206(31.69)
	Establishment of proper ADR reporting system	75(39.47)	184(40)	259(39.85)
	Need to improve interaction between healthcare workers	33 (17.37)	74(16.1)	107(16.46)
	Recognize role of pharmacist in healthcare system	13(6.84)	48(10.43)	61(9.38)
	Improvement of overall healthcare system	7(3.68)	4(0.87)	11(1.69)
	Concern authority should Publish reported ADRs	2(1.05)	4(0.87)	6(0.92)

## Discussion

Strengthening of national pharmacovigilance system can contribute towards improving drug safety issues as well as maintaining global database of ADRs for collaborating with Uppsala Monitoring centre. Probing is required to estimate the impact of under reporting and effects of intervention to improve ADR reporting. The results of the present study showed that although most of the pharmacists were familiar with the term pharmacovigilance and considered it important to report ADRs but still involvement of pharmacist as chief personnel in ADR reporting program in Pakistan is inadequate. They considered it as professional obligation and emphasized on mandatory reporting for the practicing pharmacists in Pakistan. These results were consistent with results of various studies conducted in different countries in which pharmacists have been extensively involved in ADR reporting and importance of ADRs has been emphasized by them [8, 16, 17, 18, 19]. The results of the present study showed that majority of the pharmacists were not satisfied with current ADR monitoring practices in Pakistan and considered current pharmacovigilance centers ineffective and inefficient, although most of them were of the view that pharmacist is well educated to report an ADR but they are not familiar with the mechanism of ADR reporting in Pakistan. However, still majority of the pharmacists were interested to participate towards ADR reporting system in Pakistan. Similar findings were reported from India [20]. The present study showed that most of the pharmacists sometimes discuss an ADR with pharmacist colleague and few of them discuss an ADR with prescriber. The results of the present study are consistent with findings of a study conducted in Saudi Arabia which reported rare discussion of pharmacists regarding ADR with other healthcare professionals [1]. Similarly the present study reported inadequate reporting and patient counseling regarding ADRs. The findings reported from various studies also highlighted low patient counseling regarding ADRs [8, 21, 22].

The current study reported that most common factors for not reporting ADRs were lack of ADR reporting center and knowledge regarding ADR reporting mechanism. Similar findings were reported from studies conducted in Saudi Arabia, Jordan and Malaysia [1, 9, 22]. The present study highlighted the need of devising an appropriate ADR reporting system along with effective training programs for pharmacists on ADR reporting. Similar findings were reported from the studies conducted in Saudi Arabia, turkey and India [21, 22, 23].

## Conclusion and Recommendations

The results of the present study concluded that although pharmacists have positive perceptions and attitudes towards ADR reporting but still reporting rate is low mainly due to the absence of ADR reporting centers and lack of awareness regarding mechanism of ADR reporting in Pakistan. As the idea of pharmacovigilance is in its primitive stages in Pakistan, shared care model of involving multiple stakeholders in ADR reporting should be introduced in Pakistan health care facilities that can improve pharmaceutical care in Pakistan. This highlights the need for further research which can assess the need and

acceptability of the right model to be adopted for ADR reporting in the healthcare system of Pakistan.

## References

1. Mansour Adam Mahmoud, Yazeed Alswaida, Thamir Alshammari, Tahir Mehmood Khan, Alian Alrasheedy, Mohamad Azmi Hassali, et al. Community pharmacists' knowledge, behaviors and experiences about adverse drug reaction reporting in Saudi Arabia. *Saudi Pharm J.* 2014;22(5):411-418. Doi: 10.1016/j.jsps.2013.07.005
2. Munir Pirmohamed, Sally James, Shaun Meakin, Chris Green, Andrew K Scott, Thomas J Walley, et al. Adverse drug reactions as cause of admission to hospital: prospective analysis of 18 820 patients. *BMJ.* 2004;329(7456):15-19. Doi: 10.1136/bmj.329.7456.15
3. Herdeiro M.T, Adolfo Figueiras, Jorge Polónia, J J Gestal-Otero. Influence of pharmacists' attitudes on adverse drug reaction reporting. *Drug Saf.* 2006;29(4):331-340.
4. Phansalkar S, Hoffman JM, Nebeker JR, Hurdle JF. Pharmacists versus nonpharmacists in adverse drug event detection: A meta-analysis and systematic review. *Am J Health Syst Pharm.* 2007;64(8):842-849.
5. Angela Emerson, Richard M. Martin, Mark Tomlin, Ronald D. Mann. Prospective cohort study of adverse events monitored by hospital pharmacists. *Pharmacoepidemiology and Drug Safety.* 2001;10(2):95-103. Doi: 10.1002/pds.574
6. van Grootheest AC, van Puijenbroek EP, de Jong-van den Berg LT. Contribution of pharmacists to the reporting of adverse drug reactions. *Pharmacoepidemiol Drug Saf.* 2002;11(3):205-210. Doi: 10.1002/pds.702
7. Bhuvan K.C, A.A. Alrasheedy, M.I.M. Ibrahim. Do community pharmacists in Nepal have a role in adverse drug reaction reporting systems?. *Australas Med J.* 2013;6(2):100-103. Doi: 10.4066/AMJ.2013.1544
8. Sundos Qassim, Zakia Metwaly, Mohammed Shamsain, Yassin Al Hariri. Reporting adverse drug reactions: evaluation of knowledge, attitude and practice among community pharmacists in UAE. *IOSR Journal of Pharmacy.* 2014;4(4):17-23.
9. Suyagh M, D. Farah, R.A. Farha. Pharmacist's knowledge, practice and attitudes toward pharmacovigilance and adverse drug reactions reporting process. *Saudi Pharm J.* 2015;23(2):147-153. Doi: 10.1016/j.jsps.2014.07.001
10. Gonzalez-Gonzalez C, Lopez-Gonzalez E, Herdeiro MT, Figueiras A. Strategies to improve adverse drug reaction reporting: a critical and systematic review. *Drug Saf.* 2013;36(5):317-328. Doi: 10.1007/s40264-013-0058-2

11. Jawaid, S.A. DRAP should come up with its Vision and Mission Statement besides short and long term plans. *Pulse International*. 2015;16(4).
12. Mahmood K.T, Fatima Amin, Minaa Tahir, Ikram Ul Haq. Pharmacovigilance-A need for best patient care in Pakistan. A review. *Journal of Pharmaceutical Sciences and Research*. 2011;3(11):1566-1584.
13. Atif, M, Mahmood Ahmad, Quaratulain Saleem, Louise Curley, Muhammad Qamar-uz-Zaman, Zaheer-Ud-Din Babar. Pharmaceutical policy in Pakistan, in *Pharmaceutical Policy in Countries with Developing Healthcare Systems*. Springer. 2017;25-44.
14. Mustafa G, Saeed-ur-Rasheed, Muhammad Tahir Aziz. Adverse drug reaction reporting system at different hospitals of Lahore. An evaluation and patient outcome analysis. *J App Pharm*. 2013;713-719.
15. Shakeel Sadia, Iffat Wajiha, Anjum Fakhshsheena, Bushra Rabia, Ibrahim Sadaf, Shafiq Shajya. Emerging need of Pharmacovigilance: Perspectives of future pharmacist in Pakistan. *International Journal of Pharmacy Teaching & Practices*. 2014;5(2):966-969.
16. Upadhyaya H.B, Vora MB, Nagar JG, Patel PB. Knowledge, attitude and practices toward pharmacovigilance and adverse drug reactions in postgraduate students of Tertiary Care Hospital in Gujarat. *J Adv Pharm Technol Res*. 2015;6(1):29-34. Doi: 10.4103/2231-4040.150369
17. Bawazir S.A. Attitude of community pharmacists in Saudi Arabia towards adverse drug reaction reporting. *Saudi Pharmaceutical Journal*. 2006;14(1):75-83.
18. Hailua, W, Akshaya Srikanth Bhagavathula, Endalkachew Admassie, Isha Patel, Tahir Mehmood Khan. Knowledge, attitude and practices towards adverse drug reaction reporting in Gondar, Ethiopia. *JPHSR*. 2014; Doi: 10.1111/jphs.12065
19. Ting K.N, D.M. Stratton-Powell, C. Anderson. Community pharmacists' views on adverse drug reactions reporting in Malaysia: a pilot study. *Pharm World Sci*. 2010;32(3):339-342. Doi: 10.1007/s11096-010-9382-0
20. Ahmad A, Patel I, Balkrishnan R, Mohanta GP, Manna PK. An evaluation of knowledge, attitude and practice of Indian pharmacists towards adverse drug reaction reporting: A pilot study. *Perspect Clin Res*. 2013;4(4):204-210. Doi: 10.4103/2229-3485.120168
21. Prakasam A, A. Nidamanuri, S. Kumar. Knowledge, perception and practice of pharmacovigilance among community pharmacists in South India. *Pharm Pract (Granada)*. 2012;10(4):222-226.
22. Elkalmi R.M, Hassali MA, Ibrahim MI, Jamshed SQ, Al-Lela OQ. Community Pharmacists' Attitudes, Perceptions, and Barriers toward Adverse Drug Reaction Reporting in Malaysia: A Quantitative Insight. *J Patient Saf*. 2014;10(2):81-87. Doi: 10.1097/PTS.0000000000000051
23. Toklu H Z. and M K Uysal. The knowledge and attitude of the Turkish community pharmacists toward pharmacovigilance in the Kadikoy district of Istanbul. *Pharm World Sci*. 2008;30(5):556-562. Doi: 10.1007/s11096-008-9209-4