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Assessment of Knowledge, Attitudes and Practice among the Medical and Pharmacy Students towards Pharmacovigilance and Adverse Drug Reactions in Abbottabad, Pakistan

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Abstract

Introduction: Pharmacovigilance plays a significant role in the rational use of medicines by providing information about adverse drug reactions (ADRs). This study is mainly aimed at evaluating and assessing the knowledge, attitude and practice towards pharmacovigilance and ADR's amongst Pakistani pharmacy and medical students in various pharmacy and medical colleges in Abbottabad, Pakistan.

Method: A cross-sectional study was conducted using KAP questionnaire. The questionnaire comprise of three portions, consisted of a total of 21 questions, 13 (Qs: 1-13) were related to the "knowledge", 6 (Qs: 14-19) were related to "attitude" and the remaining 2 (Qs: 13-15, 19-20) were related to the "practice" aspects.

Results: The total 200 pharmacy and medical students provided their response. More than half of them (n = 103, 51.5%) were females and 48.5% (n = 97) were males. Overall the pharmacy students had a high score (30.50) as compared to the medical students (27.97). Majority of the respondents (n = 189, 94.5%) considered reporting ADR should be made compulsory, also most respondents (n = 168, 84%) accepts reporting ADR as their professional responsibility. Majority of the respondents (n = 128, 64%) were of opinion that reporting is a combined duty of doctors, pharmacists and nurses.

Conclusion: As both, pharmacy and medical students showed low KAP scores which indicate that there is a need for regular education and training of the students regarding pharmacovigilance and ADR management.

Keywords: Pharmacovigilance; Adverse drug reactions; Knowledge; Attitude; Practice; Medical students; Pharmacy students; Abbottabad; Pakistan

Introduction

The history of pharmacovigilance goes back to more than 40 years [1]. The global interest in the monitoring of drug safety showed a remarkable increase in the last four decades especially after the thalidomide disaster in the sixties [2]. The thalidomide disaster opened up the issue of drug safety for the public and healthcare professionals alike and brought about an awareness of the importance of the systemic surveillance "Pharmacovigilance" which focuses on numerous activities which are exclusively intended to improve patient care, and avoidance of ADR or any other drug-related problem (DRP) [3].

The World Health Organization (WHO) defines pharmacovigilance as "science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other possible drug-related problems" [4]. World Health Organization (WHO) defines Adverse Drug Reactions (ADR) as "a response to a drug that is noxious and un-intended and occurs at doses normally used in man for prophylaxis, diagnosis or therapy of disease, or for modification of physiological function" [4]. A meta-analysis of 39 prospective studies reported an overall incidence of serious ADRs in hospitalized patients of 6.7% and of fatal ADRs of 0.32% [5]. The fatality rate makes ADRs the fourth to sixth leading cause of death in the USA. Another meta-analysis of 36 studies indicated that approximately 5% of hospital admissions are due to ADRs [6]. The costs of ADRs are estimated to be $1.56-$4 billion in direct hospital costs per year in the United States [7]. Once place onto the market, a medicine exits the secure scientific environment of clinical trials and is legally allowed for use by the general population [8]. The information gathered during the pre-marketing phase of drug development is unavoidably deficient with

regard to possible ADRs [9]. Therefore, it is necessary that new and medically still evolving treatments are monitored for their effectiveness and safety under real-life conditions post release. Experience has shown that many adverse effects, interactions (i.e., with foods or other medicines) and risk factors come to light only during the years after the release of a medicine [8]. In Pakistan, a National Health Policy (NHP) exists and its 2009 draft states and promotes the rational use of drugs [10], and by promoting rational use of drugs ADR's can be prevented [11].

The National Drug Policy (NDP) does not include the component of pharmacovigilance as such, but states that an Adverse Drug Reaction Monitoring Centre will be established and will also undertake post-marketing surveillance studies of newly registered drug products containing newly developed drug substance and also advocates the monitoring of adverse drug reactions [12]. The implementation of NDP remained very poor. There is neither any system nor any organization related to pharmacovigilance which is an emerging concept and process vital for delivery of safe and effective drug therapy. In Pakistan, there are legal requirements requiring the Marketing Authorization holder to constantly monitor the safety of their products and report to the Medicines Regulatory Authority (MRA). Laws about monitoring ADR

exist in Pakistan. A national Pharmacovigilance center linked to the MRA does not exist in Pakistan [13]. An official standardized form for reporting ADRs is used in Pakistan (Appendix B) [14].

A national ADR database does not exist in Pakistan. In the past 2 years, no ADR reports were sent to the WHO database in Uppsala. ADRs are not monitored in public health programs (example: TB, AIDS) [13]. This study is mainly aimed at evaluating and assessing the knowledge, attitude and practice towards pharmacovigilance amongst Pakistani pharmacy and medical students. This would provide valuable knowledge on the issue of ADR reporting and which can contribute to the development and evaluation of the pharmacovigilance system.

The specific objectives of this study are:

1. To evaluate the knowledge, attitude and practice towards ADR reporting system amongst pharmacy students.

2. To evaluate the knowledge, attitude and practice towards ADR reporting system amongst medical students.

3. To determine barriers considered by reporters towards ADR reporting and the practice of pharmacovigilance.

This study has many important implications that can provide health care policy makers and planners with useful data to explore the current status of pharmacovigilance in Pakistan. The study is the first of its kind in Pakistan that will evaluate the factors that could possibly affect ADRs reporting and monitoring among healthcare professionals and pharmacists in particular. The result of the study will help in developing and improving the ADR reporting procedure. The study will help to determine the lack of practice of Pharmacovigilance in Pakistan despite the fact that ADR reporting is a part of Pakistan medicine policy [12].

Assessing knowledge and attitude towards pharmacovigilance will provide valuable data on the issues of pharmacovigilance and ADRs reporting can be utilized to develop, improve and further evolutions of the pharmacovigilance system.

Methodology

Study design

A cross-sectional study was conducted to assess the knowledge, attitude and practice (KAP) toward pharmacovigilance among the medical and pharmacy students in Abbottabad region (KPK, Pakistan).

Study participants and sample size

The sample size was calculated using "Raosoft sample size calculator" to be 323 (% error: 5%, Confidence level: 95%, Population size: 2000, Response Distribution: 50%). The inclusion criteria for students; who are in their fourth (4th) or fifth (5th) pharmacy or medical professional year will be eligible for filling the questionnaire. The students who were absent and not willing to participate were excluded from this study.

Study site

Four medical college students and students of two universities having department of pharmacy was included. The medical colleges were Ayub medical college Abbottabad, Abbottabad International medical college Abbottabad, Women medical college Abbottabad and Frontier medical college Abbottabad. The pharmacy departments of universities were COMSATS institute of information technology (Abbottabad campus) and Women institute of learning Abbottabad.

Survey methodology

It was a questionnaire based study in which a KAP questionnaire (Appendix A) was developed and distributed among students and was given a time of 1 day to fill and then return to the concerned person. The questionnaire consists three portions which describes three attributes, i.e., knowledge, attitude and practice towards pharmacovigilance. It consisted of a total of 21 questions. Among these questions, 13 (Qs: 1-13) were related to the "knowledge", 6 (Qs: 14-19) were related to "attitude" and the remaining 2 (Qs: 13-15, 19-20) were related to the "practice" aspects (practice related questions designed to be fit for students). Each correct answer and each positive response were given a score of "2" whereas the negative response or wrong answers were given a score of "1". The maximum possible score was "42". The Cronbach alpha value of the questionnaire was calculated to be 0.711. The questionnaire was distributed among the students and asked to return in one day to the concerned person (returning period was extended, for some institutes on the request of some respondents). Each college/university was covered at separate dates and the filled questionnaires were collected on the designated dates.

Data analysis

The filled KAP questionnaires were analyzed as per the study objectives. The various independent variables like age, gender, educational qualification, and dependents variable (KAP scores) were analyzed using SPSS 17.0 software. SPSS was used for data entry and for performing statistics (Descriptive statistics). The mean, SD and total score were compared among different subgroups of respondents. An Independent t-test was used for comparing the scores of the subgroups with "two groups" and ANOVA for the subgroups with 'more than two groups'. All tests were carried out at a significance level of 0.05.

Result

The total 200 pharmacy and medical students provided their response. More than half of them (n = 103, 51.5%) were females and 48.5% (n = 97) were males. Majority of the respondents (n = 198, 99%) were within the age group of 21-30 year. Among the respondents more than half of them were pharmacy students (n = 109, 54.5%) and 45.5% (n = 91) were medical students. The demographic details of the respondents are tabulated in Table 1.

Knowledge, attitude and practice scores

Overall the pharmacy students had a high score (30.50) as compared to the medical students (27.97). The mean scores of the respondents classified based on the educational qualification are given in Table 2.

Interrelation of the knowledge, attitude and practice scores of the professionals with their demographic profiles

There was a positive relation between the "gender" and "professional status" (P-values of 0.001and 0.000 respectively) with the KAP scores of the respondents as p-values are less than 0.05 (P < 0.05). While as compared to age and professional status, no such relation was found between age of the correspondents and the KAP scores. The details are given in Table 3.

Response of professionals to knowledge related questions

There were 13 knowledge related questions. Among the respondents almost half (n = 96, 48%) were able to define ADR correctly and 42.0% (n = 84) were able to define pharmacovigilance correctly. Only 12% (n = 24) respondents were aware of the location of international monitoring

		Frequency (%)
Gender	Male	97 (48.5)
	Female	103 (51.5)
Age	Up to 20 years	0
	21-30 years	198 (99)
	31-40 years	2 (1)
Profession	Medical	91 (45.5)
	Pharmacy	109 (54.5)
Professional year	4th	97 (48.5)
	5th	103 (51.5)

Table 1: Demographic details of the healthcare professionals (n = 200).

Students	**Mean (SD)**			
	Knowledge [Max 26]	**Attitude [Max 12]**	**Practice [Max 4]**	**Total Score [Max 42]**
Medical (n = 91)	16.41 (2.48)	8.93 (1.47)	2.66 (0.73)	27.97 (3.04)
Pharmacy (n = 109)	18.13 (2.91)	9.64 (1.28)	2.77 (0.72)	30.50 (2.77)
Total (n = 200)	17.35 (2.47)	9.32 (1.41)	2.72 (0.73)	29.35 (3.15)

Table 2: Mean KAP scores of the respondents.

		Scores (SD)	P-value
Gender	Male (n = 97)	28.59 (3.29)	0.01
	Female (n = 103)	30.07 (2.86)	
Age	Up to 20 (n = 0)	0 (0)	0.132
	21-30 (n = 198)	29.38 (3.12)	
	31-40 (n = 2)	26.0 (5.65)	
Professional status	Medical Students	27.97 (3.04)	0.000
	Pharmacy Students	30.50 (2.77)	

Table 3: Association of the KAP scores with respondents' demography (n = 200).

center for ADR. Among the respondents only 30% (n = 52) knew pharmacovigilance being a component of NMP of Pakistan. While half of the respondents (n = 103, 51.5%) knew about the existence of ADR form used for reporting ADR's in Pakistan. Further details are shown in Table 4.

Responses of the professionals to the attitude related questions

There were 6 attitude related questions. In general the respondents had a good attitude towards ADR and Pharmacovigilance. Majority of the respondents (n = 189, 94.5%) considered reporting ADR should be made compulsory, also most respondents (n = 168, 84%) accepts reporting ADR as their professional responsibility. More than half of the respondents (n = 117, 58.5%) were in opinion that pharmacovigilance center should be established in every hospital.

Respondents gave their views on the important factors that may discourage a Health care Professional (HCP) from reporting ADR. They were, no reward or compensation for reporting (n = 33, 16.5%); lack of time required for reporting (n = 59, 29.5%); single unreported case may not affect ADR database (n = 19, 9.5%); non availability of reporting center (n = 39, 19.5%) and 10% (n = 20) respondents considered all these factors to be important.

Majority of the respondents (n = 128, 64%) were in opinion that reporting is a combined duty of doctors, pharmacists and nurses, while 28% (n = 56) mentioned it to be the responsibility of pharmacists, followed by doctors (n = 9, 4.5%) and nurses (n = 7, 3.5%). The details regarding responses of these questions are given in Table 5.

Responses of the professionals to the practice related questions

There were 2 practice related questions. It was found that only one fourth (n = 51, 25.5%) of the respondents were ever trained on

Questions	Number	Percent
Definition of ADR is	96	48.0
The types of ADR's	79	39.5
Definition of Pharmacovigilance	84	42.0
The important purpose of Pharmacovigilance is	71	35.5
Which of the following methods is commonly employed by the pharmaceutical companies to monitor adverse drug reactions of new drugs once they are launched in the market?	103	51.5
The international center for adverse drug reaction monitoring is located in	24	12.0
One of the following is a major risk factor for the occurrence of maximum adverse drug reaction	44	22.0
Which one of the following is the 'WHO online database' for reporting ADRs?	21	10.5
In case a serious adverse event in Pakistan is observed where it should be reported?	90	45.0
Is there an ADR reporting form exist in Pakistan?	103	51.5
Does a national or regional/district Pharmacovigilance center linked to the MRA (Medicine Regulatory Authority) exist in Pakistan?	55	27.5
Does the National Drug Policy include the component of Pharmacovigilance?	58	30.0
Are there training courses in Pharmacovigilance in Pakistan?	52	26.0

Table 4: Responses of the professionals to the knowledge related questions (Students answering correctly).

reporting ADR. The details regarding the responses for these questions are listed in Table 6.

Discussion

It is the first study of its kind that evaluated the KAP of among pharmacy and medical students concerning ADRs and pharmacovigilance. Overall, the KAP scores of the students were low. Pharmacy students had a high score as compared to the medical students, which necessitate the requirement of educational intervention at undergrad level to improve the knowledge and practice of pharmacovigilance. As ADRs is the fourth and sixth leading cause of deaths, therefore pharmacovigilance must be included in health care system.

The World Health Organization (WHO) defines Pharmacovigilance as "science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug related problems." The ultimate aim of Pharmacovigilance is to ensure safe and rational use of medicines, once they are released for use by general public. The most important result of Pharmacovigilance is the prevention of negative effects of pharmacotherapy that affects the patient [9].

Pharmacovigilance programs have played a major role in detection of ADRs and banning of several drugs from the market after approval included benoxaprofen, cerivastatin, cisapride, Domperidone (injectable), valdecoxib, and sibutramine. Therefore, Pharmacovigilance is one of the important post-marketing tools in ensuring the safety of pharmaceutical, herbals and related health products [1,15,16].

The spontaneous reporting system is the most efficient warning system of adverse drug reactions (ADRs); however, under-reporting of ADRs is one of the major problems associated with pharmacovigilance programs [17].

The major reasons for underreporting include, the ADR is not serious, and the ADR is already known, uncertainty concerning the causal relationship between the ADR and the drug, Lack of time, Lack of interest, only severe ADRs need to be reported, Fear of appearing ridiculous for reporting merely suspected ADR's, practice of carrying out less urgent tasks in preference to more urgent ones, difficulty to determine whether or not a drug is responsible for a particular adverse reaction, and complacency (only safe drugs are allowed on the market). While the knowledge and attitudes of health professionals appear to

be strongly related with reporting [18,19]. Therefore, one of the better ways to improve the reporting and to overcome underreporting is to increase the KAP of the healthcare professional concerning ADR monitoring and pharmacovigilance programs.

In this study, factors discussed that may lead to under-reporting were, no reward or compensation for reporting (n = 33, 16.5%); lack of time required for reporting (n = 59, 29.5%); single unreported case may not affect ADR database (n = 19, 9.5%); non availability of reporting center (n = 39, 19.5%) and 10% (n = 20) respondents considered all these factors that may lead to under-reporting.

A study conducted in Malaysia, also reported insufficient knowledge about pharmacovigilance and ADR reporting among final year pharmacy students in Malaysian public universities and also pharmacy students poorly understands the concept of pharmacovigilance [20].

A survey among undergraduate pharmacy students in Nigeria on ADR reporting and other pharmacovigilance activities showed deficient knowledge in the respective fields which were attributed to the absence of content of pharmacovigilance in the curricula; ultimately lack of knowledge may lead to under-reporting [21].

A survey conducted in India showed that the knowledge of ADRs and Pharmacovigilance activity was poor in undergraduate medical students, and need the urgent attention on priority basis, not only for the success of the Pharmacovigilance program, but for the better clinical management of the patients in general [22].

Another survey conducted in India among medical students, interns and post graduates (PG's) showed that medical students have less knowledge, and awareness about pharmacovigilance as compared to interns and PG's, which showed that educational intervention is required at undergrad level [23].

Similar trends were observed in this study, where both pharmacy and medical students showed overall lower KAP scores, both showed lower knowledge scores indicating that intervention is required to improve knowledge of future professionals at undergraduate level, however among students pharmacy students showed better knowledge scores as compared to medical students. Despite lower knowledge, both, medical and pharmacy students showed better attitude towards pharmacovigilance, most of the students (94.5%) considered that reporting of adverse drug reaction should be made compulsory, also (83.5%) of the respondents advocates pharmacovigilance to

Questions	Number	Percent
The healthcare professionals responsible for reporting an ADR in a hospital is/are	128	64
Do you think reporting is a professional responsibility for you?	168	84.0
What is your opinion about establishing ADR monitoring center in every hospital?	117	58.5
Which among the following factors do you think discourage a health care professional from reporting Adverse Drug Reactions?	59	29.5
Do you think reporting of adverse drug reaction should be made compulsory?	189	94.5
Do you think Pharmacovigilance should be a part of curriculum?	167	83.5

Table 5: Responses of the professionals to the attitude related questions (Students answering yes/positive response).

Questions	Number	Percent
Have you anytime read any article on prevention of adverse drug reactions?	86	43.0
Have you ever been trained on how to report Adverse Drug Reaction (ADR)?	51	25.5

Table 6: Responses of the professionals to the practice related questions (Students answering 'yes').

be the part of the curriculum, while (84%) considered reporting to be their professional responsibility. Regarding attitude, pharmacy students showed better attitude scores than medical students towards ADR and pharmacovigilance. These findings advocate the need for interventions to improve the KAP of both pharmacy and medical students. Pharmacists are recommended as they play an immense role in educating other HCP's regarding prevention, detection and reporting of ADRs [24]. A lower KAP score recognized in this study further positioned the pharmacist as the main stakeholder requiring educational and training intervention in order to improve the KAP of the healthcare professionals in the area of pharmacovigilance and ADR's.

Of the total medical and pharmacy students in Abbottabad region, only 200 students were studied. Thus, the findings might or not represent the overall perspectives of the medical and pharmacy students about ADR's and pharmacovigilance. Moreover, this study was conducted in only one city and hence difficult to extrapolate the study findings to the entire country. Another limitation of this study was the lack of any intervention strategies to improve KAP of the students.

As the study clearly indicates the lower knowledge towards pharmacovigilance among pharmacy and medical students, so it is recommended to conduct educational intervention to improve knowledge of future HCP's, as well as pharmacovigilance should be included in the curriculum. As only small proportion of student have ever been trained on reporting ADR's, so training sessions should be made part of the professional study courses. Although, reporting ADR's is a part of Pakistan's NDP, however no center linked to MRA exists, so a pharmacovigilance center should be established at national level which should be linked to International monitoring center. It is also recommended that further studies should be conducted which evaluate the KAP of students, both before and after educational intervention, and it is also recommended to conduct similar studies among practicing health care professionals.

Conclusion

Pharmacovigilance is combinations of various activities which are exclusively intended to improve patient care, by avoiding ADR's related to drug use and ensure drug safety and rationality of drug use. Pharmacovigilance plays a significant role in safe and effective use of drugs in post marketing scenario. Thus, pharmacovigilance should be a part of every health care setting.

Regarding the study, the pharmacy and medical students showed relatively better attitude but limited knowledge and practice towards ADRs and pharmacovigilance. There is a need for continuous educational strategy for the doctors, and the pharmacists. Non-inclusion of pharmacovigilance and ADR reporting in the pharmacy curriculum is probably ascribed with deficiency in knowledge of undergraduate pharmacy and medical students on ADR reporting and other pharmacovigilance activities, as well as lack of specialized training programs can lead to lack of practice of pharmacovigilance or can be a reason for under-reporting or non-reporting. As future pharmacy practitioners, pharmacy students need to be well grounded in pharmacovigilance activities to reduce the incidence of ADR under-reporting. Furthermore, the role of the pharmacist as a member of the healthcare team and in direct patient care does not exist in Pakistan which will be a foremost test for the graduating pharmacist. It is a need of time that a specialized pharmacovigilance center with specialized members should be established at national level for the monitoring of ADR's and for ensuring drug safety.

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