# **Medication Safety : Perceptions and Gaps among Medical Undergraduates**

**ABSTRACT**

**Introduction**

Medication errors occur in all clinical domains, affecting all populations from neonates to elderly. A medication error is any error occurring in the medication-use process. It is a global health concern, since it affect patients and cost the healthcare system billions of dollars annually. Providers should take an active role in maintaining safe medication practices by taking time to instruct patients on when and how to take medications and discuss potential side effects and drug-drug interactions. Modern medicine medical students being the future of health care development should have sufficient knowledge along with a positive attitude and precise practice measures for implementing medication safety. There is paucity of studies regarding this and hence the objective was to describe the knowledge, attitude and practice on medication safety among second year MBBS students of Government Medical College in Kerala.

**Method**

This cross-sectional study was conducted in September 2022 in association with Pharmacovigilance awareness week. All the second MBBS students were requested to participate in the study. A validated questionnaire was prepared by the investigators referring to previous studies and it consisted of 25 questions (9 questions each for knowledge and attitude , 7 questions for practice). The questionnaire was administered as Google Fill Out Form .

**Results**

 Among the 167 students of second MBBS ,144 responded giving a response rate of 86.23%. Most of the students were unaware about the precise concept of Pharmacovigilance(83.3%) and root cause analysis in medication safety( 85.4%).The mean total Knowledge score was 3.98±1.736 and the median total Attitude and Practice scores were 6( Interquartile Range-2) and 5( IQR-1) respectively.

**Conclusion-** Majority of the students had positive attitude and satisfactory practice skills even though the knowledge is poor. This necessitates the need of further awareness classes and programme addressing medication safety.

Keywords – Medication safety, Medication errors, Pharmacovigilance

**INTRODUCTION**

The medication use process is a complex entity and may result in errors which are multifaceted and affecting all range of population in every clinical sphere.1 The medication safety framework has a conceptual model that integrates the structure, process and outcome quality concepts which are relevant to it.1The Committee on Data Standards for Patient Safety defines an error as ‘‘the failure of a planned action to be completed as intended (that is, error of execution) or the use of a wrong plan to achieve an aim (error of planning).2 The burden on healthcare system amounts to billions of dollars annually due to medication errors and adverse reactions.3

Providers should take an active role in maintaining safe medication practices by taking time to instruct patients on when and how to take medications and discuss potential side effects and drug-drug interactions.2 Medication process has different stages like medical prescribing, transcribing, dispensing, administering and monitoring and medication error can happen at any stage of medication process.4 Differences in occurrence of drug related problems in different places may be due to the differences in diseases, prescribing practices, genetics, diet habits and use of herbal remedies which has specific toxic problems.5

Since use of medications and adverse drug events are two sides of the same coin, the success of pharmacovigilance depends on participation of healthcare professionals, degree of reporting and proper intimation to the Pharmacovigilance centers.5 Medical students being the future of health care development should have sufficient knowledge along with a positive attitude and precise practice measures for implementing medication safety. There is paucity of studies that address the knowledge, attitudes and practice of medical undergraduates towards medication safety. The objective of this study was to describe the knowledge, attitude and practice on medication safety among second year MBBS students of Government Medical College in Central Kerala.

**MATERIALS AND METHODS**

This was a cross sectional study carried out for a period of one month in September 2022 among Second Professional MBBS students in Department of Pharmacology, Government Medical College, Kottayam as a part of the Pharmacovigilance Awareness Week conducted in association with Pharmacovigilance Programme of India (PvPI). All the second MBBS students were requested to participate in the study. A questionnaire was prepared by the investigators referring to previous studies and it was validated for content and time by experts. It consisted of 25 questions (9 questions each for knowledge and attitude, 7 questions for practice).4,5 The questionnaire was piloted among 10 participants and the Cronbach’s alpha was found to be 0.56. The questionnaire was administered as Google Fill Out Form to second year medical students. Out of the 167 students, only 148 attempted the Google Fill Out Form out of which 4 students refused to give consent and hence were excluded from the study.

 The data recorded were entered in MS Excel Spreadsheet. Statistical analysis was performed using SPSS software, version 16. Descriptive analysis were used to present the results as percentages and frequencies.

**RESULTS**

Among the 167 students of second MBBS ,144 responded giving a response rate of 86.23%. The mean age was 21± 1.39 years. As shown in Figure 1 Gender distribution of the respondents showed 63.2 % were females ,32.6% were males and 4.2 % didn’t prefer to disclose gender.

Figure 1 - Gender distribution

Table 1 summarises the knowledge of the participants on medication safety and pharmacovigilance. As shown in Table 1, even though majority of the participants knew what an augmented ADR is(79.9%) and the International Centre for ADR reporting was at Sweden(96.5%), a vast majority could not correctly point out the World Health Organisation(WHO) definition of pharmacovigilance (16.7%), concepts in medication error like root cause analysis, just culture and rule based error. The questions on WHO online database of ADR reporting, patient safety challenges and key action areas of medication safety were also correctly answered by only 14.6%,49.3% and 542% respectively.

Table 1 : Knowledge on medication safety and pharmacovigilance

|  |  |  |
| --- | --- | --- |
| Questions | Correct responseN (%) | Wrong responseN (%) |
| Pharmacovigilance is the study that relates to **detection, assessment, understanding and prevention of adverse effects** | 24(16.7%) | 120(83.3%) |
| Augmented Drug Reaction is **dose Dependent, common in occurrence, rarely fatal** | 115(79.9%) | 29(20.1%) |
| International Centre of ADR Monitoring is located in **Sweden** | 139(96.5%) | 5 (3.5%) |
| The WHO online database for reporting ADRs is **Vigibase** | 21(14.6%) | 123(85.4%) |
| Root cause analysis in medication safety is a **method which identifies and prevents problems after they occur** | 21(14.6%) | 123(85.4%) |
| Just culture in medication safety **encourages people to speak up about mistakes** | 72 (50%) | 72(50%) |
| Key action area to be addressed to improve medication safety as per WHO is **polypharmacy** | 78(54.2%) | 66(45.8%) |
|  Prescribing oral treatment in a patient with dysphagia is **rule based error** | 32(22.2%) | 112(77.8%) |
|  Second Patient Safety Challenge Declared by the WHO is **Safe Surgery Save Lives** | 71(49.3%) | 73(50.7%) |

Table 2 – Attitude based questionnaire

|  |  |  |
| --- | --- | --- |
| Questions | Positive Attitude | Negative Attitude |
| N (%) | N (%) |
| I support direct ADR reporting by the patients  | 130(90.3%) | 14(9.7%) |
| I worry about the legal problem while I think about ADR | 56(38.9%) | 88(61.1%) |
| I think ADR reporting is a professional obligation  | 23(16%) | 121(84%) |
| I believe ADR reporting should be made mandatory for practicing doctors | 134(93.1%) | 10(6.9%) |
| My participation in the Pharmacovigilance Sensitization programme was due to genuine interest | 95(66.0%) | 49(34%) |
| I think involvement of students in Pharmacovigilance Sensitization should be made mandatory | 40(27.8%) | 104(72.2%) |
| I think Medication Safety Programme should be included in the Medical Curriculum | 144(100%) | 0 |
| I think heading zero (0.5) is a must while writing the dose of the drug | 137(95.1%) | 7 (4.9%) |
| I think prescribing generic drugs is mandatory | 101(70.1%) | 43(29.9%) |

Table 3– Practice based questionnaire

|  |  |  |
| --- | --- | --- |
| Questions | Positive Practice | Negative Practice |
| N (%) | N (%) |
| If I cannot read out the name of the drugs in the case sheet, I will report to the senior doctor. | 123(85.4%) | 21(14.6%) |
| I have reported an ADR | 15(10.4%) | 129(89.6%) |
| I have been trained on how to report ADRs | 140(97.2%) | 4(2.8%) |
| I have taken Over the Counter Medication | 112(77.8%) | 32(22.2%) |
| I have read (gone through) the medication prescribed to patients in the wards | 121(84%) | 23(16%) |
| I have watched insertion of canula to patients in the wards | 125(86.8%) | 19(13.2%) |
| I have noticed the high-risk medication chart in the nursing station | 48(33.3%) | 96(66.7%) |

The mean Knowledge score of the study participants was 3.98±1.736 [95% Confidence Interval 3.69-4.27] out of 9 with a minimum score of 1 and maximum 8. The median attitude and practice scores were 6[Interquartile range IQR 2] and 5[IQR 1]. We could not find any association of gender with knowledge attitude or practice.

**DISCUSSION**

This study was done to describe the perceptions of medical undergraduates on medication safety. According to the present study, only 16.7% correctly stated the definition of Pharmacovigilance while 79.9% responded that augmented drug reactions are common, dose dependent and rarely fatal. Less than one-fifth correctly identified the WHO database for ADR as Vigibase, however 96.5% correctly answered that the International centre for ADR Monitoring was located in Sweden. More than half of the participants responded that the key action area to be addressed to improve medication safety as per WHO is Polypharmacy. Most of the students were unaware about root cause analysis in medication safety (85.4%). Though 130(90.3%) participants supported direct ADR reporting by the patients instead of health care professionals, 61.1% were worried about the legal problem while they thought about ADR. 84% participants thought ADR reporting is a professional obligation to them and 93.1% believed that it should be made mandatory for practicing doctors**.** Only two third participated in the Pharmacovigilance Sensitisation programme because of genuine interest, however all the participants opined that Medication Safety Programme should be included in the Medical Curriculum. 70.1% thought that prescribing generic drugs should be made mandatory. This positive attitude was as a result of the Pharmacovigilance awareness programme conducted by our department in the Pharmacovigilance awareness week. More than four fifth participants stated that in the event of problem arising in reading the case sheet they would request the help of the senior doctors. 84% had gone through the medication part of any patient in the ward and only 33.3% had noticed the high-risk medication chart in the nursing station. Although 97.2% stated they have been trained on how to report an ADR only one tenth of the participants have reported an ADR. Around 77.8% stated that they had taken Over the counter medication. The participants had satisfactory practice skills.

Medication safety and its significance is undervalued in India. A study conducted in a tertiary hospital shows that majority of the medication errors are transcription errors followed by prescription as well as administration errors. The doctors need to be vigilant during prescribing and verifying the medication charts.6

 In the study by Gaude et al., 73.7% of participants responded the definition of pharmacovigilance correctly and 72.6% were well aware of the purpose of pharmacovigilance. 86.3% participants knew the definition of ADRs correctly, but only 18% could identify the types of ADRs.7 Similarly Marko et al., found that more than 60% and 73. 68% responders have knowledge about pharmacovigilance and ADR reporting, respectively. About 58% second year students, 52.5% pre-final year students and 66.66% interns correctly knew about the location of WHO-UMC.8 Aghakouchakzadeh et al., found that among the 40 participants, 8% had a general knowledge about the general concept of medication errors and the cause of medication errors, while 55% were aware of their responsibility of ADR reporting and the types of ADRs which should be reported.9

In the study by Gaude et al., 67.3% participants answered positively toward attitude related questions. 97.9% participants agreed that it is necessary to report ADR. However 11% students stated that fear of legal consequences might be another reason for underreporting.7 Studies by Marko et al as well Aghakouchakzadeh et al, show that majority of the participants supported that reporting ADRs is a professional obligation.7,8  Half of participants stated that medication errors were inevitable events.9 A study done in Kerala found that the attitude towards ADR reporting was good however the knowledge about ADR reporting system was inadequate among medical students.10

In the study by Gaude et al,, 38.9% participants had identified an ADR in a patient, but only 6.3% reported the ADR to their superiors. However only 19.9% participants answered positively about practice-related questions.7Marko et al and Aghakouchakzadeh et al opined the ADR reporting practice was low in the first year student participants though Marko et al., reported higher percentage of ADR reporting trained students and interns. 7,8According some studies among the hospital pharmacists the authors highlighted a narrow knowledge about the concept and process of Pharmacovigilance and spontaneous ADRs reporting system. However, these pharmacists had positive attitudes, but very little practice with reporting systems.4,9A review article on pharmacovigilance suggested the need of developing a unified Pharmacovigilance education intervention which would adequately prepare the medical students to rationally report ADRs.11

A study on medication errors in the general public states the importance of implementing medication errors reporting system in India. They suggested that educational interventions as well as electronic prescribing can contribute lower incidence of medication errors.12 A similar study done among the health care providers of Palestine also point towards the low knowledge about medication errors and need of national reporting systems.13 A study done in Saudi Arabia pointed that efforts to all levels of prescribing and adoption of optimum practices by the entire medical team would help in improving the medication safety at the hospital level.14 A study among the nurses on medication errors suggested the importance of educational and training programs on medication error reporting which would enhance comprehension of medication errors and reporting their occurrence accordingly.15

Limitations of this study is that this is a single centre study and those students who participated in the pharmacovigilance sensitisation programme was included in the study.

**CONCLUSION**

Majority of the students had positive attitude and satisfactory practice skills even though the knowledge is inadequate. Inadequate knowledge of Pharmacovigilance is associated with a high degree of underreporting of ADRs. This necessitates the need of further awareness classes and programmes addressing medication safety.

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