RESEARCH ARTICLE

# HOW CONFIDENT ARE THE STUDENTS AND INTERNS TO PRESCRIBE – AN ASSESSMENT BASED ON THEIR VIEWS AND SUGGESTIONS?

**Background:** One of the main goals of the pharmacology curriculum in undergraduate medical education is to prepare medical students for the task of prescribing medications rationally with confidence.
**Aims & Objective:** To study the self-perceived confidence to prescribe of 3rd year medical students and fresh interns who are about to begin their internship. To examine their views on how well their undergraduate pharmacology training has prepared them to prescribe confidently and to know how they wanted the undergraduate pharmacology curriculum to be modified so as to improve the ability and confidence to prescribe.
**Materials and Methods:** Student and intern perceptions were obtained using a preformed questionnaire. Most of the questions were of yes/no type. Few close-ended questions were assessed using a 5-point likert scale. Qualitative data on participant views and suggestions was collected and analysed using simple descriptive statistics. Where relevant chi-square test was used to determine any significant difference and a p value of < 0.05 was considered as significant.
**Results:** 34 (29%) interns and 42 (36%) students feel that their undergraduate therapeutics training has not prepared them to prescribe safely and rationally. At the same time students were more confident in calculating the paediatric drug doses [54 (46.5%) versus 29 (24.7%) p<0.05] and IV infusion rates [32 (27.5%) versus 13 (11.1%) p<0.05] when compared to the interns. 70% (81/116) students and 64% (75/117) interns wanted the pharmacology practical to be more clinically relevant and suggested for hospital real time/bedside pharmacology teaching.
**Conclusion:** The findings demonstrate a lack of preparedness among the respondents to prescribe medications confidently suggesting that their undergraduate pharmacology curriculum was inadequate. Deficiencies and suggestions presented by the respondents should be considered and addressed.
**Key Words:** Clinical Pharmacology and Therapeutics; Prescription Writing; Undergraduate Pharmacology Teaching; Medical Education; Prescribing Confidence

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## INTRODUCTION

Prescribing is the basic task which has to be performed by most doctors in order to influence their patients' health – whatever specialization medical graduates decide to pursue, most will have to remain 'specialists' in drug prescribing.[1] Pharmacology, as a basic medical science subject, provides the scientific basis of therapeutics i.e. the scientific foundation for safe and rational prescribing of drugs.[2] Medical students are provided courses in both basic and clinical pharmacology during their 2nd and 3rd year of under graduation so that they are adequately trained to prescribe drugs when they graduate.

Recently there has been a widespread concern internationally regarding the inadequate undergraduate (UG) pharmacology teaching and the high incidence of prescribing errors by junior doctors during their training.[3] Significant data is emerging from different parts of the world that highlights the shortfalls in basic pharmacological knowledge and prescribing skills among medical graduates. Feedback from medical students show they do not feel prepared to prescribe. Junior doctors are neither confident nor competent in writing a prescription eliciting the lack of undergraduate education in prescribing.[4]

In an earlier study conducted in India, students doing their first year post graduation felt their UG teaching did not prepare them to prescribe rationally or safely. Ninety-two percent of them felt that UG clinical pharmacology and therapeutics (CPT) teaching should be improved.[5] In a similar study conducted on foundation year 1 doctors in UK, it was found that they were unsatisfied with their UG CPT teaching and felt incapable of prescribing rationally and safely. Only 32% respondents considered themselves 'competent to prescribe' at the point of graduation.[6] Hence it has been recognized that undergraduate and postgraduate education in prescribing needs to be examined to determine whether it is achieving the aims of creating safe and rational prescribers.[7]

Students are good curriculum experts, they have a general overview on the curriculum content and are the best

source for evaluating an educational programme. They are also an excellent source of new ideas and suggestions for improving the curriculum.[8] We undertook this study in order to assess the confidence for prescribing of medical graduates who are about to begin their internship and compare with 3rd year medical students who have completed their one and half year pharmacology training. We also planned to examine their views of on how well their pharmacology curriculum has prepared them to prescribe confidently and to know how they wanted the undergraduate pharmacology curriculum to be modified so as to improve their confidence to prescribe.

This study was undertaken in a medical college in Kerala, a southern state of India which has recently introduced various reforms in its medical curricula through establishing a single health university, Kerala University of Health Sciences (KUHS). The revised pharmacology curriculum introduced by KUHS gives more emphasis on teaching of clinical pharmacology and rational therapeutics. The present questionnaire based survey was carried out among the medical students and interns enrolled at the Calicut University, which prescribed the traditional pharmacology curriculum. The present study would help to identify the deficiencies of the traditional pharmacology curriculum as perceived by the students and interns. By considering the valid suggestions of the study participants a new learner centered curriculum can be formulated. Additionally our study can also serve as a reference point for the later assessment of the newly introduced pharmacology curriculum of the KUHS.

## MATERIALS AND METHODS

This was a cross-sectional, questionnaire-based study. The study was done in a private medical college and hospital in Kerala. The Study Subjects included, (i) Medical students (n=116) after the end of their one and half year of pharmacology training; and (ii) New Interns (n =117) who had recently graduated and about to begin their housemanship. A structured questionnaire was designed after minor modifications from the work of Tobaiqy et al[9] and Oshikoya et al[10]. The questionnaire sought information from the participants about their undergraduate training in pharmacology, their confidence to prescribe medications in special patient groups, their confidence to set up an intravenous line and to calculate the infusion rate of drugs and their confidence in accessing, assessing and analyzing drug related information. Most of the questions were leading and required either a yes or no response. The questionnaire also sought to assess deficiencies and gaps in the pharmacology training as perceived by the participants for which a blank space was provided for the interns and students to express their views.

They were asked to rate their present knowledge of pharmacology by a five point Likert scale ranging from very poor to excellent. They were also asked to provide a feedback regarding the adequacy of their pharmacology training and how well it has prepared them to prescribe safely and rationally. Suggestions to improve pharmacology teaching were also solicited. Their confidence to prescribe a list of commonly used drugs without supervision was assessed. Pharmacology topics which they feel, require much teaching, focus and coverage were asked to be listed.

Permission to conduct the study was sought from our institutional ethics committee. The participants were informed to maintain anonymity in the filling of the questionnaire. The questionnaire was administered to the participants after obtaining their informed consent to utilize the data for the purpose of research and publication. Simple descriptive statistics was used to generate frequencies, percentages and proportions. Where relevant Chi-square test was used to determine any statistical significance and a p value of $<0.05$ was regarded as significant. Qualitative statements were reduced to their simple meaning and were described in terms of the number of participants who expressed them.

## RESULTS

The response rate for our questionnaire based survey was 90% (17/130) among interns while among the students the response rate was 78% (116/148).

Table 1 shows how the respondents rated their present knowledge of pharmacology, where only 8 (6.8%) interns and 11 (9.4) students rated their present knowledge as good.

When asked whether their undergraduate pharmacology training had adequately prepared them to prescribe safely and rationally, only 25 (21.3%) interns and 34 (29.3%) students replied yes, 34 (29%) interns and 42 (36.2) students replied no while most of the interns 58 (49.5%) and 39 (33.6%) students were unsure. Majority of the respondents were not confident in prescribing for special patient groups like pregnant women, children, elderly and in patients with hepatic and renal disease (Table 2).

**Table-1:** Respondents' rating of their present pharmacology knowledge

| Respondents | Very Poor | Poor | Average | Good | Excellent |
|---|---|---|---|---|---|
| Interns | 04 (3.4%) | 19 (16.2%) | 85 (72.6%) | 08 (6.8%) | 0 |
| Students | 03 (2.5%) | 24 (20.6%) | 76 (65.5%) | 11 (9.4%) | 0 |

**Table-2:** Number of respondents confident of prescribing to special patient groups

| Medications | Interns | Students |
|---|---|---|
| Pregnancy | 15 (12.8%) | 15 (12.9%) |
| Children | 17 (14.5%) | 20 (17.2%) |
| Elderly | 36 (30.7%) | 30 (25.8%) |
| Hepatic and renal dysfunction | 09 (7.4%) | 16 (13.6%) |

**Table-3:** Number of Respondents confident of prescribing medications, unsupervised

| Medications | Interns | Students |
|---|---|---|
| Antimalarials | 24 (20.5%) | 47 (40.5%)* |
| Vitamins and minerals | 95 (81.1%)* | 82 (70.6%) |
| Antibiotics | 66 (56.4%) | 55 (47.4%) |
| NSAIDs | 91 (77.7%) | 81 (69.8%) |
| Antacids and Peptic ulcer healing drugs | 94 (80.3%) | 103 (88.7%) |
| Diuretics | 16 (13.6%) | 56 (48.2%)* |
| Antihistamines | 95 (81.1%)* | 67 (57.7%) |
| Laxatives | 65 (55.5%) | 73 (67.2%) |
| Inhalers for asthma/C0PD | 41 (35.0%) | 77 (66.3%)* |
| Sedatives | 12 (10.2%) | 26 (22.4%)* |
| Antiemetic | 81 (69.2%) | 79 (68.1%) |
| Antitussives & mucolytics | 75 (64.1%) | 82 (70.6%) |
| Vaccines | 60 (51.2%) | 42 (36.6%) |
| Anticonvulsants | 07 (05.9%)* | 24 (20.6%)* |
| Nitrates | 14 (11.9%) | 36 (31.0%)* |
| Corticosteroids | 25 (21.3%) | 35 (30.1%) |
| Opioids | 09 (07.6%) | 31 (26.7%)* |
| Antihypertensive | 23 (19.6%) | 65 (56.0%)* |
| Digoxin | 06 (05.1%) | 31 (26.7%)* |
| Antidepressants | 13 (11.1%) | 25 (21.5%)* |
| Antipsychotics | 03 (02.5%) | 19 (16.3%)* |
| Anti-diarrheal & Antispasmodics | 65 (55.5%) | 74 (63.7%) |
| Statins | 32 (27.3%) | 28 (24.1%) |
| Topical skin preparations | 74 (63.2%) | 67 (57.7%) |
| Oral contraceptives | 60 (51.2%) | 61 (52.5%) |
| Insulin and oral hypoglycaemic | 26 (22.2%) | 67 (57.7%)* |

* $p < 0.05$

As per our findings students were more confident of calculating the drug doses in children when compared the interns [54 (46.5%) versus 29 (24.7%) $p < 0.05$]. Similarly students also expressed more confidence in setting up an IV line and in calculating the infusion rate of intravenous drugs [32 (27.5%) versus 13 (11.1%) $p<0.05$]. The confidence of the students in accessing, assessing and analyzing any drug related information was better when compared to the interns. [58 (50.1%) versus 39 (33.3%) $p<0.05$]. Given a list of commonly used medications, the respondents were asked whether they are confident or not to prescribe any of these medications without supervision , majority of the respondents were confident to prescribe antacids, laxatives,vitamins, antihistamines, antiemetics, NSAIDs, antibiotics, and topical skin preparations. Significantly the students were confident of prescribing more number of medications than interns (Table 3).

When asked for the views and deficiencies regarding their undergraduate pharmacology training and suggestions for its improvement. The most common comment of the 64% (75/117) interns and 70% (81/116) students was regarding the futility of the pharmacology practical especially the animal experiments and pharmacy and the general suggestion was to replace these with pharmacology exercises having clinical application, to include bed side teaching in pharmacology and to make the teaching of pharmacology more interactive and interesting by using clinical scenarios and real examples. 15% (19/117) interns and 23% (27/116) students suggested to introduce new teaching and learning measures to improve the retention of pharmacological knowledge. Another common suggestion by 35% (41/117) interns and 30% (35/116) students was to include the teaching of trade names of drugs along with generic names and to give more importance to the teaching of commonly used drugs, drugs of choice, lifesaving drugs and drug dosages. 15% (17/117) of the interns wanted the pharmacology curriculum to be extended up to the final year of MBBS. They also suggested for complete changeover of the current examination pattern of the pharmacology practical to include clinical cases.

## DISCUSSION

The present study was undertaken to examine the undergraduate education in pharmacology wherein the self-perceived confidence to prescribe of medical students and new interns was assessed. The study also sought to identify the areas in undergraduate pharmacology education which students and interns considered to be deficient and inadequate.

As per the findings of our study, a significant proportion of our participants were unsure regarding the adequacy of their undergraduate pharmacology education in preparing them to prescribe safely and rationally. Most of the participants rated their present knowledge of pharmacology to be average. Our findings correlate with similar studies conducted in UK in which 74% of the respondents felt their training was inadequate[11] According to another study significant proportion of the participants agreed that their undergraduate education had not prepared or equipped them suitably to prescribe safely and rationally, and rated their knowledge of clinical pharmacology as poor suggesting the need for improved, focused and well-structured clinical pharmacology teaching.[9]

The results also reveal that only a small number of students and interns in our study were confident to prescribe to special patient groups like pregnant women, children, elderly and patients with hepatic and renal impairment. According to a well-executed study in UK, it was found that confident prescribing to special patient groups, was directly associated with specialist ward attachment and exposure to special patient groups in a hospital setting.[9] Our participants' lack of confidence suggests to a deficiency in their training in this regard especially the lack of clinical or applied aspects of how to prescribe to these special patient groups.

Another important finding of our study was the interns' relatively low confidence in several competencies when compared to the medical students especially in calculating the infusion rate of intravenous medications and pediatric drug doses. Errors in dose calculation form a significant part of prescribing errors.[12] Dose calculation taught in pharmacology is not reinforced in the clinical departments and there is a long gap between the teaching of pharmacology and the commencement of internship.[10] Hence teaching of the calculation of drug dosages and infusion rates in pharmacology should be followed by the teaching of the same in anaesthesia and paediatrics so as to reinforce the knowledge and skill of the students on this topic.[12] Skills for accessing, assessing and analyzing relevant pharmacological and therapeutic information, especially the new and recent concepts are necessary for effective prescribing.[13]

In our study the students' exhibited a greater level of confidence in the above skills. This may be due to their problem-based learning (PBL) of evidence based medicine (EBM) during their second year where in the students gained familiarity with these skills. This was not the case with the interns who were merely introduced to the principles of EBM as a part of pharmacology curriculum during their second MBBS. Given a list of commonly used medications, the respondents were asked whether they are confident or not to prescribe any of these medications without supervision , majority of the interns and students were confident of prescribing vitamins and minerals, antihistaminics, antacids and anti-ulcer drugs, NSAIDs, antiemetics and antitussives which have a relatively low risk of adverse reactions. But interestingly the students exhibited more confidence than interns in prescribing of digoxin, diuretics, antihypertensives, Insulin and oral hypoglycaemics, inhalers for asthma and anticonvulsants which are drugs mostly involved in severe and fatal adverse reactions and whose casual prescribing without due concern is not warranted. Confidence in prescribing comes from practice and familiarity with a particular drug on the ward.[14] It occurs that students may be overconfident about their prescribing ability regarding these drugs and this can further be explored through future studies incorporating an objective assessment.

Introducing bedside teaching, making the pharmacology practical more clinically relevant, using clinical scenarios and real examples to make teaching of pharmacology more interactive and interesting and introducing newer teaching and instructional methods to improve the retention of pharmacological knowledge were the common suggestions of the study participants which have repeatedly been suggested in all the previous studies involving participant feedback.[3,11,15-18]

A number of innovations have been carried out in pharmacology teaching and learning throughout the world.[19] Context learning has been found to be more successful and effective than sequential learning where in learning and applications of knowledge are separated.[16] Modifying the didactic lectures in pharmacology to include context-learning, i.e. by adding patient cases (clinical practice) and prescription writing (skills) can facilitate the speed of learning and recall.[20]

Implementing problem-based training in pharmacotherapy in undergraduate medical education based on national standard treatment guidelines has also been recommended as an important intervention to improve prescribing.[21] As in previous studies in India [16,18] Interns wanted the pharmacology curriculum to be extended and integrated with the final year clinical subjects. In many medical schools in developed nations pharmacology is taught throughout the undergraduate course[22] The benefits of the integration have been widely reported and the method has been recommended by the World Health Organization (WHO) as a core intervention to promote rational drug use.[10]

Changing of the current examination pattern was also suggested by some respondents. The present scheme of assessment is not related to the assessing of desired therapeutic and prescribing skills, but is mostly irrelevant as many skills which are assessed are not required for the making of a basic medical doctor.[23] Valid and reliable schemes of assessment should be introduced to ensure that students have achieved the desired curricular outcomes.[1]

There are some limitations to our study. Our study relied on self-perceived confidence of the participants rather than objective assessment of their prescribing skills and knowledge. The findings of our study are restricted to a single medical college and ours was a cross-sectional study, and we compared two different cohorts rather than following a single cohort of students till the start of their internship.

This study was undertaken before the new clinical pharmacology curriculum was introduced by the KUHS. Our findings may serve as guidance for further reforms and also as a baseline for comparison of outcomes after the implementation of the new curriculum.

## CONCLUSION

Lack of confidence in prescribing various medications and performing prescribing related tasks suggests that undergraduate training in prescribing was inadequate. Revised pattern of pharmacology teaching which is more learner centered, clinically oriented and well integrated should be introduced. Perceived deficiencies identified by students and interns which have already been expressed consistently by previous surveys should be taken seriously and addressed.

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