

# JOURNAL OF CLINICAL AND HEALTH SCIENCES

ORIGINAL ARTICLE

## Students' Perception of Teaching Methods in Pharmacology in a Malaysian Medical School

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**Received**

8<sup>th</sup> January 2016

**Received in revised form**

26<sup>th</sup> April 2016

**Accepted**

23<sup>rd</sup> May 2016

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### ABSTRACT

**Introduction:** The study attempts to evaluate the students' perception of pharmacology as a subject, its usefulness in future practice, teaching methods currently used, and their patterns of learning and preparing for exams. **Methods:** A structured, self-administered questionnaire was distributed to second year medical students. **Results:** Of the 125 students who participated, 22.73 % considered pharmacology more important than any other subject. The students found small group sessions most interesting followed by directed self-learning, computer aided learning and lectures. Of those who responded, 79 and 66 % suggested to increase the small group and directed-self-learning sessions respectively. Up to 40 % of the students felt that pharmacology teaching must be through case-based discussions and 20 % requested for more practical sessions. **Conclusions:** It appears that majority of students entering the medical schools has little prior knowledge of pharmacology. While going through the preclinical years they understood the importance of pharmacology and its application in future practice, however, they tend to develop interest in one or other topics. Students prefer to have a greater number of small group sessions as they feel that these sessions are most useful for learning. Majority of the students tend to use both the textbooks and lecture notes and study regularly for better performance in examinations. The students also preferred to have more case-based learning sessions incorporated into the small group sessions.

**KEYWORDS:** Pharmacology teaching, student perception, teaching methodologies

## INTRODUCTION

Pharmacology as a discipline is undergoing continuous development and is becoming an important component of all areas of medicine. Prescribing skills of newly graduated doctors largely depend upon good foundation in pharmacology. To acquire the necessary prescribing skills it is important that medical students appreciate pharmacological principles and understand their application in clinical situations [1]. To achieve these objectives, curriculum and teaching programs are undergoing tremendous changes so that students acquire not only the factual knowledge in pharmacology but can also be trained adequately for therapeutics [2, 3]. Active participation of students in learning sessions shows their interest in the subject and is an important factor that contributes to knowledge acquisition by the students. An earlier study involving students at the International Medical School and Faculty of Health and Life Science University (MSU),

Malaysia, found that the students did not consider pharmacology as an interesting subject [4]. It has also been noted that there is lack of standardization in the teaching of pharmacology and therapeutics across various undergraduate programmes in Malaysia [5]. Hence, the outcomes may differ among Medical Faculties in Malaysia.

The current curriculum at the Faculty of Medicine UiTM, which was implemented in 2009, incorporates pharmacology teaching from semester 1 till semester 4, in contrast to other medical schools in Malaysia where pharmacology is taught in the 3rd and 4th semesters. Teaching methodologies also vary among medical schools. The curriculum at UiTM, incorporates a number of tools, such as lectures, small group sessions, directed self-learning, computer aided learning and problem based learning sessions in the teaching of pharmacology. It is important to assess the effectiveness of curriculum delivery regularly and to know what the shortcomings are so that corrective actions may be taken. Student feedback is useful to

assess the effectiveness of curriculum delivery [6]. Hence, the present study was undertaken to gather students' perception about pharmacology as a subject, its usefulness in future practice, the teaching methods currently in use and their patterns of learning and preparing for examinations at the Faculty of Medicine, Universiti Teknologi MARA.

## METHODS

Participants were second year MBBS students in their last module of study and were due to appear for their final pre-clinical examination at the Faculty of Medicine, Universiti Teknologi MARA, Selangor, Malaysia. The study design was approved by the Institutional Research Committee. The validated questionnaire used in this study was a modified version of a questionnaire used in an earlier study [7] and consisted of 12 questions with 4-8 options. It did not require students to reveal their identity. The participants could mark one or more options in questions 1-7 and 10. Some questions provided an opportunity to students to write their own views about reforms in lectures or the teaching methodologies used. The main categories explored in the questionnaire were in reference to students' perception of pharmacology as a subject, teaching methodologies employed and the resources they utilized to learn pharmacology. A short briefing about the aims and objectives of the study was given to the students before they completed the questionnaires and the questionnaires were collected immediately upon completion. Data collected were analysed using test contained in the Statistical Package for Social Sciences (SPSS), Version 18. Frequency was expressed as percentage. Analysis of variance (ANOVA) and the post-hoc test were used to analyse the differences in the rating of various teaching modalities. A p value <0.05 was considered as statistically significant.

## RESULTS

One hundred and twenty five students were given the questionnaire and one hundred and eleven students answered all questions.

### A) Perception of pharmacology as a subject

Of the 110 students who answered this, 62.73 % knew a little about pharmacology but 27.27 % did not know the subject at all before being introduced in the 1st year. Only 1.82 % of the students admitted to being very familiar whereas 9.09 % thought they were somewhat familiar with pharmacology before the subject was introduced. However, none of them knew a lot about the contents of the subject.

While 39.09 % students considered pharmacology at par with other subjects, 26.36 % considered it as one of the few most important subjects and 22.73 % students considered the importance of pharmacology above all subjects. A small fraction (2.73 %) of students thought pharmacology as only a theoretical subject and is of less practical use. Interestingly, 9.09% students thought that it is of no use altogether.

Among the various topics in pharmacology, cardiovascular pharmacology was considered the most interesting topic (50.91 %) followed by respiratory (35.45 %) and endocrine pharmacology (31.82 %). Autacoids and general pharmacology was interesting for 13.64 and 12.73 % of the students respectively. A rather small number of students found central nervous system (6.36 %), gastrointestinal system (5.45 %), autonomic nervous system (4.55 %) and chemotherapy (3.64 %) interesting. Only 18.18 % of the students found all topics interesting. More than half of the students (56.36 %) were of the opinion that all topics in pharmacology will be useful in future. However, 20 % of the students thought cardiovascular pharmacology would be useful in future. Smaller proportions of students considered respiratory (6.09 %), GIT (5.27 %), general pharmacology (2.91 %), central nervous system (2.73 %), endocrine (2.28 %), autonomic nervous system (2.27 %) and chemotherapy (2.09%) useful in future.

### (B) Teaching methodologies

Of the teaching methodologies, more than half of the students (54.55 %) found small group sessions most helpful in learning, whilst 22.73 % of the students rated lectures as a useful tool for learning. Only 3.64 % students said that small group sessions are not useful and 10 % said that lectures are not useful for learning. Directed self-learning sessions were

considered useful by 44.55 % of students. Computer aided learning sessions were considered not useful for learning by 43.64 % of the students, and only 14.55 % of the students considered computer aided learning sessions useful. Only 3 students (2.73 %) responded that seminars are useful for learning while 60.91 % said that seminars do not help in learning. Majority of the students (87 %) showed preference for any one of the method of teaching (Table 1).

**Table 1** Students' responses showing relative usefulness of various teaching methods as learning tools

	Useful for learning	Not useful for learning
Lectures	22.73 %	10.00 %
Small group sessions	54.55 %	3.64 %
Computer aided learning	14.55 %	43.64 %
Seminars	2.73 %	60.91 %
Directed self-learning	44.55 %	6.66 %

Students rated the teaching sessions as: Always boring (0); Most boring, some interesting (1); Some interesting, some boring (2); Most interesting, some boring (3), Always interesting (4). The small group sessions were given the highest score with an average of  $2.38 \pm 1.19$ , followed by directed self-learning, computer aided learning, lectures and seminars with average scores of  $2.18 \pm 1.11$ ,  $2.05 \pm 1.21$ ,  $1.85 \pm 0.92$  and  $1.03 \pm 1.12$  respectively. Small group session ratings were significantly higher when compared to ratings for all other teaching modalities ( $p<0.05$ ).

Directed self-learning was rated with a significantly higher score than that of lectures and seminars but was comparable to the score for computer aided learning. Lectures scored significantly higher than seminars but significantly less than other teaching modalities (Table 2). None of the students found either small group sessions or lectures always boring but 44 % of the students said that seminars were always boring.

In terms of recommendation, 79.09 % of the students suggested an increase in small group session hours; 66 % suggested an increase in directed self-learning hours; 44 % of the students recommended an increase in the lectures and ; 43% suggested increasing the computer aided learning sessions (Table 2). Some of the representative comments from students about pharmacology teaching are presented in Table 3.

### C) Learning approaches and utilization of learning resources

For learning and preparing for examinations, 60 % of the students used both the lecture notes and text books whereas 22 % of the students admitted to relying only on lecture notes and 10.8 % of the students prepared their own notes. Only 8 students said that they used only textbooks. With regards to computer aided learning and seminars, 18 and 2 students, respectively, wanted more of these sessions.

Up to 45.45 % of the students responded that their pattern of studying pharmacology is regular because of progress test, which is held at the end of each module. However, students also said that they study pharmacology regularly to gain more knowledge (30 %) and because of their interest in it (15 %). There were also 7.91 % and 1.64 % of the students who studied only before progress test or for final examination, respectively.

Majority of the students (76.36 %) assessed their own grasping power as average. Only 10 % said that their grasping power was good while 9.09 % said that it was below average. Additionally, 4 students said that their grasping power is poor while 2 students said that they can never learn.

## DISCUSSION

The present study was carried out at the Faculty of Medicine, Universiti Teknologi MARA to gather students' perception about pharmacology as a subject, its usefulness in future practice, their opinion about the teaching methods currently in use and their patterns of learning and preparing for exams.

The content-related background knowledge of students is one of the key factors in determining how they will learn new information. However, in the current study, majority of students had little or no prior knowledge of pharmacology. Pazzani (1991) showed that prior knowledge can influence the rate of concept learning [8]. In another study, prior knowledge about the subject and ability were found to positively influence the self-efficacy [9]. In the current study, the possibility that insufficient prior knowledge could contribute to difficulties in grasping the conceptual knowledge was reflected in the response to another question when majority of the students rated their grasping power as average. This is in contrast to

another study in which 91 % of the students responded that they understood and had good grasp of the subject [10].

**Table 2** Students' responses showing the rating of various teaching methods and their recommendations to increase the sessions

	Rating (Mean ± SD)	Recommendation to increase the sessions
Lectures	1.85 ± 0.92*	43.64 %
Small group sessions	2.38 ± 1.19* #\\$	79.09 %
Computer aided learning	2.05 ± 1.21*	16.36 %
Directed self-learning	2.18 ± 1.11*#	66.36 %
Seminars	1.04 ± 1.12	1.82 %

Students rated the sessions as: 0 - Always boring, 1 - Most boring, few interesting, 2 - Some interesting, some boring, 3 - Most interesting, some boring, 4 - Always interesting

\*p<0.0001 versus seminars; # p<0.001 versus lectures; \\$ p<0.05 versus directed self-learning and computer aided learning.

**Table 3** Selected representative comments from 2<sup>nd</sup> year medical students on pharmacology teaching

1. Include more practical sessions and examples. (20 %)
2. Involve the students more and avoid monotonous lecturing (10 %).
3. Lectures only on important topics. (5.8 %)
4. Show more figures and graphs instead of text slides. (4.5 %)
5. Teaching is more descriptive rather than demonstrative. (11 %)
6. Computer-based modules were very useful to understand the topics. (8.5%)
7. Small group sessions are the most useful learning tools. (60 %)
8. Provide more time for self-learning. (59.60 %)
9. Pharmacology teaching must be a case-based learning. (40 %)

Pharmacology is unique among basic sciences as students follow it from preclinical to clinical years and beyond. The knowledge of pharmacology is essential to ensure a scientific basis for rational therapeutic decisions [11]. Understanding among students regarding the importance of pharmacology was evident as majority of the students considered it as one of the few most important subjects, important above all subjects or at par with other subjects. In another study done at a private medical school in Malaysia, majority of the students agreed that pharmacology has created a knowledge base that will help them with the rational choice of drugs during future practice [4].

In the current study, majority of students did not find CNS topics interesting. A similar observation was made in another study in which majority of the students responded that CNS topics were most difficult to understand [10]. Additionally, the observation that most students found cardiovascular pharmacology interesting and that cardiovascular pharmacology would be useful in future is in accordance with the

observations made in other studies [6, 10]. However, in our study considerably smaller number of the students found chemotherapy interesting in contrast to a previous study [10]. Although, more than half of the students considered all topics useful in future, only a small fraction of students considered topics like CNS and chemotherapy useful for future practice. In contrast to the results of our study, Bhosale et al. observed that larger proportion of the students considered chemotherapy and CNS as useful for future application [6]. Currently, at the Medical Faculty, UiTM, there are no differences in the proportion of small group sessions per topic within each module and this does not seem to be the reason for greater interest in some topics and not in others. Most topics are aligned in a way that they are first discussed in pathology, microbiology and other disciplines so that students have sufficient prior knowledge to understand pharmacology. However pharmacology of some centrally acting drugs such as antipsychotics, antidepressants general anesthetics etc, is included in the central nervous system without prior discussion under other subjects. This could be one of the reasons for the lack of interest in central nervous system topics. It seems that there is a need to improve methods of delivering these "not so interesting topics" in a way that can raise interest and understanding of these topics amongst students. In addition it is also important to look into details of alignment of pharmacology topics with other subjects. It is important to emphasize that all the topics are complementary to each other, and for better understanding of the subject, learning all topics is necessary.

The current study also demonstrated that small group sessions were the most favored and most recommended teaching modality followed by directed self-learning and lectures (Table 1 and 2). This is similar to what has been reported in another study in which 76 % of the students favored tutorials and recommended to have small groups of 5-10 [10]. Joshi and Ganjiwale have also reported that students find small group interactive sessions very useful for learning pharmacology [12]. Interestingly, students' rating of computer aided learning was comparable to directed self-learning sessions but very few found it a

useful learning tool and therefore majority did not recommended an increase in these sessions (Table 2). Currently, the computer aided learning programmes in use, are only supplementary to the topics learned in other sessions and are therefore not considered by students as additional learning tool. Incorporating programmes on topics not discussed during other sessions, will probably raise the students' interest in these sessions. As most of the students found seminars boring and useless, it is necessary to evaluate the ways in which seminars are conducted and make necessary changes.

With regards to learning approaches and utilization of learning resources, the proportion of students stating that they use both lecture notes and text books was higher in our study than that reported earlier [10]. However, the proportion of students that prepared their own notes was considerably lower in our study compared to that reported earlier by Sekhri et al. [10]. Moreover, in our study, nearly one-fourth of the students responded that they rely only on the lecture notes and very few said that they use only textbooks. They use textbooks because either they do not understand the subject during lectures or they find text books more interesting than lectures. In contrast, another study reported that more than half of the students learn pharmacology from textbook and a similar proportion uses a combination of teacher's class notes, self-prepared notes and textbook [6]. These comparative observations indicate that in our study a greater number of students are dependent on the teaching sessions rather than on self-study.

In the current study, the observation that nearly one-third of the students study pharmacology regularly to gain knowledge was in accordance to that reported in a previous study [10]. Interestingly, assessment driven study pattern was evident in our study as almost half of the students responded that they study regularly because of progress test. The same has also been reported in another study [13], in which students stated that for preparing for final university examination, pre-university tests held at the end of course were most useful (86 %) followed by class tests (84 %).

Based on specific comments written at the end of the questionnaire, students were of the opinion that

pharmacology teaching must be case-based discussions and said that practical sessions must be included (Table 3). Studies in the past have also shown that students appreciate pharmacology especially when the teaching is integrated with problem based learning [14]. Ghosh and Dawka showed that 80 % of students like a judicious mixture of the didactic lecture and problem based learning [15]. In one of the studies, although most students admitted that case-based interactive sessions enhance their understanding and aroused intellectual curiosity, they preferred tutorials to help them score better in the examinations [16].

Therefore, incorporation of more case-based discussions into the small group sessions seems to enhance interest of students and is likely to be helpful in learning application of basic pharmacology concepts to clinical practice. Some of the medical schools have integrated pharmacology teaching with hospital visits where students interact with patients, obtain history and details of drugs used during the treatment followed by discussion with pharmacology teachers. Students have shown a favorable response to this approach. Use of practical sessions on rational drug use and introduction of pharmacology modules in clinical years of training were also welcomed by the students [17].

## CONCLUSIONS

This study showed that majority of students entering the medical schools has little prior knowledge of pharmacology. While going through preclinical years they understand the importance of pharmacology and application of all pharmacology topics in future practice. However, they tend to develop interest in one or other topics. Students prefer to have greater number of small group sessions as they feel that these sessions are most useful for learning. More students tend to use both the textbooks and lecture notes and study regularly for better performance in examinations. More case-based learning sessions were recommended by students and it seems appropriate to incorporate more case-based learning approaches in small group sessions.

## Conflicts of Interest

Authors declare none.

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