

Original Research

Knowledge of Dental Pharmacology amongst under graduate students and their perception towards training in the subject during BDS course: A questionnaire based study

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ABSTRACT:

Background: Dentists are required to prescribe various drugs to their patients in their routine clinical practice. Hence, they are expected to have adequate knowledge of Pharmacology in general, and Dental Pharmacology specifically. However, it is generally seen and has been reported that because of the vastness of curriculum, special attention to Dental Pharmacology is not given, either during teaching or during learning by the students. Hence a need was felt to conduct a study to analyze the present status of knowledge of Dental Pharmacology amongst BDS students and their perceptions towards the current scenario of training in Dental Pharmacology according to the present curriculum. **Materials and Methods:** After obtaining necessary permissions, a pre-validated self-administered Questionnaire proforma was distributed to four batches (II year, III year, Final year BDS and interns) of a Dental institution in Pune. Data gathered from the completed proformas was sorted, tabulated and analyzed using descriptive statistics. **Result:** Out of the 310 students approached, 245 students participated in the study. Average score of accurately answered questions to assess the knowledge of Pharmacology amongst students was 5.71 (out of 8). Majority of the students agreed that Pharmacology was an important subject; however they felt the need of its integration with clinical scenarios and subjects. More than 85% participants thought that recent advances must be included in Pharmacology curriculum which is being taught. Most of them agreed that due to lack of reinforcement, there was an attrition of knowledge in Dental Pharmacology through the year of BDS training. **Conclusion:** There seems to be moderate knowledge of Dental Pharmacology amongst the Undergraduate Dental students, however need of specific attention to dental pharmacology, incorporating new advances in the field as well as an integrated approach in training in the subject has been felt by the students.

Keywords: Pharmacology; Perception; Teaching-Learning; Dental education

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INTRODUCTION

Pharmacology forms the backbone of rational therapeutics and is one of the most evolving branches in dental sciences. Dentists are required to prescribe various drugs to their patients in their routine clinical practice. Prescribing skills of newly graduated doctors largely depend upon good foundation in Pharmacology.¹ There are certain groups of drugs which are more commonly prescribed in dental

practice as compared to others. Hence, dentists are expected to have adequate knowledge of pharmacology in general and dental pharmacology specifically. In India, Pharmacology is introduced in the second year of the BDS course to the students along with other Para-clinical subjects like Pathology and Microbiology.² Hence it can be assumed that dentists being health care professionals must have a fair idea of different types of drugs, and at the same

time it is also important that they have a more intensive knowledge of dental pharmacology. However, it is generally seen that because of the vastness of curriculum, the attention given to Dental Pharmacology is lacking, either during teaching or during learning, or both. Due to content overload, students often find it difficult to remember and recall the pharmacological terms, concepts and drug names in the subject.³ Also, Dental Pharmacology as a subject does not seem to be effectively integrated or updated with any of the clinical subjects taught in the later years. Students may find it difficult to retain the knowledge that they have gained in their second year up to internship and beyond, as their training is more general in nature during that time. As a result, some students may not feel confident in prescribing drugs in their practice or may be doing so without adequate knowledge.

To acquire the necessary prescribing skills, it is important that the students not only appreciate pharmacological principles but also understand their applications in clinical situations which are relevant to their practice.⁴ There are a few studies done involving medical students to assess their feedback on training in Pharmacology, to the best of our knowledge; no such study has been done on Dental students. Hence a need was felt to conduct a study to analyze the present status of knowledge of Pharmacology amongst BDS students and their perceptions towards the current scenario of the teaching-learning process in Dental Pharmacology according to the present curriculum.

MATERIALS AND METHODS:

The potential participants of the study were the students of II, III and IV year BDS and interns of Sinhgad Dental College & Hospital, Pune. After acquiring necessary permissions and consents of the participants, a pre-validated structured questionnaire was made available to them in person (printouts) and using google docx. (documents), as per their availability and convenience. (Annexure1)

The questionnaire consisted of 3 parts. The first part consisted of the demographic details of the participant. The 2nd part constituted of 16 questions framed to analyze the attitude and perception of the students regarding their training in Pharmacology in the current scenario. The 3rd section consisted of eight questions which were made to help assess the actual knowledge of Dental Pharmacology that the student had gained through the current teaching methods and retention of the same through years. These questions were selected by the experts in the subject and validated through peer discussion. 1 mark was given for each correct answer. Scores were categorized as 0-2: Poor, 3-4: Average, 5-6: Good, 7-8: Excellent.

All the data collected was sorted, tabulated and analyzed using descriptive analysis methods and SPSS software in the view of the objectives of the study.

RESULTS:

The prevalidated, structured questionnaire was made available to 310 undergraduate students from 2nd year to interns. It was completely filled by 245 students; i.e. approximately 80% response rate was achieved. Out of 245 participants who responded, 193 were females and 52 males. Maximum students who participated in the study were interns (36.3%), followed by an approximately equal number of 2nd (25.3%) and 3rd year (23.7%) students, and lastly final year students (14.7%).

Out of 245 students who participated in the study, approximately 60% strongly agreed that Pharmacology is important as a subject to be taught in the 2nd year, followed by 32.7% students who agreed with the statement, 5.7% who were neutral and as few as 1.2% disagreed.

On asking if Pharmacology as a subject aroused their interest, around half of the participants agreed, 26.5% agreed strongly, whereas only 4.5% disagreed. Only around half of the participants agreed that special emphasis was given on Dental Pharmacology during teaching learning as well as assessment in Pharmacology during second year, with 22.9% having a neutral opinion about the same.

Nearly 40% of the students were of the opinion that the syllabus for Pharmacology was too vast and some topics do not seem to have clinical applications in Dentistry, followed by 26.9% feeling neutral and 21.2% disagreeing. 2.9% of them seemed to strongly disagree with this.

Students had varied reactions regarding clearing the subject examinations through rote* learning. (*rote: learning something by repetition and not understanding) (Graph 1); with fairly equal number of students agreeing, feeling neutral and disagreeing upon this question.

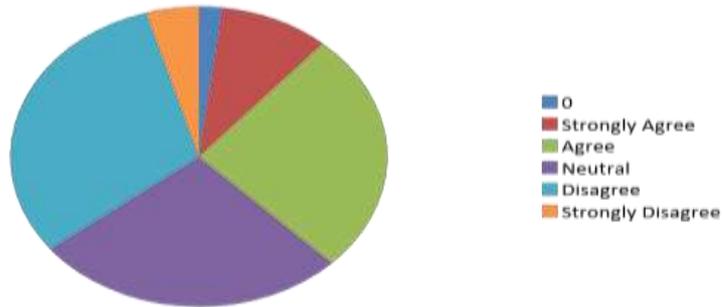
48.6% of students agreed that the assessment of problem-solving skills, especially in dental scenario is done during examination, 26.9% were neutral and 15% strongly agreed, 6.9% disagreed, and a mere 0.8% strongly disagreed.

On asking whether the subject has created the knowledge base which would help them in choosing drugs rationally in their future dental practice, 55.5% agreed, 20.8% strongly agreed, while 4.1% disagreed. 39.6% students said that they were neutral regarding their confidence while prescribing drugs to medically compromised patients already on medication who come for dental treatment. Not far behind, 33.5% said they would be confident while prescribing drugs to medically compromised patients, whereas as many as 18% believed that they would not be confident enough in such a scenario. Similarly, when asked if they thought they had gained enough knowledge regarding Adverse Drug Reactions (ADR) and Drug interactions (DI) in their 2nd year, 34.7% students had a neutral reaction and 33.9% did think that they had gained enough knowledge about ADRs and DIs. But, as many as 23.3% seemed to disagree.

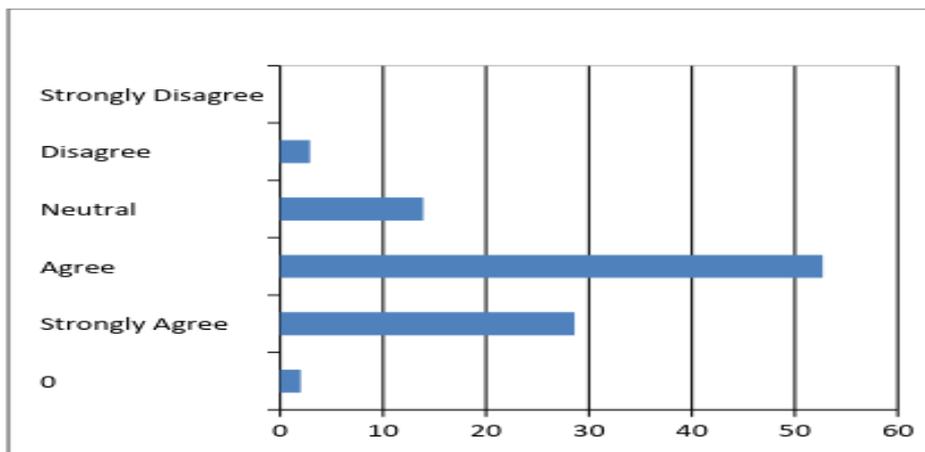
A similar reaction was obtained from the students when asked if they could write a prescription for various dental pathologies confidently, i.e majority were neutral, followed by a third who agreed, and even lesser disagreed.

One of the most important questions to be answered by the participants, whether they believed attrition of Knowledge of Pharmacology happens with time after 2nd year or not, was agreed upon by more than 50%

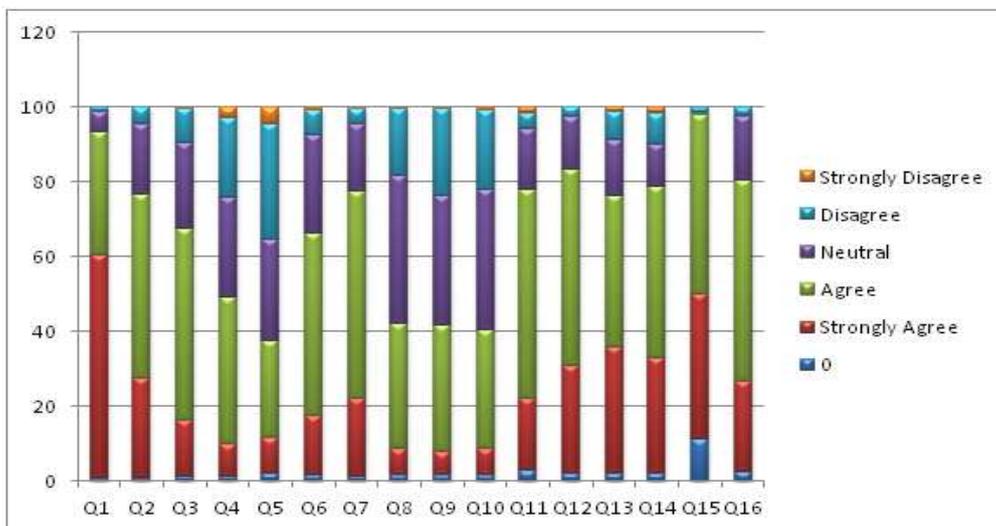
(55.5%) and strongly so by 19.2% of the students. Similarly, more than half the students believe that changes are necessary in the current curriculum and training of Pharmacology to help students recollect/remember the knowledge of Dental pharmacology in clinics, 28.6% strongly agree with the same, while 13.9% were neutral, and only 2.9% disagreed (Graph 2).



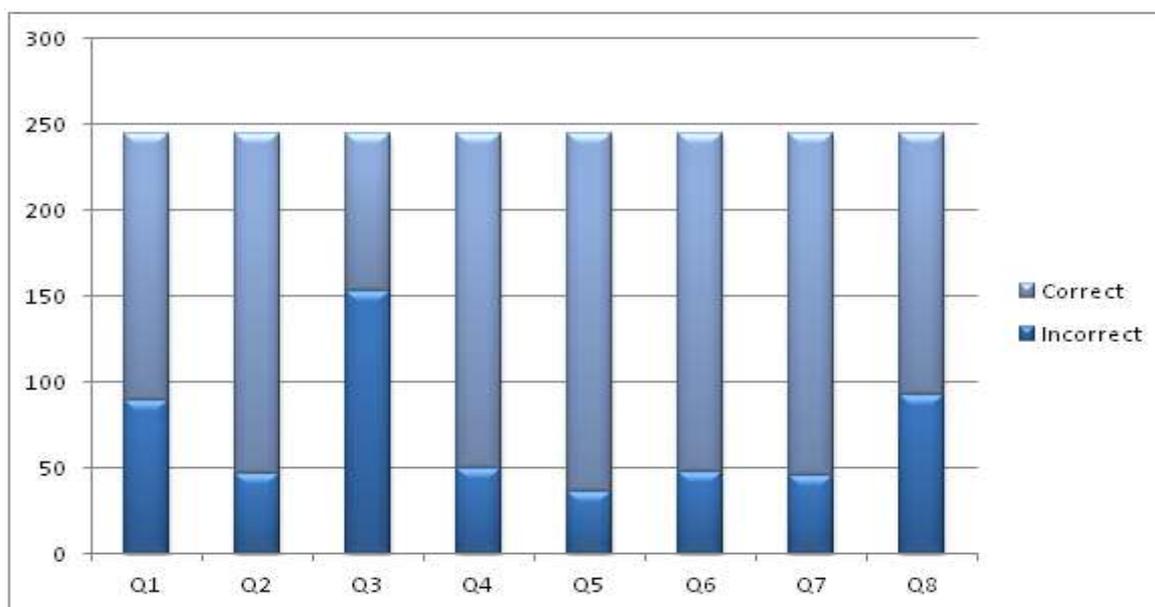
Graph 1: Students' response regarding clearing the subject by rote learning



Graph 2: Students' response regarding changes required in present curriculum



Graph 3: Question-wise response of the participants Part II of the questionnaire (Perception-based)



Graph 4: Accuracy with which participants answered the knowledge based questions

Annexure: I
SURVEY QUESTIONNAIRE
Part I

Name:

Year of study: 2nd year 3rd year 4th year Intern

Gender: Male Female

Part II

Kindly tick the most appropriate response according to you.

Sr. No.	QUESTIONS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
1.	Pharmacology is important as a subject to be taught in 2 nd year.					
2.	Pharmacology as a subject aroused your interest.					
3.	Special emphasis was given on Dental Pharmacology during teaching learning as well as assessment in Pharmacology during second year.					
4.	The syllabus for Pharmacology was too vast and some topics do not seem to have clinical applications in Dentistry.					
5.	You cleared the subject examinations through rote* learning. (*rote: learning something by repetition and not understanding)					
6.	The assessment/examination concentrates on ability to acquire facts rather than on the development of problem-solving skills, especially in dental scenario.					
7.	The subject has created the knowledge base which will help you in choosing drugs rationally in your future dental practice.					
8.	Presently, you would be confident while prescribing drugs to medically compromised patients already on medication who come for dental treatment.					
9.	You have gained enough knowledge regarding Adverse Drug Reactions (ADR) and Drug interactions in your 2 nd year.					
10.	You can write a prescription for various dental pathologies confidently.					
11.	Attrition of Knowledge of Pharmacology happens with time after 2 nd year.					
12.	Changes are necessary in the current curriculum and training of Pharmacology to help students recollect/remember the knowledge of Dental pharmacology in clinics.					
13.	Pharmacology should be integrated with the					

	clinical sciences in third and fourth year BDS.					
14.	There is a need to teach Dental Pharmacology in and after 3rd year as a part of Oral Medicine.					
15.	Recent advances must be included in Pharmacology curriculum which is being taught to you.					
16.	You would welcome modules on Pharmacology and therapeutics during the clinical years of your training.					

Part III

I. Kindly tick the most appropriate answer.

1. The drug of choice for neuralgic pain in maxillo-facial region is:
 - a. Methadone
 - b. Ibuprofen
 - c. Carbamazepine
 - d. Lorazepam
2. Epinephrine added to a solution of lidocaine for local anaesthesia will increase the:
 - a. risk of convulsions.
 - b. duration of local anaesthesia.
 - c. absorption of lidocaine.
 - d. heart rate when absorbed.
3. The most appropriate alimentary route of administration when passage of drugs through liver is minimized is:
 - a. Oral
 - b. Transdermal
 - c. Rectal
 - d. Intra-duodenal
4. Which one of the following is an antifungal drug
 - a. Tinidazole
 - b. Fluconazole
 - c. Metronidazole
 - d. Secnidazole
5. Which of the following antibiotics inhibit the bacterial cell wall synthesis
 - a. Beta Lactam
 - b. Aminoglycosides
 - c. Tetracyclines
 - d. Macrolides
6. Most frequent and most serious reaction to insulin is:
 - a. Hypoglycemia
 - b. Dependent edema
 - c. Lipodystrophy
 - d. Allergy
7. Which one of the following drugs would be the most appropriate first line therapy for acute anaphylaxis following administration of amoxicillin?
 - a. Adrenaline
 - b. Diazepam
 - c. Hydrocortisone
 - d. Salbutamol
8. Which of the following analgesic may be prescribed most safely to a pregnant patient with dental pain?
 - a. Ibuprofen
 - b. Paracetamol
 - c. Ketorolac
 - d. Morphine

- II.** A 45 year old patient reports to the clinic with history of severe pain and swelling associated with a severely carious tooth in lower right posterior region of jaw. The patient gives medical history of being suffering from peptic ulcers and dental history of scaling 1 year back. The clinical examination also reveals painful submandibular lymphadenopathy. Radiographic diagnosis for the tooth was given as Periapical abscess. Write a sample prescription for this patient as a part of immediate pharmacological treatment in the space provided below:

Thank you for your participation!

40.8% and 33.5% agreed and strongly agreed respectively with the concept that pharmacology must be integrated with other clinical subjects during later years of training. On the same note, 46.1% agreed and 30.6% strongly agreed that there is a need to teach Dental Pharmacology in and after 3rd year as a part of Oral Medicine. More than 85% thought that recent advances must be included in Pharmacology curriculum which is being taught. 54% students also said that they would welcome modules on Pharmacology and therapeutics during the clinical years of their training, with approximately 24% strongly supporting it (Graph 3).

The further 8 questions were incorporated to assess the knowledge gained and retained by the students belonging to various years of study. Graph 4 shows the accuracy with which each knowledge based question was answered by the students (total being 245). The results showed that the average score of accurately answered questions was 5.71 (out of 8). In the last question a specific and common clinical dental situation was given and students were needed to write the prescription for the same. This response was evaluated by two experts, one in Pharmacology and one in Oral Medicine respectively and their feedback was taken. It was observed that only about one third (33%) of the participants could write an ideal prescription with all the components of it correctly. At the same time, only 54% of the participants could write the medicine appropriate to the clinical situation given.

DISCUSSION:

Analysis of the perception of students is an accepted means of reviewing teaching and evaluation methods and developing new strategies in undergraduate programs around the world.⁵ Understanding current perceptions held by prospective dental practitioners regarding Pharmacology and its applicability in their clinical practice may be helpful in improving the teaching learning methods and introducing appropriate modifications into the curriculum where and when necessary. Pharmacology is a basic and essential subject which forms the basis of therapeutics in the field of Medicine as well as Dentistry. In the BDS course in India, it is included in the second year of training and is expected to primarily enable the UG students to take rational pharmacological and therapeutic decisions in their future clinical practice. It is of utmost importance that like medical students, dental students also develop a skilful prescription writing ability and have adequate knowledge of pharmaceuticals principles and clinical applications. A solid foundation in Pharmacology with special emphasis on Dental pharmacology is a must to achieve this.

It is little known if in its present form, the training in Pharmacology is adequate and appropriate for Dental students and gives them clinical and practical competency. Students' feedback is necessary to gain a

perspective of the present training methods and thus the resultant knowledge they gain in the subject during the training.

In the present study, many interesting things came in to picture. Most of the participants appeared to be cognizant of the importance of the subject and found it interesting. In studies done by Prasad et al and Mahfoudh et al in 2016 and 2015 respectively, similar views were expressed where students gave a positive feedback for Pharmacology as a subject. However, they also opined that the need for concerted efforts to make learning pharmacology an interesting experience and to identify priority areas for such improvements.^{1,6}

The vastness of the syllabus of the basic medical subjects has always been a matter of concern.⁷ Certain previous studies have suggested that this could partially be due to students' apathy about the enormous challenge of learning about the majority of drugs.⁸ It has also been reported that Pharmacology is perceived as dry and volatile by many dental students.⁹ In subject of Pharmacology, there are a few topics which appear to be of lesser relevance to the practicing Dentists as compared to other topics. Although a basic knowledge of the same is required for any health care professional, probably the revamping of the curriculum could be done in a way that more weightage could be given to the topics with greater relevance for a Dentist's day to day clinical practice. This perception was even reflected in the response of our participants as well when around half of them felt that the syllabus was too vast and only half of them felt that any special emphasis was given on Dental Pharmacology. This could be an indication that the curriculum demands some relevant modifications. Not only curriculum but newer teaching methods could also be adopted to teach Pharmacology. In one of the studies, it was suggested that there is a need of conducting few microteaching sessions and more of clinical-oriented problem-based learning with MCQ-based revisions at the end of each class in the pharmacology teaching at undergraduate level.^{10,11}

Most of the participants agreed that the subject had created the knowledge base which would help them in rational selection of drugs in the practice. However, there was a uniform consistency in the belief of the participants that training in Pharmacology should not be limited to second year but an integrated system of training should be made available in the latter years of course as well. This could probably help in non-attrition of the knowledge through these years. In a study done on medical students to assess if the need of Pharmacology even after second year, "58% of the students said only recent advances while 38% of students opted for orientation course and smaller number of students (4%) felt they had enough of Pharmacology".¹ Hence there is no denying that reinforcement in some form during all the years of

training and an integrated approach in training seems to be the need of the hour.

The need and desirability for more integration of Pharmacology during the clinical years has also been supported by several studies as well as accredited organizations in medical education, including the American Medical Association.¹² A dynamic system to include the latest advances in the existing curriculum has also been recommended.¹³

Our study also attempted to analyze the knowledge of Pharmacology amongst the students and interns. It was noted that they had moderate knowledge of Pharmacology. This was in sync with the results of the study done by Sharoom et al in 2017 on Medical and Dental students.¹⁴ Question wise analysis showed that maximum incorrect answers were given to Question 3, followed by Question 1 and 8. Since these questions were more of applied Pharmacology and 2 of them were of Dental Pharmacology. Also, the percentage of correct answers given were the highest amongst second year (exam-going) and lowest in fourth year. This may indicate that there is a possibility of attrition of knowledge due to lack of reinforcement during the successive year of 2nd BDS. The lack of practical knowledge was also reflected in the fact that only 33% of the students could write a prescription correctly with all the necessary components. Not only the structure but appropriate medicine was not prescribed by nearly half of them for the given clinical situation. As this study was unicentric, it had its inherent biases and limitations. However, there is a clear indication that dental students do require practical and problem based training in the subject of Pharmacology. This seem to be a matter of universal concern. In a study done in Mexico, it was concluded that the knowledge of pharmacology among fourth-year students in the School of Dentistry had several lacunae that could affect patient safety. Authors inferred that since prescribing accurately is extremely important, “it is necessary to develop therapeutic guidelines, and to provide pharmacological therapy courses”.¹⁴

CONCLUSION

This study attempted at analyzing the knowledge and perception of Dental students towards Pharmacology. It may be inferred that although the importance of Pharmacology as a subject is realized by the Dental students, vastness of the curriculum could be weighing them down. There seems to be a need to modify the curriculum and make it more centred towards Dental Pharmacology. An integrated approach with continuous reinforcement through the years of training and orienting it to the future clinical practice could also be considered.

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