



# Challenges Faced by Dental Students in Understanding Dental Anatomy, Histology and Oral Pathology: A Cross-Sectional Study

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## Abstract

**Aim and objectives of the study:** The purpose of this study was to assess the challenges that dental students face in understanding the topics of dental anatomy and histology and oral pathology and to find solutions to overcome them.

**Materials & Methods:** A descriptive cross-sectional study was carried out in the department of Oral Pathology, Hi-Tech Dental College and Hospital, Odisha, where the prepared questionnaires were distributed to all the undergraduate students and interns of HDCH, IDS, Odisha. The questionnaire was in the form of multiple-choice questions and designed in a way that is simple to understand and answer.

**Results:** Through our research, we found that the degree of dentistry students' understanding of the subjects is satisfactory, but there are still some gaps in the students' understanding and interest in these subjects.

**Conclusion:** From the outcomes, it tends to be deciphered that students felt troubles which are not difficult to deal with if proper measures are taken. Combining new technologies with traditional teaching methods will undoubtedly lead to a better understanding of the subject.

**Keywords:** Understanding, dental students, Dental histology, Oral Pathology, Knowledge, Newer technologies

## INTRODUCTION

The purpose of undergraduate training is not only to prepare you academically and technically, but also to give you the opportunity to get the right attitude that professionals require.<sup>[1]</sup> Technical standards, in contrast to academic standards, refer to the development of the physical, cognitive, and behavioral abilities required to sufficiently complete all aspects of the curriculum and the professional characteristics required of all students upon graduation. The core abilities required by the program lie in the following areas: intellectual (conceptual, integrative and quantitative ability to solve and diagnose problems), motor, sensory, communication, and behavioral and social aspects of the dentist's performance.<sup>[2]</sup> The dentistry course is a four-year opportunity for dental educators to gradually develop students' knowledge, skills, and attitudes, in hopes of becoming a competent dentist upon graduation. As students' progress through dental courses,

knowledge will gradually be acquired in classrooms, seminars, clinics, and interactions with peers.<sup>[3]</sup> Dental researchers at these institutions play an important role in promoting knowledge and teaching.<sup>[4]</sup> Attitudes are learned through social interactions and are not learned in textbooks.<sup>[5]</sup> Previous studies have shown that the main sources of knowledge in oral health are the media, dental professionals and the dental literature.<sup>[6]</sup> Oral pathology is a subspecialty of pathology and dentistry that deals with the microscopic study of pathological conditions that affect the oral cavity and the maxillofacial region. Today, many of the deadly illnesses, including diabetes, heart disease, cancer and HIV infection, affect, enhance, or spread lesions in the oral cavity.<sup>[7]</sup> The Oral Pathology department plays an important role in the education of this unique and diverse field of dentistry. Books, internet, lectures have made great progress but there is still a gap between students' understanding and interest in the subject. This may be due in part to the fact that students see it as a non-technical subject, so there is a smaller scope of practice.<sup>[8]</sup> Histology is the branch of medical science that deals with cell and tissue anatomy and tissues of living organisms that are studied by dissection, staining, and microscopic evaluation of microstructures. Oral histology, a sub-discipline of histology, is a core component of oral biology, an important subject in the basic sciences group taught at the start of the dental program. This is because it covers interdisciplinary issues that are relevant to several dental specialties. Although knowledge of anatomy and histology is known to be important for dental practice, dental students are known to have oral histology less relevant to their profession and more difficult to learn.<sup>[9]</sup> As the information infrastructure of oral histology grows and learning strategies develop, do we ignore existing techniques to validate popular preparation and learning techniques and simplify the general preparation and learning process? , Or is essential to check if it needs to be changed again. Dental anatomy is defined as study of the development, morphology, function, and identity of each of the teeth in the human dentitions, as well as the way in which the teeth relate in shape, form, structure, color, and function to the other teeth in the same dental arch and to the teeth in the opposing arch.<sup>[10]</sup> The foundation of dentistry students is their ability to recognize pathological diseases under the microscope. This can be achieved by reading books, comprehensive literature, and following prescribed courses.<sup>[11]</sup> The aim of this survey is to analyze the problems encountered by dental school students in understanding dental anatomy, histology and oral pathology as well as to find the answers necessary to overcome these problems.

## MATERIALS & METHODS

A descriptive cross-sectional study was conducted in the department of Oral Pathology, HI-TECH DENTAL COLLEGE AND HOSPITAL where the prepared questionnaires was distributed to all the undergraduate students and interns of HDCH and IDS, Bhubaneswar. All the participants were clarified the objectives of the study. The questionnaire was given to each individual and the subjects were requested to respond anonymously but to mention their gender, age and bds year. The total study sample of 486 subjects was divided into 5 groups: -

Group I: 103 subjects of BDS 1st year

Group II: 95 subjects of BDS 2nd year

Group III: 98 subjects of BDS 3rd year

Group IV: 96 subjects of BDS Final year

Group V: 94 subjects of BDS Interns

Those internship students who had done BDS from outside were excluded from the study. The questionnaire was in the form of MCQ's and consisted of two, three and four alternatives as well as aimed in such a way which was easy to understand and answer. Two different questionnaires were made one focused on dental anatomy and histology, the other focused on oral pathology. The questionnaires were distributed according to their curriculum. The data was collected and statistically analysed with the help of SPSS software (statistical package for social sciences) version 22.0 using Pearson chi-square test, Pearson correlation coefficient test and Cronbach's alpha reliability test. A probability value of  $< 0.05$  was considered to be statistically significant.

## RESULTS

All the 486 participants responded to the questionnaire. Out of these, 231 (47.53%) were males and 255 (52.46%) were females indicating predominance of females. A total of 103 were from first year, 95 were from second year, 98 were from third year, 96 were from final year and 94 were interns. The results in [Table 1] showed 331 (68.10%) of the participants have spent more than 8hrs in DADH lab and the results were found to be statistically significant. 357 (73.45%) participants responded that they had attended almost all classes based on carving and slides, but 129 (26.54%) students had missed the classes and statistically result was not significant. Out of 486 students, 431 (88.68%) felt difficulty in carving a tooth and results were found to be significant. In the present study, 59.05 % of the students have made an effort to understand the tooth before carving with a statistically significant result. Majority of the participants (76.33%) revise histological diagrams just before their examination with statistically non-significant results. In the present study, 343 (70.57%) of the students have felt that carving basic shapes like preliminary exercise, helped in carving tooth structures and results were statistically significant. 342 (70.37%) students go through the topics before discussing the slide, while 96 students responded with sometimes and results were statistically significant. 93.62% students felt necessary to clarify the topic of the slides before focusing them with statistically non-significant results. 80.65% of the students requested staff to clarify doubtful topics and the results were not significant. Out of 486 students 350 (72.01%) drew the observations made in oral histology class and the results were found to be statistically significant. In present study, 254 (52.22%) students recognised the features after seeing slide, while 120 students responded with sometimes and the results were statistically significant. 327 (67.28%) students read the topic in advance before seeing the slide which shows results statistically significant. A total of 403 (82.92%) students felt that google, internet were good source of knowledge and the results were statistically significant. Study shows 453 (93.20%) students felt there ought to be more intuitive sessions with the faculty and seniors and results were statistically significant. Out of 486 students, 367 (75.51%) students felt that there should be more hours contributed by them to increase understanding of subject. The results were statistically significant. An 83.33% said that they can improve if they are further motivated by the means of pop quiz, while 29 students reported that the improvement can be done through medals in university examination and results were statistically significant. A 66.25 % of the students felt that most trouble they face is identification whereas 23.25 % students felt identifying, drawing and remembering features are the main difficulty during examination. The result is statistically significant. The results in [Table 2] showed 241 (83.68%) of the participants have spent more than 8hrs in Oral pathology lab and the results were found to be statistically non-significant. 272 (94.44%) students reported they go through the topics before discussing the slide, while only very few 12 reported with sometimes. The results were statistically non-significant. 96.87% students reported in favour of clarifying the topics of slide before focusing them and results were statistically non-significant. Majority of students 285 (98.95%) have seen at least two slides in single practical class, results were non-significant. In present study 263 (91.31%) students reported they request the staffs to clarify the tough topics and results were statistically significant. Most of students 250 (86.80%) drew the observations made in oral pathology class. The results were statistically significant. A 213 (73.95%) participants put forth an attempt to explore around the oral pathology department and results were statistically significant. 252 (87.50%) students accepted that they go through the oral pathology atlas book just before their exam, results were statistically significant. 96.52% participants agreed that apart from textbook, internet google helped them in understanding pathology slides. Results were statistically significant. An 85.76% confirmed that they can improve if they are further motivated by the means of pop quiz, while 18 students reported that the improvement can be done through medals in university exams. The results were statistically significant.

## DISCUSSION

In department of Oral pathology & microbiology, a cross-sectional study was conducted to determine the difficulties faced by the dental students in oral histology and dental anatomy as well as oral pathology subject. Currently, the country has 310 dental colleges, of which 292 are privately owned and only 40 are government-run.<sup>[12]</sup> This reflects that India is one of the largest producers of dental alumni. In the present study 331 (68.10%) of the participants have spent more than 8hrs in DADH lab, while 157 students spent less than 8 hrs which shows that the clinical time can be made more interesting so that students would make 100% of the

attendance. Out of 486 students, 431 (88.68%) felt difficulty in carving a tooth. This can be solved by spending more qualitative time in learning and understanding the tooth morphology & anatomy and practising carving. Modern technology application like tooth carving videos can be projected in practical class so that they can improve their learning and modify their ways of approaching the problem. 59.05 % of the students have made an effort to understand the tooth before carving which can be improved. (70.57%) of the students have felt that carving basic shapes like preliminary exercise, helped in carving tooth structures. 80.65% of the students requested staff to clarify doubtful topics in oral histology which shows students have interest towards the subject and want to increase their understanding. Nearly all the participants answered 'yes' for drawing the observations made in oral histology class, while 94 (19.34%) replied with 'sometimes'. Nearly half of the participants 52.26% recognized the features on a slide after seeing it for the first time, while 24.69% responded with 'sometimes' and 23.04% responded with 'almost never'. This can be improved by introducing virtual microscopy. Recent technological advances have made it possible for computers to transform into microscopes and thus led to the transition from optical to digital microscopes (DM)<sup>[13]</sup>. A total of 82.92% said that the internet could be of help and was a good source for understanding Oral histology slides. A total of 75.51% participants felt more hours should be contributed to increase their understanding than the usual. Most of the students 93.20% also felt there ought to be more intuitive sessions with the faculty or the seniors. An 83.33% said that they can improve if they are further motivated by the means of pop quiz ,while 29 students reported that the improvement can be done through medals in university and 52 students favored of scholarships. In response to question 'What is the basic problem that you face during practical exam?' A 66.25 % of the students felt that their main difficulty was identification of histology slide, whereas 23.25 % students felt identifying, drawing and remembering features are the main difficulty during examination. This can be solved by having digitalization of slides. To improve their learning students can be asked to focus the slide by themselves which in turn will help them in examination. Student exchange programs and cooperation with foreign universities will help Indian colleges to share their progress and skills by providing the best teaching method for students. The DCI-initiated student exchange program is one way to support these interactions.<sup>[14]</sup>

Oral and maxillofacial pathology (OMP) may be viewed as a specialty of dentistry, which addresses the diagnosis and treatment of diseases of the oral and perioral regions. Oral pathology is an important transitional specialty between dentistry and medicine, and is closely linked to pathology, otolaryngology, and dermatology, among others. The interest of undergraduate (BDS) students toward oral pathology should be enhanced during the initial years of BDS. In addition, there is a need to raise awareness of oral pathology among medical professionals and the general public<sup>[15]</sup>. Majority of students 285 (98.95%) have seen at least two slides in single practical class. More students can be encouraged by using modern 3D virtual technology of pathology slides. Shifting from conventional light microscope to advance digital microscopic imaging can definitely improve the learning process and students would show further interest. Sciubba et al also stated that students do get motivated if there is some kind of encouragement. Students who combine academic knowledge and clinical diagnosis may be rewarded. This is only possible if students are enrolled more frequently in the faculty of oral medicine and dental radiology, where they can hone their skills<sup>[16]</sup>. Although this current study shows that dental students have sufficient knowledge of the subject, there is still a gap between students' understanding and application in the clinical field. This is likely due to the fact that students view the subject as non-clinical and have less room for practice. In this present study, 241 (83.68%) students encountered difficulty in identifying the slides in examination. This can be solved by introducing 3D animated technology so as to make the classes more interesting.<sup>[17]</sup> 59.37% of the participants have encountered difficulty in recognizing the features on a slide after seeing it. This can be modified by computer animated graphics which shows detailed magnified images of pathological slides. In this present scenario newer concept of digital microscopy is gaining popularity over conventional light microscope. The current situation of oral pathology and histology as a discipline is worrying. We should mainly focus on changing students' attitudes towards the discipline, because they believe that the discipline is a non-clinical discipline with a small scope of practice and needs to expand the scope of the subject. Dental counselors are responsible for creating good learning opportunities, motivating students and promoting the best quality of education.<sup>[18]</sup> Learning environment refers to the culture of a classroom, school, or educational institution and its governing rules and characteristics, including how students perceive that environment, as well as how teachers can organize the educational environment to facilitate learning.<sup>[19]</sup> Dental health courses are subject to continuous assessment

and evaluation throughout to reflect the latest technical innovations in dentistry as well as the requirements for optimal oral health.<sup>[20]</sup>

## CONCLUSION

Through the present study it was found out that the students were well oriented on the whole about Dental anatomy and Histology as well as Oral Pathology. They found difficulties in getting grasp of the subjects, if small alterations in done by means of introducing newer technologies and digital microscopy , certainly these challenges can be overcome and teaching environment can be made more interesting and systematic for the students. This specialty's future should be made aware among the initial years of BDS curriculum so that they can develop interest and make it as a career option. Introducing certain changes in the curriculum, learning method can be made more interesting and comprehensive for the budding future aspirants. Changing the trends in teaching and application of newer technologies will certainly help students to get motivated and improve their knowledge and practical skills.

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## TABLES

**Table 1: Questions focusing on dental anatomy & oral histology**

Sl. No.	Question	Answers	Group I	Group II	Group III	Group IV	Group V	Total	Chi-square	P-value
1	How much time per week do you spend in DADH lab?	2-4hrs	5	2	2	1	2	12	21.94399	0.038152*
		4-6hrs	9	6	3	2	1	21		
		6-8hrs	34	22	22	26	18	122		
		>8hrs	55	65	71	67	73	331		
2	Have you attended almost all classes based on carving and slides?	Yes	64	72	72	75	74	357	9.44568	0.050875
		No	39	23	26	21	20	129		
3	Have you faced difficulty in carving a tooth	Yes	85	89	80	88	89	431	15.33501	0.004055*
		No	18	6	18	8	5	55		
4	Do you put forth an attempt to understand the tooth before you carve?	Yes	65	55	57	45	65	287	30.82942	0.000151*
		No	27	25	20	15	15	102		
		Sometimes	11	15	21	36	14	97		
5	Do you revise histological diagrams before your examination?	Yes	78	65	81	72	75	371	7.057816	0.530408
		No	10	12	5	8	8	43		
		Sometimes	15	18	12	16	11	72		
6	Do you think that carving basic shapes like preliminary exercise, helped in carving tooth structures?	Yes	56	72	68	75	72	343	1.64024	0.000936*
		No	47	23	30	21	22	143		
7	Do you go through the topics before discussing the slide?	Yes	65	56	68	72	81	342	27.82864	0.000508*
		No	12	8	14	8	6	48		
		Sometimes	26	31	16	16	7	96		
8	Is it necessary to clarify the topic of the slides before focusing them?	Yes	98	89	90	90	88	455	0.926691	0.920701
		No	5	6	8	6	6	31		
9	Do you request your teacher to clarify doubtful topics?	Yes	85	74	83	68	82	392	15.15293	0.056239
		No	5	9	2	10	2	28		
		Sometimes	13	12	13	18	10	66		
10	Do you draw the observations made in your oral histology class?	Yes	55	71	68	73	83	350	34.00115	4.06071E-05*
		No	15	8	12	5	2	42		
		Sometimes	33	16	18	18	9	94		
11	How well can you recognize the features on a slide after seeing it for the first time?	Very well	47	41	55	45	66	254	23.19893	0.003118*
		Sometimes	35	26	19	25	15	120		
		Almost never	21	28	24	26	13	112		

12	Do you read the topic in advance before seeing the slide?	Yes	52	75	56	66	78	327	53.94715	7.06837E-09*
		No	4	10	7	6	8	35		
		Sometimes	47	10	35	24	8	124		
13	Is Google helpful for understanding oral histology slides?	Yes	82	88	67	78	88	403	43.22977	7.95098E-07*
		No	10	4	5	9	1	29		
		Sometimes	11	3	26	9	5	54		
14	Do you feel there ought to be more intuitive sessions with the faculty or the seniors?	Yes	86	91	88	94	94	453	28.37039	1.04923E-05*
		No	17	4	10	2	0	33		
15	Do you think that more hours should be contributed by the students to increase understanding?	Yes	72	63	62	78	92	367	52.91344	1.12087E-08*
		No	5	15	11	10	1	42		
		Never bothered	26	17	25	8	1	77		
16	Do you believe that you can perform better if the studying sessions are made more interesting and interactive?	Yes	98	91	96	91	90	466	1.508917	0.825061
		No	5	4	2	5	4	20		
17	If yes, what kind of motivation?	Pop quiz	76	75	88	82	84	405	22.10244	0.00473*
		Scholarship	22	10	5	9	6	52		
		Medals in university	5	10	5	5	4	29		
18	What is the basic problem that you face during practical exam?	Identifying	58	61	56	79	68	322	32.04311	0.001363*
		Drawing diagrams	8	10	7	5	2	32		
		Remembering features	5	2	3	2	7	19		
		All of the above	32	22	32	10	17	113		

\*Statistically Significant Difference (P-value<0.05) Group I: BDS 1st year, Group II: BDS 2nd year, Group III: BDS 3rd year, Group IV: Final year, Gr V: Interns

**Table 2: Questions focusing on Oral Pathology & Microbiology**

Sl.no.	Questions	Answers	Group III	Group IV	Group V	Total	Chi-square	P- value
1	How much time per week do you spend in department of oral pathology?	2-4hrs	3	4	2	9	3.892794	0.691182
		4-6hrs	4	3	5	12		
		6-8hrs	6	8	12	26		
		8hrs or more	85	81	75	241		
2	How often do you go through the topics before discussing the slide?	Yes	90	92	90	272	3.90552	0.418943
		No	3	0	1	4		
		Sometimes	5	4	3	12		
3	Is it necessary to clarify the topic of the slides before focusing them?	Yes	98	92	89	279	6.347747	0.17464
		No	0	0	1	1		
		Never bothered	0	4	4	8		
4	How many slides in an average are seen in a single practical class?	1	0	0	0	0	5.877551	0.052931
		2	95	96	94	285		
		3	3	0	0	3		
		More than 3	0	0	0	0		
5	Do you request your teacher to clarify tough topics?	Yes	85	88	90	263	13.20308	0.010325*
		No	10	8	0	18		
		Sometimes	3	0	4	7		
6	Do you draw the observations made in your oral pathology class?	Yes	80	76	94	250	21.64218	0.000236*
		No	10	10	0	20		
		Sometimes	8	10	0	18		
		Never bothered	0	0	0	0		
7	Did you even take a look around the oral pathology department?	Yes	85	63	65	213	22.06298	0.001179*
		No	10	16	10	36		
		Sometimes	3	7	13	23		
		Never bothered	0	10	6	16		
8	How do you really recognize the slide?	From outside	5	1	0	6	7.023774	0.318654
		From inside	88	90	88	266		
		Both ways	0	0	0	0		
		Never bothered	5	5	6	16		
9	How well can you recognize the features on a slide after seeing it ?	Very well	12	20	12	44	6.209863	0.184014
		Sometimes	22	21	30	73		
		Almost Never	64	55	52	171		
10	Do you read the topic in advance before seeing the slide?	Yes	95	90	88	273	5.313089	0.256654
		No	0	0	2	2		
		Sometimes	3	6	4	13		
11	What are the main troubles that you face in histological slides?	Identifying	86	76	79	241	9.560087	0.144442
		Drawing Diagrams	6	10	2	18		
		Remembering Features	2	2	5	9		
		All of the above	4	8	8	20		
12	How often do you study from oral pathology atlas book?	Almost Daily	6	9	2	17	14.70775	0.022656*
		Just before Practical's	7	6	0	13		
		Just before exams	85	78	89	252		
		Almost Never	0	3	3	6		



13	Is Google helpful for understanding oral pathology slides?	Yes	88	96	94	278	20.08516	0.00048*
		No	0	0	0	0		
		Sometimes	10	0	0	10		
14	How well you understand the topics covered in the class?	Easy to understand	0	8	2	10	12.27964	0.056013
		Difficult	6	6	4	16		
		Some topics are easy & some are not	86	76	79	241		
		Never Bothered	6	6	9	21		
15	Do you feel more revision classes should be organized than the standard no. of classes?	Yes	98	96	94	288	0	1
		No	0	0	0	0		
16	Do you feel there should be more interactive sessions with the faculty or the seniors?	Yes	95	96	94	285	5.877551	0.052931
		No	3	0	0	3		
17	Do you think that more hours should be contributed by the students to increase understanding?	Yes	98	96	94	288	0	1
		No	0	0	0	0		
18	Do you believe that you can improve if you are further motivated and the studying sessions are made more interesting & interactive?	Yes	98	96	94	288	0	1
		No	0	0	0	0		
19	If yes, what kind of motivation?	Pop Quiz	95	80	72	247	19.43941	0.000644*
		Scholarships	3	10	10	23		
		Awards in university exams	0	6	12	18		
20	How many types of microscope have you seen in oral pathology lab?	Light microscope	98	96	94	288	0	1
		Polarizing microscope	0	0	0	0		
		Dark field microscope	0	0	0	0		
		More than one	0	0	0	0		

\*Statistically Significant Difference (P-value<0.05) Group III: BDS 3rd year, Group IV: BDS Final year, Group V: Inter