



From dentistry students' points of view: do anatomy classes we took actually boost our learning during clinic?

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Abstract: The aim of medical education is to teach the essence of practical skills alongside with the theoretical knowledge. Teaching anatomy, as the center of medical education, should be leading to use this knowledge as a skill during clinical period. According to the rising numbers of dentistry faculties' experiences, inappropriate education results in misguidance during clinic. Thus, this study was conducted to find about the pre-clinical and clinical dentistry students' points of view on the helpfulness of anatomy classes in achieving clinical goals. Present descriptive cross-sectional study evaluated Guilan University of Medical Sciences' pre-clinical and clinical dentistry students' opinions on the effectiveness of anatomy classes during their clinical period in 2017. The sampling method used here was census via questionnaire and scoring was according to Likert scaling system. Analyses showed that anatomy of the nervous system was the most assistive course, which helped dentistry students during their clinical period ($P < 0.001$). The least scored course was visceral organs and that means they did not use most of their learnings from classes with this topic ($P < 0.001$). They also stated that other important factors such as using cadavers and mouldages in practical sessions, teaching clinical skills theoretically before practical sessions and performing group activities are crucial for them to recall important details of the relevant courses during clinical period. Results of this study suggests that alongside with the various topics of anatomy courses, other factors like professors' characteristics and their teaching methods are also of important factors helping the dentistry students throughout clinic.

Key words: Anatomy, Education, Teaching methods, Dentistry

Received February 18, 2018; Revised March 19, 2018; Accepted April 4, 2018

Introduction

Educational activities are a kind of investment being handed down from one generation to another, the main goal of

which is raising awareness as well as human potential capabilities [1]. Among all the features of medical education, learning practical and communicational skills alongside with skills on cognitive areas is noteworthy [2]. In fact, there is a cause-effect relationship between the efficiency of a future human and the quality and the quantity of their today education [3]. Human anatomy is the study of the structures forming organs of the body [4]. Anatomy has been the essence of medical education for hundreds of years [5] and has been recognized as the central core of medical education since Renaissance [6]. Learning anatomy should lead to a better understanding for students and create connections among the presented courses

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and their practice during the clinical period [7]. The limitations hinder active learning and deteriorate the quality of education in a situation in which comprehension takes the first priority [6]. According to the statistics, in England 33 percent of post-surgery complaints is due to injury to adjacent organs [8] and this has drawn the attention of the medical education authorities into a more meticulous training of anatomy [5]. In the realm of diagnosis, anatomy training takes a higher level of importance by having access to photo-taking methods such as normal, cone beam and panoramic computed tomography and magnetic resonance imaging, and improving basic and clinical anatomy education results in a higher efficiency for medical as well as dentistry students during residency and work [9]. Dentistry is defined as a set of clinical skills concerning prevention, diagnosis and treatment of dental diseases and oral hygiene [10]. Dentistry training in Iran includes two years of basic sciences alongside with four years of practical skills including pre-clinical phase (semester fifth to semester eleventh) and clinical phase (semester twelfth). In the first 2 years, general courses are presented both theoretically and practically. During the next four years, dentistry students pass practical courses in pre-clinical and clinical phases of their education as hospital internship. This curriculum is also common in Canada, United States and some European countries [11]. Students need to pass the comprehensive dental science exam in order to enter the second level. They also need to pass all the courses and defend their thesis to be graduated [1, 11]. Given the increasing number of dentistry faculties and accordingly the increase in the number of general dentists and specialists, if there are any drawbacks in the dental training, they are likely to cause problems in achieving the goals of basic science courses and negatively influence the graduate students' efficiency and capability. Then, there will be social, cultural and economic complications. There has been a plethora of studies to prove the necessity to modify dental training courses both in Iran and all over the world covering various areas ranging from basic sciences to clinical courses [1, 12]. Considering the fact that anatomy contains various topics and the courses are taught separately, the use of anatomy in the clinical performance of the dentistry students in Guilan University of Medical Sciences has not been investigated; therefore, the present study was conducted to evaluate dentistry students' prospects about the role of anatomy courses in achieving clinical objectives in 2017.

Table 1. Detailed scores achieved on different anatomy courses' helpfulness during pre-clinic and clinic phase, according to Guilan University of Medical Sciences' dentistry students' opinions

Ranking	Anatomical sciences 1	Anatomical sciences 2	Anatomical sciences 3	Nervous system	Muscular system	Blood vessels	Osteology	Lymphatic system	Visceral organs
Very much	39 (28.7)	39 (28.7)	42 (30.9)	65 (47.8)	57 (41.9)	58 (42.6)	58 (42.6)	27 (19.9)	22 (16.2)
Much	39 (28.7)	45 (33.1)	42 (30.9)	38 (27.9)	39 (28.7)	32 (23.5)	31 (42.6)	24 (17.6)	25 (18.4)
Moderate	27 (19.9)	29 (21.3)	27 (19.9)	24 (17.6)	27 (19.9)	32 (23.5)	32 (23.5)	46 (33.8)	45 (33.1)
Low	14 (10.3)	9 (6.6)	10 (7.4)	6 (4.4)	8 (5.9)	11 (8.1)	11 (8.1)	29 (21.3)	30 (22.1)
Very low	11 (8.1)	7 (5.1)	6 (4.4)	2 (1.5)	5 (3.7)	2 (1.5)	3 (2.2)	8 (5.9)	13 (9.6)
Missing	6 (4.4)	7 (5.1)	9 (6.6)	1 (0.7)	0 (0)	1 (0.7)	1 (0.7)	2 (1.5)	1 (0.7)
Total	130 (100)	129 (100)	127 (100)	135 (100)	136 (100)	135 (100)	135 (100)	134 (100)	135 (100)
Median (IQR)	4.00 (3.00-5.00)	4.00 (3.00-5.00)	4.00 (3.00-5.00)	4.00 (4.00-5.00)	4.00 (3.00-5.00)	4.00 (3.00-5.00)	4.00 (3.00-5.00)	3.00 (2.00-4.00)	3.00 (2.00-4.00)

Values are presented as number (%) or median (percentiles 25 and 75). IQR, interquartile range.

Table 2. Distribution of the mean ranks achieved on different anatomy courses' helpfulness during pre-clinic and clinic phase, according to Guilan University of Medical Sciences' dentistry students' opinions

Anatomy courses	Anatomical sciences 1	Anatomical sciences 2	Anatomical sciences 3	Nervous system	Muscular system	Blood vessels	Osteology	Lymphatic system	Visceral organs	P-value
Mean rank	4.58	4.93	5.03	6.13	5.69	5.68	5.40	4.02	3.55	<0.001

Friedman test showed a significant difference among groups, in which anatomy of the nervous system with mean rank of 6.13 was the most highly ranked topic and internal organs with the mean rank of 3.55 was the least ranked topic ($P<0.001$).

Materials and Methods

Present descriptive cross-sectional study was carried out on dentistry students during their pre-clinical and clinical period at Guilan University of Medical Sciences in 2017. The data collection was done through handing in questionnaires containing demographic information such as age and gender, and a survey on the helpfulness of various anatomy topics and other important factors as described below:

- Anatomical sciences 1, 2, and 3 courses, and by detail topics of nervous system, muscular system, blood vessels, skeletal system, lymphatic system and visceral organs
- Providing theoretical courses before practical sessions with the aid of PowerPoint and video projection
- Teaching clinical points
- Using cadavers and moulages in practical sessions
- Making use of original textbooks, translated or compiled books and handouts
- Professors' characteristics, such as their ability to convey theatricals, their strictness and teaching methods.

Students were asked to specify the clinical application of each statement on the questionnaire regardless of the physical conditions of the professors, according the Likert scaling, in which 5 equaled "very much," 4 equaled "much," 3 equaled "moderate," 2 equaled "low," and 1 equaled "very low." Reliability and validity of questionnaires were assessed using Cronbach's alpha test ($\alpha=0.937$) and content validity index (0.65), respectively. Data were present as percentage and median (interquartile range) and Friedman test was used to compare the groups of data, a value of $P<0.05$ was considered statistically significant. All analyses were performed by the aid of SPSS software version 22 (IBM Corp., Armonk, NY, USA).

This study was performed in accordance with the guidelines of the research ethics committee of Guilan University of Medical Sciences (Registration code: 96061512, Approval code: IR.GUMS.REC.1396.256).

Results

Out of 136 participants, 68 were females (54.4 %) and 57 were males (45.6%). The age range was 18 to 30 with the mean and standard deviation of 22.75 ± 2.04 . Based on this survey, anatomy of nervous system with the mean rank of 6.13 was the most frequently ranked topic (47%), whereas the visceral organs with the mean rank of 3.55, was of the least practical value according to students' prospects (Tables 1, 2). As it is shown in Tables 3 and 4, more than 50% of participants scored the role of cadavers (mean rank, 8.30) in dissection labs. Results suggested that using more than one book as a reference with the mean rank of 5.32 was the least helpful factor to the students (Table 3). Students also stated that teaching clinical points (mean rank, 8.02), performing group activities (mean rank, 7.86) and using moulages (mean rank, 7.85) were other important factors helping their performance through clinical period (Table 4). Results also suggested that professors' features are also very important. More than 50% of students stated that professors' teaching methods (mean rank, 8.40) and ability to convey theatrical (mean rank, 5.77) specially in combination with the use of visual tools as PowerPoint presentation and video projection (mean rank, 8.54) were other two main factors to recall the learnings during clinic. Professors' strictness was another noticeable factor for their understanding and recalling process (mean rank, 6.88).

Discussion

With great advances in medicine and due to the medical education methods' role in society, some studies have suggested the necessity of reviewing and making changes in medical education principles in line with dentistry. In this context, great changes in medical education systems have occurred in developed and developing countries [11]. The relationship between basic sciences and their use in clinical activities has caused an increase in students' attention. Therefore, the curriculum objectives came true. This result was shown in the study done by Ahangari et al. [1] in form of the greatest total

Table 3. Detailed scores achieved on other effective factors' helpfulness during pre-clinic and clinic phase, according to Guilian University of Medical Sciences' dentistry students' opinions

Ranking	Teaching clinical points	Providing theoretical courses before practical sessions	Using original textbooks (English)	Using translated and/or compiled books (Persian)	Using handouts	Using more than one reference book	Using moulage	Using cadaver	Performing group activities
Very much	67 (49.3)	28 (20.6)	29 (21.3)	37 (27.2)	36 (26.5)	26 (19.1)	63 (46.3)	75 (55.1)	62 (45.6)
Much	31 (22.8)	40 (29.4)	38 (27.9)	47 (34.6)	41 (30.1)	38 (27.9)	33 (24.3)	24 (17.6)	31 (22.8)
Moderate	23 (16.9)	34 (25)	38 (27.9)	35 (25.7)	42 (30.9)	43 (31.6)	26 (19.1)	18 (13.2)	27 (19.9)
Low	10 (7.4)	25 (18.4)	21 (15.4)	11 (8.1)	11 (8.1)	20 (14.7)	10 (7.4)	9 (6.6)	10 (7.4)
Very low	3 (2.2)	7 (5.1)	8 (5.9)	4 (2.9)	4 (2.9)	8 (5.9)	3 (2.2)	7 (5.1)	3 (2.2)
Missing	2 (1.5)	2 (1.5)	2 (1.5)	2 (1.5)	2 (1.5)	1 (0.7)	1 (0.7)	3 (2.2)	3 (2.2)
Total	134 (100)	134 (100)	134 (100)	134 (100)	134 (100)	135 (100)	135 (100)	133 (100)	133 (100)
Median (IQR)	4.00 (3.00-5.00)	4.00 (3.00-4.00)	3.50 (3.00-4.00)	4.00 (3.00-5.00)	4.00 (3.00-5.00)	3.00 (3.00-4.00)	4.00 (3.00-5.00)	5.00 (3.00-5.00)	4.00 (3.00-5.00)

Values are presented as number (%) or median (percentiles 25 and 75). IQR, interquartile range.

Table 4. Distribution of the mean ranks achieved on other effective factors' helpfulness during pre-clinic and clinic phase, according to Guilian University of Medical Sciences' dentistry students' opinions

Teaching clinical points	Providing theoretical courses before practical sessions	Using original textbooks (English)	Using translated and/or compiled books (Persian)	Using handouts	Using more than one reference book	Using moulage	Using cadaver	Performing group activities	P-value
8.02	5.64	5.61	6.53	6.28	5.32	7.85	8.30	7.86	<0.001

Friedman test showed a significant difference among groups, in which using cadaver with mean rank of 8.30 was the most highly ranked factor and using more than one reference book with the mean rank of 5.32 was the least ranked factor ($P<0.001$).

scores. Accompaniment of anatomy training with clinical points is the subject which can improve medical education [9]. Education quality is strongly related to teacher's knowledge and the teaching method. For instance, workshops, conferences and using teaching-assistant tools are methods which involve students and therefore, improve learning [13]. Teaching anatomy based on dissection of cadaver is a kind of deep learning method, which includes the combination of various items (listening, recalling theoretic contents, seeing those contents in a real body, memorizing the details about it) and ends in total understanding. In this method, a student has to use the findings he/she learns in dissection lab directly, to design a pattern to explain the relationship between the subjects he previously learned about in classroom. Comparing this method with those based on objectives or surface learning depended on memory, the use of cadaver is way more helpful [14]. According to the results of this study, 55.1% of the students have reported the usefulness of cadaver, 46.3% stated the moulage, and 47.8% stated the PowerPoint usefulness in their learning process. Teaching strategies is one of the most important factors which affect academic achievements. Nasiri et al. [15] showed a significant relationship between learning strategies and academic achievement. In another study concerning the basic sciences students' prospects, Nasiri et al. [16] showed that teaching methods and professors' personality were of effective aspects of an effective teaching. Professors' participation in "teachers' empowerment" courses can also have a great impact on the students' learning. These trainings cause the teachers to identify the most recent educational methods and use them in appropriate situations. Therefore, universities have to analyze and check these cases and use them to improve the curriculum [17]. For instance, India with the most medical universities and students, established a national teacher training center which one of its objectives is to train an empower teachers and create a communication channels for them [18]. In the present study, 53.7% have reported that the professors' teaching method is so important. Also, 34.6% stated that professors' strictness can have a positive effect on their clinical practice. According to Alipour et al. [12], lessons such as head and neck anatomy, medical terminology, pharmacology, oral histology, and oral embryology were the most helpful courses in clinical phase of dentistry, with the average of 3.76, 3.49, 3.40, and 3.16, respectively. Although, this study has not considered all the subfields of basic sciences, we mainly focused on different topics in the field of anatomical sciences. Ramezani et al. [19] in a study at Islamic Azad Uni-

versity of Tehran, which was on achieving the goals of dentistry curriculum from the students' point of view, showed that the highest level of achieving goals was for dental anatomy and the least one was for the hygienic situations and epidemiology, research design, genetics, and psychology. Stewart et al. [20] in their study on graduated dentists from Melbourne University in Australia showed that those who took part in this test prioritized anatomy, pharmacology, medical pathology and surgery respectively. One of the main topics in anatomy which dentistry students have to deal with, is the anatomy of the nervous system. Complex network of cranial nerves, the necessity of detailed learning of their distribution in the head and neck and the relationship between cranial nerves and the quality of a dentist's work, brings a great importance to this field of anatomy. In agreement with our study, Farrokhi et al. [21] in a research conducted on medical students of Zanjan University of Medical Sciences, reported that anatomy of nervous system was of the topics with great impact on clinical courses of medical students.

Findings enhance the importance of reviewing the educational planning for medical students. So, Further researches are need to be done to find out the pitfalls of the present medical education system and build a new system in which students' needs and opinions are more emphasized.

Our study indicated that the most practical topic in the eyes of Guilan University of Medical Sciences' pre-clinical and clinical dentistry students was the anatomy of nervous system, while the least practical topic was the visceral organ. Teaching clinical points, providing theoretical concepts before practical sessions, teaching methods of the professors and their knowledge, and using cadavers and moulages were also crucial factors for improvement in their clinical activities. This study clearly supports the idea of "cadaver dissection benefits being maximized during clinical phase." It is necessary for dentistry students to undertake cadaver dissection during the basic sciences phase in order to recall anatomical details in clinic. Interestingly, this paper also showed that maybe, it is okay for professors to be a little bit strict as long as they give the students opportunity to access their (professors') knowledge.

Acknowledgements

We would like to thank all the dentistry students in pre-clinic and clinic phase for their participation.

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