

Perception of faculty members on clinical learning objectives of undergraduate orthodontic curriculum

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Abstract

Introduction: Contents related to knowledge and skills of orthodontics course for undergraduate dental program vary in dental schools. Currently there is no demarcation of contents related to skills of orthodontics course for undergraduate and postgraduate programme in Pakistan. This study aimed to perceive consensus of faculty members on orthodontic course contents associated with skills of "Treatment" required for undergraduate students.

Material and Methods: The study design was a cross sectional which was conducted at Islamic International Dental College, Islamabad. Learning objectives related to skills of orthodontic were formulated in the form of a questionnaire with five point likert scale and sent to study participants (N=42) who were academicians at various dental colleges. The obtained data was analyzed by using SPSS version 20.

Results: Twenty participants (N= 20) responded on questionnaire. Out of twenty eight learning objectives, participants achieved consensus on 22 items associated with skills related to treatment for mixed dentition. Six items could not receive consensus which were related to fixed appliances and functional appliances.

Conclusions: Undergraduate students should have skills of history taking, oral examination, x-ray and removable appliances in orthodontic discipline. A further study is recommended to calculate students learning time (SLT) in this manner.

Keywords: Dental student; learning outcome; malocclusion; mixed dentition; skills of orthodontics

Introduction

Undergraduate course of orthodontics forms a small but variable part of overall dental education of students. The undergraduate students get an opportunity to deal with dental patients to have knowledge and skills on almost all aspects of orthodontic treatment. In general dental practice, they treat orthodontic patients by using their knowledge and skills acquired during their

posting in orthodontic department.

The early diagnosis and referral of orthodontic cases have been suggested for providing the best care to patients. Referral are made usually by general dental practitioners (GDP) and pediatric professionals and it is required professionally that they are well informed about the correct diagnosis of early malocclusion problems¹.

In US, it was found that dental students had lack of skills to recognize malocclusion and use dental instruments in diagnosing orthodontic problems.² The curriculum of a British dental school had emphasized more on diagnosis of a malocclusion.³ Studies have shown that quite considerable number of general dentists provided comprehensive dental treatment even they were professionally not allowed to precede such specialized cases.^{4,5} Researchers have shown

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that malocclusions such as cross bite, open bite were treated by general dentists.^{6,7}

There is a list of contents in the national curriculum of Bachelor of Dental Surgery (BDS), without any distinction of knowledge and skills required at undergraduate level. Faculty members find difficulty when visit to other dental colleges as external examiners. They come across that different meanings of the depth and context of the topic are thought by different faculty members. Few members emphasize on knowledge component while others on practical skills. There are no proper guidelines on learning outcomes of orthodontic course at various colleges. In addition, there is no demarcation between postgraduate and undergraduate courses.

This study aimed to develop consensus as the optimal orthodontic course contents associated with skills required for treatment of orthodontics at undergraduate BDS programme. The study was approved by ethic committee of Riphah International University (Riphah/ERC/16/062).

Material and Methods

This was a cross sectional study which was conducted at Islamic International Dental College of Riphah International University, Islamabad.

The study instrument was adopted from a previous study based on AMME Guide 87 by Artino et al.⁸ However the contents validity of the study instrument were revised by three subject experts.

Inclusion criteria of study participants were professional education and experience. Thus orthodontic faculty members with minimum three years teaching experience and holding either fellowship from College of Physician and Surgeons Pakistan (CPSP), Royal College of Surgeons England (RCSE), Royal College of Physician and Surgeon (RCPS) Edinburgh,

Royal College of Surgeon, Glasgow and Royal College of Surgeon Ireland were study participants. Other than fellowship, faculty members holding Master in Dental Surgery (Orthodontics) and Master of Science (MS) were also included.

Faculty members holding three months to one year certificates in orthodontics or any other continuing orthodontic courses lasting from two days to few weeks were excluded. Visiting faculty members and orthodontists who were involved full time in private practice were also excluded.

Twenty eight Learning outcomes (LOs) associated with skills required in "Treatment" part of orthodontics in undergraduate course were circulated through emails to chosen orthodontic participants (N=42). Learning outcomes were in the form of questionnaire with five point likert scale where 'Strongly disagree (SDA), Disagree (DA), Neutral (N), Agree (A) and Strongly Agree (SA) were parameters. Later 'SDA, DA, N' were combined as one set and labeled as No consensus and 'A, SA' were put together as 'Consensus'. In this way, consensus were obtained.

Statistical Package for Social Sciences (SPSS version 20.0) was used to analyze the data with frequency and percentage.

Results

The analysis of data from participants (N=20), showed that over 80 % of participants agreed on history and clinical examination to be included in undergraduate dental programme as learning outcome. Similarly cephalographs, OPG, study casts and photographs were also given 'agreed' perception by participants (Table I). More than seventy percent agreed on definite treatment plan by undergraduate dental students to be excluded.

Table I: Perception on learning outcomes regarding treatment planning

NO	Statement	SDA* n (%)	DA* n (%)	N* n (%)	A* n (%)	SA* n (%)	Consensus	
							Yes	NO
1	Demonstrate basic principles of treatment planning	0 (0%)	0 (0%)	0 (0%)	5 (25%)	15 (75%)	√	
2	Describe basic problems faced by an orthodontic patient in 3 planes of space	0 (0%)	0 (0%)	2 (10%)	7 (10%)	11 (55%)	√	
3	Develop a problem list and preliminary treatment plan by using history and clinical examination	0 (0%)	0 (0%)	0 (0%)	11 (55%)	9 (45%)	√	
4	Develop a preliminary treatment plan (by using basic diagnostic aids (Cephalographs, OPG, Study casts, Photographs)	0 (0%)	0 (0%)	0 (0%)	11 (55%)	9 (45%)	√	
5	Develop a definitive treatment plan (by using basic diagnostic aids (Cephalographs, OPG, study casts, Photographs)	0 (0%)	11 (55%)	5 (25%)	2 (10%)	2 (10%)		√

*LO with minimum perception (agreed+ strongly agreed) by participants was added as consensus LO

Table II showed LOs about skills which undergraduate students should or shouldn't perform. In this category, eleven LOs were chosen and most of LOs obtained less than 70% perception by academicians. For example, learning outcome 'Measure the cross bite and expansion required on study casts' was rejected by more than fifty percent participants while LOs 'Take the detailed orthodontic history in a systematic way', 'Perform orthodontic intra and extra oral examination in a systematic way' were given 'agreed' perception by all participants (Table II).

Table II: Perception on learning outcomes associated with 'skills of orthodontic treatment'

No.	Statement	SDA* n (%)	DA* n (%)	N* n (%)	A* n (%)	SA* n (%)	Consensus	
							Yes	NO
6	Take the detailed orthodontic history in a systematic way	0 (0%)	0 (0%)	0 (0%)	4 (20%)	16 (80%)	√	
7	Perform orthodontic intra and extra oral examination in a systematic way	0 (0%)	0 (0%)	0 (0%)	5 (25%)	15 (75%)	√	
8	Perform mixed dentition space analysis and Bolton analysis on the study casts	0 (0%)	0 (0%)	0 (0%)	4 (20%)	16 (80%)	√	
9	Measure the cross bite and expansion required on study casts	0 (0%)	4 (20%)	5 (25%)	8 (40%)	3 (15%)		√
10	Apply the elastomeric separators on mixed dentition patient	0 (0%)	2 (10%)	6 (30%)	6 (30%)	6 (30%)	√	
11	Select and cement the bands for molar teeth on mixed dentition patient	0 (0%)	4 (20%)	6 (30%)	9 (45%)	1 (5%)		√
12	Select and bond the brackets on molar teeth	0 (0%)	2 (10%)	4 (20%)	8 (40%)	6 (30%)	√	
13	Insertion and activation of simple removable appliances	0 (0%)	0 (0%)	2 (10%)	5 (25%)	13 (65%)	√	
14	Execute the treatment plan for a case with non-skeletal involvement after making a detailed problem list	0 (0%)	2 (10%)	0 (0%)	11 (55%)	7 (35%)	√	
15	Handle the emergency treatment in fixed orthodontics.	0 (0%)	2 (10%)	4 (20%)	7 (35%)	7 (35%)	√	
16	Insertion and adjustment of Hawley's retainers	0 (0%)	0 (0%)	2 (10%)	5 (25%)	13 (65%)	√	

*SDA=Strongly disagree, DA=Disagree, N=Neutral, A=Agree, SA=Strongly Agree
Regarding 'Space Problem in Mixed Dentition' nine learning outcomes were presented to participants. All agreed on skill obtained on space discrepancy and space loss during mixed dentition by undergraduate dental students (Table III). Almost fifty

percent refused to be included 'various methods on serial extraction' and 'Locate the position of impacted teeth in 3 planes of space by Parallax technique' as learning outcome for undergraduate programme (Table III).

Table III: Perception on mixed dentition related learning outcomes

NO	Statement	SDA* n (%)	DA* n (%)	N* n (%)	A* n (%)	SA* n (%)	**Consensus	
							Yes	NO
17	Demonstrate the space discrepancy during mixed dentition time (S or K)	0 (0%)	0 (0%)	0 (0%)	6 (30%)	14 (70%)	√	
18	Demonstrate various space maintainers	0 (0%)	2 (10%)	0 (0%)	2 (10%)	16 (80%)	√	
19	Explain causes for space loss in the arches	0 (0%)	0 (0%)	0 (0%)	8 (40%)	12 (60%)	√	
20	Assess the need for space regaining in the arches	0 (0%)	0 (0%)	0 (0%)	13 (65%)	7 (35%)	√	
21	Demonstrate various space regainers	0 (0%)	2 (10%)	2 (10%)	11 (55%)	5 (25%)	√	
22	Describe the use of Lee way space in arches for alignment of teeth	0 (0%)	2 (10%)	0 (0%)	6 (20%)	12 (60%)	√	
23	Formulate various steps of space supervision	0 (0%)	2 (10%)	4 (20%)	9 (45%)	5 (25%)	√	
24	Analyse indications, contra-indications, advantages and disadvantages of serial extractions	0 (0%)	0 (0%)	3 (15%)	11 (55%)	6 (30%)	√	
25	Describe various methods of serial extraction	0 (0%)	4 (20%)	7 (35%)	5 (25%)	4 (20%)	√	
26	Depict various ways of handling the crowding	0 0%	4 20%	7 35%	5 25%	4 20%		√
27	Locate the position of impacted teeth in 3 planes of space by Parallax technique	0 0%	4 20%	5 25%	5 25%	6 30%		√

28	Select and cement the bands for molar teeth on mixed dentition patient	0 0%	4 20%	6 30%	9 45%	1 5%		√
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*SDA=Strongly disagree, DA=Disagree, N=Neutral, A=Agree, SA=Strongly Agree
 **LO with minimum perception (agreed+strongly agreed) by participants was added as consensus LO.

Discussion

The definition, context and number of practical exercises vary among dental institutes resulting into a variety of graduates with variable competencies to handle patients of orthodontic problems. These graduates when enter into clinical practice depict variety of skills in orthodontic technique and in treatment planning for the common orthodontic malocclusions. This results into low quality of orthodontic services and poor referral by the general dental practitioners. Thus the community dental health is directly related to the quality of its dental graduates, this study focused on realistic objectives or outcomes to be decided for graduates with good basic skills of orthodontic. However, there was a lack of assessment of students on the selected or consensuses learning outcomes which was a limitation of this study.

The faculty members had consensus related to skill of removable appliances for an undergraduate. All faculty members were of the opinion to have basic knowledge and skill in basic removable appliance design, appliance fabrication, its activation and instructions of use. Faculty members generally had an opinion on functional appliances learning objectives. These results are comparable with the competencies defined by General Dental Council, UK, and as per the study conducted in the Newcastle University, UK, where they have defined that their students develop a basic skill in appliance design, fit, and monitor in correcting posterior cross bites and single

tooth anterior cross bites.⁹ In some parts of the world, general dental practitioners provide orthodontic treatment by removable appliances.¹⁰ In fact, the efficacy of removable appliances is not as good as fixed appliances.¹¹

Mixed dentition space management protocol is learnt at various levels. The majority of the respondents were in the favour of that the theory of these skills would be taught at undergrad level, but practice should be executed later during house job or orthodontic residency. Space analysis in mixed dentition is broadly categorized such as ' Use regression equations, radiographs or a combination of both methods .¹²⁻¹⁵ Usually the regression equations based on already erupted permanent teeth are used widely. In this manner, the Moyers probability charts and Tanaka Johnston equations are taken as standard.^{13,16} This is a complex technique and usually considered for postgraduate students. General dental practitioners (GDPs) play a key role in making referral of orthodontic patients. But mostly they compete with orthodontists in providing the treatment especially simple cross bite cases.¹⁷ GDPs should not treat orthodontic cases as they are not trained during their undergraduate training. The quality of orthodontic treatment is a public health issue because inappropriate treatment of a malocclusion can lead to irreparable damage.¹⁸ since general dentists tend to treat orthodontic cases and ultimately finish these cases worse than the average professional holding a postgraduate degree in orthodontics.¹⁹ The victims of orthodontic treatment dealt by GDPs are growing because those professional lacks the necessary expertise.²⁰ This study may benefit to curriculum managers to develop or revise the current version of curriculum.

The undergraduate orthodontic courses at Toronto and Liverpool dental schools have 250 hours of teaching and within that, more than 100 hours are allocated for clinical rotation. Both programmes contain laboratory

teaching of removable and fixed appliance technique. Undergraduate students treat their own patients with both simple and complex appliances, within their clinical training period which extends over at least 2 years.^{21,22} In our study removable appliances were suggested to be included at undergraduate programme

Though our dental schools follow national curriculum, but there is diversity in course content and the time to deliver the content also varies from institute to institute. There was a wide variation in the orthodontic course form and content in the 12 UK dental schools. The greatest variation occurred in the clinical teaching hours (50 to 126), the types of patient treatment undertaken (removable only to full fixed), the laboratory teaching hours (0 to 60), the content of the laboratory course (removable appliances to fixed appliance typodonts). It is an ongoing debate on number of curriculum hours devoted to orthodontic instructional material because there is great variation from school to school especially in US.²³ Number of clinical hours influence on proficiency of students in the practice of orthodontic because more hours of teaching translate to a greater understanding and comfort level with the practice.²⁴ In our study participants agreed on orthodontic clinical hours to be taught and practiced by undergraduate students. But how many hours should be taught or practiced by students was another limitation.

Treatment planning after the patient examination is most important part of orthodontic management. Mostly it is divided into two parts a- treatment aims and b- treatment plan. It is quite possible orthodontic treatment could affect the skeletal form when functional appliances are used but it has little effect on soft tissue and arch length. Improved dental health, relief crowding, correction of buccal occlusion, reduced over bite, reduced overjet, and alignment of teeth are some basic problems

that are addressed in the treatment of orthodontics. All learning outcomes related to basic skills would benefit to students.

Conclusions

It can be concluded from this study that learning outcomes of skills associated with history taking, oral examination and investigation are primary concerns by academicians for undergraduate orthodontic programme.

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