

Knowledge of fresh graduates in the field of dentistry regarding interceptive orthodontics

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Abstract

Introduction: Identifying a developing orthodontic problem is a primary role of dental practitioners. The awareness about Interceptive Orthodontics is important for them so that they may reach the correct diagnosis and carry out the necessary treatment or make appropriate referrals where required. Therefore, our aim was to assess the knowledge regarding Interceptive Orthodontics amongst freshly graduated dental students.

Material and methods: A validated questionnaire consisting of nine multiple choice questions was distributed by hand across different dental institutes in the twin cities along with online data collection from February 2020 to June 2020. The respondents were house officers who had graduated in the years 2018 and 2019. Each question was given a score of 1 if answered correctly and 0 if answered incorrectly.

Results: The questionnaire was returned by 136 respondents out of which 65 were incorporated in the analysis. Knowledge regarding early loss of deciduous teeth and management of space discrepancy was above average (67.7% and 53.9% respectively). Whereas it was poor regarding canine impaction and first permanent molars of poor prognosis (27.7% and 10.8% respectively). The overall knowledge about Interceptive Orthodontics was found to be poor 38.5%

Conclusions: The knowledge of fresh graduates in the field of dentistry regarding Interceptive Orthodontics is poor. Interceptive Orthodontics should be made a part of the undergraduate curriculum in Pakistan.

Keywords: Awareness; curriculum; malocclusion; questionnaire

Introduction

Malocclusion causes multiple problems for individuals and it adversely affects the overall Oral health related quality of life (OHRQoL).¹ These problems include psychosocial problems, functional problems such as difficulty in mastication, temporomandibular joint disorders, impaired speech, impaired swallowing and a greater

susceptibility to other dental diseases such as caries and periodontal disease.¹ The prevention or interception of a developing malocclusion can help to eliminate all these potential problems for the patient.

Interceptive Orthodontics comprises of orthodontic interventions that aim to treat or limit the severity of developing malocclusion.² These interventions are initiated in the developing dentition and they may also enable growth modification.^{2,3} Extremely severe malocclusions such as a pronounced overjet have a negative impact on quality of life.⁴ Adolescents may even experience bullying related to their malocclusion. Timely interception of these developing malocclusion.⁷ can either decrease the complexity or totally eliminate the need of any orthodontic treatment required in the

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permanent dentition.^{2,5,6} and have a positive effect on the Oral Health Related Quality of Life (OHRQOL).⁷

Among countries, the dentist-to-population ratios (DPR) varies greatly. World Health Organization (WHO) states that the DPR in most of the western countries is 1:2000. According to 2019 estimates, ⁸ more than 23,000 dentists are registered in Pakistan and the current DPR is around 1:10,000 which is very less than the accepted ratio. However, the biggest challenge in Pakistan is the inequitable distribution of dentists. The DPR is 1:5000 in metropolitan cities such as Karachi and Lahore, whereas in rural districts there are hardly any registered dentists available for several tens thousands of populations.⁹

Similarly, as per 2021 estimates; 36.01% of Pakistan's population is in the age range of 0-14 years.¹⁰ In urban areas, there is only one dentist available for every 2000 children in this age group and the ratio is even lower in rural areas of Pakistan. Due to the scarcity of dentists, majority of the population does not even have access to basic oral healthcare services, let alone orthodontic treatment of a malocclusion that may adversely affect the patient's quality of life. This further signifies the importance of a general dentist in Pakistan to have knowledge about interceptive orthodontics so that a diagnosis can be made at an early age and an appropriate interceptive treatment either can be provided by the general dentist or timely referrals can be made. Berndt¹¹ suggests that children who don't have access to an Orthodontist, Intercepting Orthodontic services can be provided by a general dentist: who is well equipped, remotely under the supervision of an Orthodontist. This helps in decreasing the burden in orthodontic clinics and tertiary care hospitals and save cost as well as time for the patients.

Identifying a developing malocclusion is a primary role of any dental practitioner. Knowledge of dentist about interceptive orthodontics is pivotal for diagnosis, timely

interception or referral. In Pakistan, to the best of our knowledge, no study has been conducted so far that assesses the knowledge regarding interceptive orthodontic procedures amongst dentists. Hence, the objective of this study was to assess the knowledge of fresh dental graduates regarding Intercepting Orthodontic treatment in Pakistan.

Material and Methods

The questionnaire based cross sectional study was carried out in different dental hospitals across Rawalpindi and Islamabad. Ethical approval was obtained from the Ethical Review Committee of Margalla Institute of Health Sciences, Rawalpindi, Pakistan. (ERC Ref No:MM/76/2020).

Sample size was calculated using Raosoft calculator. A minimum sample of 65 respondents was required keeping the correlation value (r) as 0.347 as reported by Borrie et al.¹² The sampling technique used was non-probability consecutive sampling.

Inclusion criteria included dentists who had graduated in the years 2018 and 2019 and were currently doing house job. Any dentist who is currently doing house job but has not graduated in the above-mentioned years were excluded from the study. The study is testing the knowledge of fresh graduates i.e the knowledge they have acquired through their undergraduate programme. Therefore, being in different months of house job does not affect the outcome. Data collection was carried out from February 2020 to June 2020.

MCQ based questionnaire was developed and used for assessment of knowledge regarding Intercepting Orthodontics among dentists. Subjects satisfying the inclusion criteria were asked to fill the questionnaire which was distributed manually and through an online link shared by the principal investigator, in different institutes of twin cities. The purpose of the questionnaire was explained to respondents beforehand and filling it out was considered as consent.

The questionnaire comprised of nine scenario based multiple choice questions with four options each formulated by the principal investigator. The questionnaire was further reviewed by the subject matters experts who judged the questionnaire for its relevance, understanding and clarity for corrections to be made accordingly.

Each scenario addressed a separate anomaly and were as follows:

1. A missing lower right 'c' in an uncrowded arch in a nine-years-old child.
2. Eight-years-old child in whom maxillary deciduous incisors required extraction due to nursing bottle caries.
3. Lower right second deciduous molar lost due to premature exfoliation.
4. Twelve-years-old child with a distally tipped and proclined maxillary right permanent lateral incisor and an absent canine bulge on both sides.
5. Nine-years-old child with a grossly carious permanent lower right first molar.
6. Nine-years-old child with grossly carious permanent upper right first molar.
7. Considerations for extraction of carious mandibular first molar followed by spontaneous space closure by maxillary second molars.
8. Diagnostic evaluation of a nine-years-old child with severe space discrepancy / severe crowding.
9. Eight-years-old child with mild lower labial segment crowding.

Questionnaire was validated prior to data collection using item analysis comprising of difficulty index, discrimination index and distractor analysis which examined responses to individual test items(questions) and assessed the quality of those items and of the test as a whole. Reliability of questionnaire was ascertained using Cronbach's alpha.

Responses were coded and analyzed using IBM® Statistical Package for the Social Sciences (SPSS®) version 25.0. Descriptive statistics were used to summarize the data. All the quantitative variables were measured as mean and standard deviation and

categories were demonstrated in frequency and percentages.

Each question answered incorrectly, was assigned a score of 0 and if answered correctly, was assigned a score of 1 and their percentages were calculated. A score of 50% was considered as average, less than 50% as poor, and more than 50% as above average.

Results

A total of 136 questionnaires were completed and returned from five different institutes across Islamabad and Rawalpindi. Out of these, the inclusion criteria were met by 65 and they were included in the analysis (n=65). Validity of the questionnaire assessed using difficulty index showed that item 1 ($p=0.11$), 7 ($p=0.14$) and 9 ($p=0.11$) were difficult. The mean difficulty index was 0.36 ± 0.23 which indicates that the items were difficult overall.

As a rule of thumb, in terms of the discrimination index, 0.40 and greater are very good items, 0.30 to 0.39 are reasonably good, 0.20 to 0.29 are marginal items and, below 0.19 are considered poor items and should be eliminated. Accordingly, items 2, 8, and 9 were very good, items 3, 4, and 6 were reasonably good, items 1 and 7 were marginal and item 5 was poor and should be excluded. The mean discrimination index was 0.40 ± 0.28 which is very good and indicates that all items could be included.

The items in our questionnaire showed excellent distractor efficiency with only 2 non-functional distractors out of a total of 27 distractors.

Internal consistency was analyzed using Cronbach's alpha. It was calculated to be 0.468. Items 5 and 6 were removed from the analysis as they were negatively impacting the internal consistency. Cronbach's alpha was recalculated and it improved to 0.637. Further removal of items didn't significantly improve Cronbach's alpha value thus data analysis was carried out after excluding items 5 and 6 only to ensure reliable results.

Table I: Reliability/internal consistency

No. of items (n)	Cronbach's alpha
7	0.637

The knowledge score ranged from 0 to 5, with the average mean score (mean \pm SD) of 2.7 \pm 1.48.

The average percentage of correct answers was 38.5% which was below average. The mean score, percentage and frequency of overall knowledge is shown in Table V.

Each question was also separately analyzed to determine the frequency and percentages of correct answers (Table VI). Knowledge of questions pertaining to missing c's (89.2%), early loss of deciduous molar scores (78.5%), and severe space discrepancy (61.5%) was above average. However, Knowledge regarding interception of early loss of maxillary deciduous incisor (35.4%), distally tipped and proclined maxillary right permanent lateral incisors (27.7%), first molar of poor prognosis (10.8%), and lower labial segment crowding (46.2%) was below average.

Table II - Distribution of frequency and percentage of score in the area of knowledge about Interceptive Orthodontics

Question no.	Frequency of correct answers (n=65)	Percentage of correct answers (%)
1	58	89.2
2	23	35.4
3	51	78.5
4	18	27.7
7	7	10.8
8	40	61.5
9	30	46.2

In addition, the questions were then categorized into different domains of interceptive orthodontics and their cumulative percentages of correct answers were calculated (Table VII). The respondents scored poorly in questions related to canine

impaction and first permanent molars of poor prognosis (27.7% and 10.8% respectively). Whereas the score was above average for the domains of early loss of deciduous teeth and management of space discrepancy (67.7% and 53.9% respectively).

Table III - Distribution of percentage of score in the different domains of knowledge about interceptive orthodontics

Domain of knowledge	Question numbers	Cumulative percentage of correct answers (%)
Early loss of deciduous teeth	1,2 and 3	67.7%
Management of space discrepancy	8 and 9	53.9%
Canine impaction	4	27.7 %
First permanent molars of poor prognosis	7	10.8 %

Discussion

Questionnaires are the most common tool used for educational research purposes. Multiple choice questions were chosen as the means to assess the knowledge regarding interceptive orthodontics in our study as they are a well-established, reliable and valid method of assessment of knowledge^{13,14} and they leave little room for bias¹⁵ as compared to other tests which are negatively affected by subjectivity.¹⁶

Validation of the questionnaire was ascertained prior to the data collection as it helps to retain valuable items and discard those which are not useful.¹⁷ Reliability of the questionnaire initially formulated was low. This is similar to the findings of Borrie et al.¹² The lack of internal consistency may have been due to the fact that interceptive orthodontics is considered as multiple separate tasks that do not have a particular dominant theme. Therefore, there is little

internal consistency in decision-making in this area¹². After elimination of two questions from questionnaire, Cronbach's alpha improved, was considered acceptable and reliable

Fresh dental graduates were included in this study because we wish to see how well the dental undergraduate curriculum of Pakistan equips the students with the knowledge of Interceptive Orthodontics, so that they may be able to retain the information and implement it in their clinical practice later on. Finding from this study showed that the mean total percentage of overall knowledge was only 38.5% which indicates an overall poor knowledge amongst fresh dental graduates. This poor knowledge highlights the gaps in our dental curriculum regarding interception of developing malocclusion. Another reason attributed to poor scores may also be a lack of clinical experience as the respondents in this study were fresh graduates.

Early loss of deciduous teeth and space discrepancy management are generally taught as part of curriculum in dental institutes which may explain better performance of respondents in these two domains. Whereas, the other domains of interceptive orthodontics are not a part of the implemented curriculum¹⁸ which maybe one of the reasons for the poor overall score.

Borrie et al. assessed the primary reasons that affects the implementation of interceptive orthodontics. They concluded that the key barriers to providing interceptive care are not just the lack of knowledge but also lack of self-confidence and experience have a significant role.¹⁹

Similarly, a survey conducted by Jauhar et al. on undergraduate orthodontic teaching also stated that 60.3% final year students were interested in further teaching of Interceptive Orthodontics.¹⁹

Lack of knowledge among fresh dental graduates highlights the knowledge gap regarding interceptive measures which greatly reflects on the fact that interceptive

orthodontics is not part of undergraduate curriculum. Thus, this can only be improved when it is included as part of undergraduate curriculum. The Pakistan Medical Commission (PMC) should take the initiative to change the current implemented curriculum in Dental institutes across Pakistan.

Improvement in knowledge will help the general dental practitioners to correctly diagnose and timely intercept various developing malocclusion which would improve the patients OHRQoL and also greatly reduce the orthodontic patient load which is significantly important owing to low DPR in Pakistan.

Two of the limitations of this study were:

Questionnaire had a limited number of scenarios to assess each domain of interceptive orthodontics separately. This result cannot be reflected upon Pakistan's dentists, as this study was not carried out Pan Pakistan and the sample size was relatively smaller.

Further research should be conducted to assess knowledge regarding each domain in more detail and should include institutes all across Pakistan.

Conclusions

The knowledge of fresh graduates in the field of dentistry regarding Interceptive Orthodontics was found to be poor. It is recommended that Interceptive Orthodontics should be taught as a part of curriculum in all dental institutes of Pakistan.

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