Assessment of the Knowledge of General Dentists Practicing in Tehran about Timing of Orthodontic Treatment

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Abstract

Objective: The ideal time to commence orthodontic treatment is very important. In Iran, due to the widely distributed population and low number and uneven distribution of orthodontists, general dental practitioners (GDPs) play an important role in proper treatment of occlusal and functional disorders and referring orthodontic patients to orthodontists. The purpose of this study was to assess the knowledge of GDPs about the proper timing of orthodontic treatment in comparison with orthodontists practicing in Tehran.

Methods: This cross-sectional analytical study was conducted on GDPs and orthodontists practicing in Tehran, who were selected by random sampling. The questionnaire used in this survey asked for demographic information including age, sex, academic degree, work place and work experience and contained questions concerning the knowledge of clinicians regarding the proper time to commence treatment for the most common types of occlusal disorders, functional disorders, temporomandibular joint (TMJ) disorders and other orthodontic problems. The answers of both groups of participants were assessed based on the American Board of Orthodontics objective grading system (ABO OGS).

Results: The results of ANOVA showed that the two groups were significantly different in terms of age ($p<0.05$), sex, academic degree ($p<0.001$), and place of work (private office, private clinic, governmental clinic) ($p<0.05$). The results of comparison of GDPs and orthodontists for the proper time of initiation of orthodontic treatment for occlusal, functional and TMJ disorders showed that the GDPs had significantly less knowledge in this regard.

Conclusion: Because of low level of knowledge of GDPs about the ideal time to commence orthodontic treatment, further training regarding diagnosis of malocclusion in primary and mixed dentition periods, etiology of malocclusion, recognition of normal occlusion and normal dental relationships as well as the proper time to start orthodontic treatment for each type of disorder seems necessary.

Key words: Dental occlusion, Dentists, Functional disorders, Orthodontic treatment, Private practice, Timing of Orthodontic treatment.

Introduction:

Malocclusion is defined as a significant deviation from normal occlusion or an imbalance in ratios of tooth size and position, bone and facial soft tissue (1).It may cause several problems for the patients. Malocclusion is among the most common developmental anomalies with high prevalence among different populations. In the recent years, demand for orthodontic treatment has greatly increased in many countries worldwide (2-4).

Several studies on the need for orthodontic treatment have been conducted in Iran and definite need for orthodontic treatment in Tehran has reported to be 21.3% in 10,000 population in the age range of 14-16 years (5) and 18.4% in Shiraz in 2000 population in the age range of 11-

14 years (6). Considering the complications of malocclusion and the high demand for orthodontic treatment, timely treatment of dentofacial disorders is very important in decreasing the costs and psychological and social consequences of these problems.

A study on the knowledge of American orthodontists about the timing of orthodontic treatment showed that out of 41 types of occlusal deviations including 25 occlusal disorders, six functional disorders, seven TMJ disorders and three others, orthodontists treated 21 conditions in the early mixed dentition period and 13 in the late mixed dentition period (7). Assessment of differences in opinions of orthodontists in Finland regarding the indications, timing and methods of orthodontic treatment in 2008 revealed that orthodontists in Finland mostly preferred early treatment (8). Comparison of early and late orthodontic treatment in eight centers by the same group of researchers revealed significant differences in terms of number of appointments, duration of treatment, type and number of tools used and the expertise in treatment (9). Also, early treatment increased patient satisfaction in terms of esthetics and function of teeth (10).The same group of researchers in 2013 compared the costs of early and late orthodontic treatments and reported that despite the superiority of early treatment, it imposed a higher cost on patients (11). Kiyak *et al*. (2005) (12) evaluated the opinions of orthodontists in Italy, the United States and Turkey regarding the timing of orthodontic treatment. Italian orthodontists preferred two-phase treatments and Turkish orthodontists preferred delayed treatment more commonly than the other two groups.

General dentists are often the first group of clinicians encountered with patients requiring orthodontic treatment. Screening of such patients is often performed by general dentists and they are responsible to treat or refer these patients (13). Galbreath *et al*. (2006) (14) in 2006 evaluated orthodontic treatments performed by general dentists in the United States and assessed the influential factors in this regard. A survey containing 21 items was sent to 750 general dentists and 62% of dentists responded. The results showed that most of them spent less than 10% of their time for orthodontic treatments. Most of them performed orthodontic treatment in the permanent dentition period and the most commonly treated cases included space maintenance, anterior crossbite, tooth rotations, habits, up-righting molars and posterior crossbite. Wolsky and McNamara (1996) (15) evaluated the orthodontic services provided by general dentists in Michigan and reported that 23.7% of dentists did not perform orthodontic treatments, 57% performed limited orthodontic treatments and 19.3% performed all types of orthodontic treatments.

Considering the absence of any previous study on this topic in Iran, this study aimed to assess the knowledge of GDPs about the appropriate timing of orthodontic treatment in comparison with orthodontists.

Methods:

This cross-sectional analytical study was performed on GDPs and orthodontists practicing in Tehran. General dentists were randomly selected among the participants in the 7th annual scientific congress of general dentists of Iran held in February 2012. Orthodontists were randomly selected among the participants of an orthodontic congress held in April 2013. Of every three participants in the congress, one was randomly selected and the questionnaire was administered. The questionnaire comprised of two sections. The first section asked for demographic information of subjects including age, sex, academic degree, work experience and work place. The second part included questions regarding the attitudes of clinicians towards proper timing of initiation of orthodontic

treatment for different types of malocclusions, functional disorders, TMJ problems and other types of orthodontic problems.

The questionnaire used in this study was adopted from Yang and Kiyak (1998) (7) and used after slight modifications. Subjects were briefed about the study and filled out the questionnaire. They responded to multiple-choice questions regarding the proper time of initiation of orthodontic treatment for each condition. The answer choices were as follows: 0: No need for treatment; 1: Primary dentition period (3-6 years); 2: Early mixed dentition period, 3: Late mixed dentition period; 4: Permanent dentition period; 5: Adulthood (16 years and older), X: I do not know.

To determine the correct responses, the scoring system of ABO OGS available online at http://www.americanboardortho.com was used and the responses of subjects were assessed accordingly. Data from 78 completed questionnaires by GDPs and 33 questionnaires filled out by orthodontists were statistically analyzed.

To report the frequency of different conditions, descriptive statistics including the frequency and percentage were used. For bivariate analysis, one-way ANOVA and for multivariate analysis (such as the correlation of age, sex, academic degree, work place and work experience with the rate of correct responses) ANOVA was used. Data were first subjected to Kolmogorov-Smirnov test to assess their normal distribution and then t-test was applied for pairwise comparisons. Data were entered into SPSS 16 (Microsoft, IL, USA). The mean score of knowledge was compared between the two groups using t-test. Multivariate analysis was conducted using logistic regression to assess the correlation of independent variables (age, gender, work place, academic degree) with dependent variables (knowledge about the proper timing of orthodontic treatment for different occlusal, functional, and TMJ conditions).

Results:

The frequency distribution of age groups of dentists is shown in Figure 1.
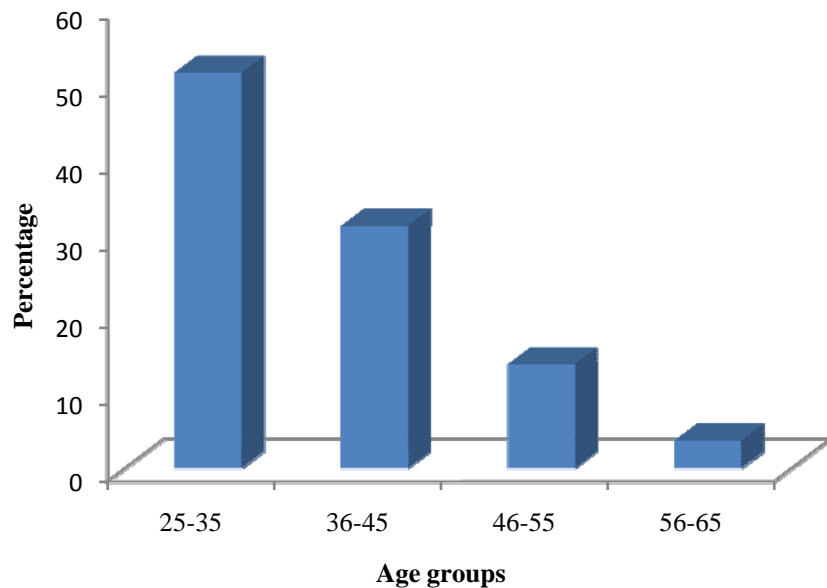

Figure 1-The frequency of subjects based on age groups

The 25-35 year old age group had the highest frequency. Of dentists, 27.9% had less than 5 years of work experience, 33.3% had 5-10 years of experience, 27.9% had 11-20 years of experience and 10.8% had 21-30 years of clinical experience.

Assessment of the number of orthodontic patients treated by dentists showed that 25.2% of dentists had never treated an orthodontic patient; 14.4% had treated less than 5 patients, 8.1% had treated 5-10 patients, 10.8% had treated 11-20 patients, 5.4% had treated 21-30 patients and 36% had treated more than 30 orthodontic patients. Assessment of the last time of participation in an orthodontic continuing education course revealed that the last time of participation in such courses was sometime in the past month in 6.5%, in the past 1-6 months in 15.7%, in the past 6-12 months in 22.2% and over one year ago in 55.6%. Assessment of the work place of dentists revealed that 46% were working in private offices, 22% in a private clinic and 32% in a governmental (community) clinic.

Also, GDPs were asked about the number of patients they had referred to orthodontists in the past year; 6.5% had not referred any patient in the past year, 19.5% had referred less than 5, 33.8% had referred 5-10 patients, 15.6% had referred 11-20 patients, 3.9% had referred 21-30 and 20.8% had referred more than 30 patients to orthodontists.

The responses of dentists to all questions in the questionnaire were analyzed by ANOVA, which showed significant differences in age ($p<0.05$), sex, academic degree ($p<0.001$), and place of work (private office, private clinic, governmental clinic) between the study groups ($p<0.05$). Comparison of the mean scores of general dentists and orthodontists regarding the proper time for initiation of orthodontic treatment for occlusal, functional and TMJ disorders using t-test is shown in Table 2.The results showed that the academic degree had a significant effect on giving a correct response regarding the proper time of treatment of occlusal and functional disorders and general dentists had a significantly less knowledge about the proper time of initiation of orthodontic treatment compared to orthodontists. Also, a significant association was found between the academic degree and level of knowledge of dentists (Figure 2). No significant difference was observed regarding the response to questions of TMJ and other problems.

Analysis of regression models for the correlation of independent variables (age, sex, place of work and academic degree) with dependent variables (knowledge about the proper time of initiation of treatment for occlusal, functional, TMJ and other problems) showed that age and level of education (5 regression model) had the strongest correlation with total knowledge score of respondents (Table 2).

Table 1-The mean score of knowledge in the two groups of GDPs and orthodontists regarding the proper time of initiation of treatment for different disorders

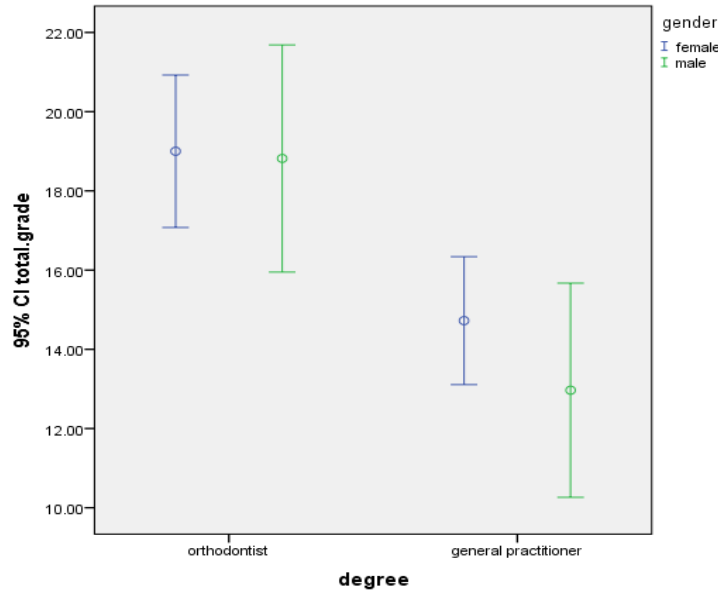| Disorder	Group	Mean	Standard Deviation	Standard error	p-value
Occlusal	General dentists	9.33	0.59	0.097	0.001
	Orthodontists	12.97	0.889	0.146	
Functional	General dentists	2.38	4.016	1.639	0.05
	Orthodontists	2.76	4.321	1.764	
TMJ	General dentists	1.33	0.770	0.290	0.06
	Orthodontists	1.33	1.590	0.602	

Figure 2- Correlation of academic degree with level of knowledge of respondents

Table 2- Results of regression model variance for the correlation of independent variables (age, gender, place of work and academic degree) with total dependent variables (occlusal, functional, TMJ and other problems)

Model		Degree of freedom	Mean square	F	Probability (P)
1	Regression	6	122.12	3.314	0.005[b]
	Remaining	101	36.85		
	Total	107			
2	Regression	5	145.89	3.994	0.002[c]
	Remaining	102	36.53		
	Total	107			
3	Regression	4	181.49	5.013	0.001[d]
	Remaining	103	36.20		
	Total	107			
4	Regression	3	236.37	6.562	000[e]
	Remaining	104	36.02		
	Total	107			
5	Regression	2	340.41	9.470	000[f]
	Remaining	105	35.95		
	Total	107			

(a) Dependent variable: Total grade
(b) Predictors: (constant), degree, age, clinic, gender, office, governmental
(c) Predictors: (constant), degree, age, gender, office, governmental
(d) Predictors: (constant), degree, age, gender, governmental
(e) Predictors: (constant), degree, age, gender
(f) Predictors: (constant), degree, age

Discussion:

In this study, of 38 occlusal disorders questioned in the questionnaire, orthodontists treated 18 cases (especially anterior and posterior crossbite) commonly in the early mixed dentition period and 14 cases (especially severe crowding in the mandibular or maxillary arch with significant esthetic problems and congenital missing) commonly in the late mixed dentition period.

Yang and Kiyak (1998) (7) in 1998 assessed the

perspectives of orthodontists in the United States regarding the proper timing of orthodontic treatment. Of 41 types of occlusal deviations questioned, 21 especially anterior crossbite (over 76%) were more commonly treated in the early mixed dentition period and 13 conditions especially deep bite (over 60%) and mandibular inadequacy (over 59%) were commonly treated in the late mixed dentition period. Maxillary midline diastema and congenital missing were treated in later periods. One-third of dentists postponed the treatment of mandibular prognathism until puberty.

Pietila *et al.* (8) in 2008 used a questionnaire to assess the perspectives of orthodontists in Finland regarding the indications of orthodontic treatment, time of first assessment of patient, time of treatment and the treatment methods used. The results showed that Finnish orthodontists mostly preferred early orthodontic treatments. However, except for crossbite and Class II malocclusion, significant differences were noted in selection of appliances and time of initiation of treatment. According to Jain and Dhakar in 2013 (13) several factors including economical and social factors affect the time of seeking orthodontic treatment by patients. For instance, in Finland, although orthodontic treatment is free up to the age of 18 years, the results of Pietila *et al.* (2010) (10) showed the superiority of early treatment in all aspects except for the need for higher frequency of visits and higher cost of treatment.

The current study results are in accord with those of Thomsen *et al.* (16) in 2006. They assessed the correlation of sex, age, academic degree and clinical training of clinicians with their success in treatment and research and reported that academic degree was the most important factor affecting medical treatment and research. A recent study in Saudi Arabia was performed on data from 57 questionnaires filled out electronically by active orthodontists in governmental and private centers regarding the time of initiation of orthodontic treatment (17). The results showed that most Saudi Arabian orthodontists preferred treatment of occlusal disorders in the mixed dentition period. They preferred treatment of functional problems in the primary dentition period. Orthodontists with more than 15 years of experience attempted to treat TMJ problems while orthodontists with less than 15 years of experience did not treat these patients and referred them to specialists. They also discussed the role of work experience and skills of orthodontists in treating these conditions.

Jain and Dhakar in 2013 (13) evaluated the factors affecting the time of initiation of orthodontic treatment and reviewed the advantages and disadvantages of early and late treatments. They emphasized the importance of knowledge of general dentists in this regard.

Considering the fact that the current study assessed the knowledge of GDPs in comparison with orthodontists regarding the time of initiation of orthodontic treatment, future more comprehensive studies such as the one conducted in Finland and others (8-11) are required to better elucidate this topic.

Conclusion:

This study revealed the need for education and training regarding the diagnosis of malocclusion in the primary and mixed dentition period, the etiology of malocclusions, normal occlusion, normal dental relationships and proper time of initiation of treatment for each orthodontic disorder. Dental schools must improve the knowledge of dental graduates in this regard. More comprehensive orthodontic educational courses must be included in the dental curricula and continuing education courses to increase the knowledge of dentists in this regard.

Conflict of Interest: "None Declared"

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