

Thesis Trends in Postgraduate Orthodontic Education in Turkey Between 2017-2021: A Pilot Study

2017-2021 Yılları Arasında Türkiye'de Lisansüstü Ortodonti Eğitiminde Tez Eğilimleri: Bir Pilot Çalışma

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ÖZ

Giriş ve Amaç: Bu çalışmanın amacı, ortodonti lisansüstü eğitiminde yapılan tezleri incelemek ve seçilen konular açısından eğilimleri analiz etmektir.

Yöntem ve Gereçler: Türkiye'de ortodonti alanında 2017-2021 yılları arasında tamamlanan doktora (PhD), yüksek lisans (MSc) ve uzmanlık tezleri incelenmiştir. Bu amaçla Türkiye Ulusal Tez Merkezi veri tabanı çevrimiçi olarak taranmıştır. Hem devlet hem de vakıf üniversitelerinde tamamlanmış tezler çalışmaya dahil edilmiştir.

Bulgular: Toplam 563 tez analiz edildi. Tezlerin 24'ü (%4,2) yüksek lisans, 125'i (%22,2) doktora ve 424'ü (%73,6) uzmanlık teziydi. Tezlerin ana amaçları incelendiğinde 173'ü (%30,7) tedavi sonucunu rapor eden, 170'i (%30,2) tanısal, 147'si (%26,1) malzeme, 27'si (%4,8) sonlu elemanlar analizi, 22'si (%3,9) hayvan deneyi ve 5'i (%0,9) eğitim ile ilgiliydi. Metodolojiye göre, tezlerin 235'i (%41,7) klinik çalışma, 121'i (%21,5) laboratuvar çalışmaları, 126'sı (%22,4) ölçüm çalışmaları (model, film, fotoğraf vb.), 45'i (%8) anket ve 33'ü (%5,9) bilgisayar tabanlı çalışmalardı.

Tartışma ve Sonuç: 3 boyutlu görüntüleme yöntemlerinin yaygınlaşması nedeniyle 2017-2021 yılları arasında tezlerin çoğu bu teknolojiler kullanılarak yapılmıştır. Derin kapanış, yapay zeka, vibrasyon tedavisi, lingual ortodonti ve şeffaf plaklar en az çalışılan konulardı.

Anahtar Kelimeler: Tez, ortodonti, lisans üstü, eğitim, üniversite

ABSTRACT

Introduction: The aim of this study was to examine the theses made in orthodontic postgraduate education and to analyze the trends in terms of selected topics.

Methods: Doctoral (PhD), master's (MSc) and specialization theses completed between 2017-2021 in the field of orthodontics in Turkey were examined. Turkish National Thesis Center database was searched online. Theses completed at both public and private universities were included in the study.

Results: A total of 563 theses were analyzed. 24 (4.2%) of the theses were master's, 125 (22.2%) doctorate and 424 (73.6%) specialization thesis. 173 (30.7%) of the thesis were reports the treatment outcome, 170 (30.2%) were diagnostic, 147 (26.1%) were material studies, 27 (4.8%) of theses were on finite element analysis, 22 (3.9%) were on animal experiment and 5 (0.9%) were about education. According to the methodology, it was found that 235 (41.7%) of theses were based on clinical studies, 121 (21.5%) were laboratory studies, 126 (22.4%) were measurement studies (models, films, photographs etc), 45 (8%) were questionnaires and 33 (5.9%) were computer-based studies.

Discussion and Conclusion: Due to the widespread use of 3-D imaging methods, most of the theses were made using these technologies. Deep bite, artificial intelligence, vibration therapy, lingual orthodontics and aligners were the least studied subjects.

Keywords: Thesis, orthodontics, postgraduate, education, university

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INTRODUCTION

Orthodontics was reported to be the most popular branch amongst all dental specialties in the United States in a survey of American Dental Association (ADA) and received the highest number of applications from graduate dental students.¹ Furthermore, the oldest specialty in postgraduate dental education is orthodontics and highest number of graduates are of this branch, yearly.²

The aim of postgraduate education in orthodontics is to train specialized individuals who have completed their theoretical and clinical practical training under the supervision of an advanced institutional framework, have received a broad-based high-level education in orthodontics and biomedical sciences, have acquired a solid background in diagnosis and treatment modalities, and have reached the capacity to apply them.³ There are 103 dental faculties in Turkey.⁴ A large number of people apply to the postgraduate orthodontic education given in some of these faculties, and the length of the programs varies between 3-6 years, some with master of science degree (M.Sc.), some with specialization degree, and some with doctor of philosophy (PhD) degree.⁵

While the ongoing content of these programs includes written and/or oral clinical and theoretical evaluations to evaluate residents' performance, it introduces residents to a number of contemporary treatment methods and practices. Almost all programs require, as a graduation criterion, the submission of a thesis or dissertation, which will be presented in the form of a typical graduate document reporting original data from research activities on various topics, and/or the preparation of an article in a publishable form.⁶ There are many studies and research articles aiming to determine the topics of interest in the publications produced in the field of orthodontics.^{7,8,9,10,11} However, to the best of our knowledge, there are no previous studies examining the trends in topic selection of thesis in postgraduate orthodontic education in Turkey. Thus, the aim of this study was to evaluate the theses made in orthodontic postgraduate education in Turkey and to analyze the trends in terms of selected topics.

MATERIALS AND METHODS

In accessing the data of the study, publicly available data from the National Thesis Center of Turkey (www.tez.yok.gov.tr) were used in February 7, 2022. To identify the theses to be included in the study, a search was conducted in the 'detailed search tab' of the search panel. The search was filtered by 'department of orthodontics'. Inclusion criteria of the study were; 1) Theses uploaded as doctoral, specialization and master's theses 2) Theses completed between 2017-2021, 3) Theses uploaded into the national thesis center. Theses completed outside the years 2017-2021 were not included in the study. The topics of the theses were

analyzed under 33 parameters. The accessed theses were classified according to the gender of the author, the academic degree of the supervisor, the type of thesis, the object of the thesis and the method of the thesis. The material-method parts of the examined theses were scanned one by one and the main parameters related to the thesis examined under the main topic of the theses were brought into the form of an additional data table. Thus, it was tried to determine the trendy subtitles that were examined within the scope of the thesis. For example, in a thesis on '3-dimensional examination of the effects of functional appliances on oropharyngeal airway volume in cases with Class II div 1 malocclusion', Class II malocclusion, functional appliances, airway and 3-dimensional imaging parameters were evaluated as subtitles and marked in an excel form. For statistical analysis, the data collected were entered into an excel form (Microsoft Office 365, USA) and analyzed with the Statistical Package for the Social Sciences software (SPSS 25.0, IBM Corporation, Armonk, NY). Analysis of the study relied on descriptive and demographic statistics and frequency distributions.

RESULTS

234 (41.5%) of the evaluated theses were written by male residents and 329 (58.5%) were by female residents. When the academic supervisors of the theses were examined, 123 (21.8%) were made by associate professors, 215 (38.2%) by assistant professors, and 225 (40%) by professors. 24 (4.2%) of the theses were master's, 125 (22.2%) doctoral and 424 (73.6%) specialization thesis.

When the object of the theses was examined, 173 (30.7%) were based on the treatment outcome, 170 (30.2%) were diagnostic, 147 (26.1%) were material studies. 27 (4.8%) of theses were on finite element analysis, 22 (3.9%) were on animal experiment and 5 (0.9%) of theses were about education.

When the methodology of the theses was examined, it was found that nearly half of them were clinical studies 235 (41.7%). 121 (21.5%) of theses were based on laboratory study and 126 (22.4%) on measurement (models, films, photographs etc). 45 (8%) of theses were questionnaires and 33 (5.9%) were computer-based studies (Table 1).

When theses are examined in detail, the most studied relevant topics were 3-D imaging 139 (11.5%), cephalometrics 123 (10.2%), Class II malocclusion 81 (6.7%), Class III malocclusion 74 (6.1%), and soft tissue 68 (5.6%). The least studied relevant topics were deepbite 2 (0.2%), artificial intelligence (AI) 3 (0.2%), vibration therapy 3 (0.2%), lingual orthodontics 5 (0.4%), aligners 5 (0.4%) and openbite 6 (0.5 %) (Table 2).

Table 1. Demographic values and descriptive statistics of the theses

	2017	2018	2019	2020	2021	Total
Gender	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Male	59 (37.1)	52 (32.3)	50 (56.8)	36 (49.3)	37 (45.1)	234 (41.5)
Female	100 (62.9)	109 (67.7)	38 (43.2)	37 (50.7)	45 (54.9)	329 (58.5)
Total	159 (28.2)	161 (28.6)	88 (15.6)	73 (13)	82 (14.6)	563 (100)
Supervisor	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Asst. Prof.	62 (39)	60 (37.2)	32 (36.3)	26 (35.6)	35 (42.7)	215 (38.2)
Assoc. Prof.	30 (18.8)	43 (26.7)	20 (22.7)	11 (15.1)	19 (23.2)	123 (21.8)
Professor	67 (42.2)	58 (36.1)	36 (41)	36 (49.3)	28 (34.1)	225 (40)
Thesis type	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Master	3 (1.9)	6 (3.7)	7 (7.9)	5 (6.9)	3 (3.6)	24 (4.2)
Doctorate	29 (18.2)	25 (15.5)	19 (21.6)	26 (35.6)	26 (31.7)	125 (22.2)
Specialization	127 (79.9)	130 (80.8)	62 (70.5)	42 (57.5)	53 (64.7)	414 (73.6)
Object	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Treatment result	45 (28.3)	50 (31.1)	26 (29.5)	22 (30.1)	30 (36.6)	173 (30.7)
Material experiment	43 (27)	47 (29.2)	25 (28.4)	15 (20.5)	17 (20.7)	147 (26.1)
Animal study	9 (5.7)	4 (2.5)	3 (3.4)	5 (6.8)	1 (1.2)	22 (3.9)
Service evaluation	2 (1.3)	2 (1.2)	2 (2.3)	-	4 (4.9)	10 (1.8)
Diagnosis	48 (30.2)	50 (31.1)	29 (33)	21 (28.8)	22 (26.8)	170 (30.2)
Finite Element Analysis	2 (1.3)	7 (4.3)	2 (2.3)	9 (12.3)	7 (8.5)	27 (4.8)
Education	1 (0.6)	1 (0.6)	1 (1.1)	1 (1.4)	1 (1.2)	5 (0.9)
Other	9 (5.7)	-	-	-	-	9 (1.6)
Method	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Clinical study	64 (40.3)	70 (43.5)	38 (43.2)	26 (35.6)	37 (45.1)	235 (41.7)
Laboratory study	38 (23.9)	36 (22.4)	16 (18.2)	20 (27.4)	11 (13.4)	121 (21.5)
Measurement (models, films etc)	35 (22.0)	36 (22.4)	21 (23.9)	13 (17.8)	21 (25.6)	126 (22.4)
Survey	12 (7.5)	13 (8.1)	10 (11.4)	5 (6.8)	5 (6.1)	45 (8)
Computer based	8 (5.0)	6 (3.7)	3 (3.4)	8 (11.0)	8 (9.8)	33 (5.9)
Other	2 (1.3)	-	-	1 (1.4)	-	3 (0.5)

Table 2. Descriptive statistics of the parameters evaluated in theses

	Relevant parameters	2017	2018	2019	2020	2021	Total
		n	n	n	n	n	n (%)
1	3-D imaging	41	35	20	17	26	139 (11.5)
2	Cephalometrics	40	32	15	12	24	123 (10.2)
3	Class II malocclusion	28	19	11	14	9	81 (6.7)
4	Class III malocclusion	28	19	7	8	12	74 (6.1)
5	Soft tissue	16	20	4	8	17	71 (5.9)
6	Orthodontic tooth movement	19	15	12	17	5	68 (5.6)
7	Rapid Palatal Expansion	23	8	8	7	14	60 (5.0)
8	Miniscrews	13	15	7	12	11	58 (4.8)
9	Brackets	18	23	6	6	4	57 (4.7)
10	Indexes	15	16	14	5	6	56 (4.6)
11	Adhesives	17	18	7	7	5	54 (4.5)
12	Functional Orthopedics	10	11	6	7	7	41 (3.4)
13	Growth & development	8	9	6	4	4	31 (2.6)
14	Distalization	8	6	6	6	5	31 (2.6)
15	Retention	8	9	4	5	5	30 (2.5)
16	Airway	4	7	2	2	11	26 (2.2)
17	Cleft-Lip and Palate	10	7	4	1	2	24 (2.0)
18	Face mask	7	7	1	2	7	24 (2.0)
19	Orthognathic surgery	2	8	4	4	4	22 (1.8)
20	Root resorption	9	2	1	1	5	18 (1.5)
21	White spot/ demineralization	1	9	6	4	-	17 (1.4)
22	Orthodontic pain	5	6	2	1	2	16 (1.3)
23	Laser	10	-	2	-	3	15 (1.2)
24	Archwires	7	3	2	-	2	14 (1.2)
25	Genetics	6	1	2	3	1	13 (1.1)
26	TMJ	4	4	2	-	2	12 (1.0)
27	Impacted tooth	1	1	2	1	5	10 (0.8)
28	Openbite	3	1	1	-	1	6 (0.5)
29	Aligners	-	-	1	-	4	5 (0.4)
30	Lingual orthodontics	3	-	1	-	1	5 (0.4)
31	Vibration therapy	1	-	-	-	2	3 (0.2)
32	Artificial Intelligence	-	1	1	-	1	3 (0.2)
33	Deepbite	2	-	-	-	-	2 (0.2)

Among the public universities, the departments that completed the highest number of theses were Suleyman Demirel University 36 (6%), Ankara University 26 (4.6%), Istanbul University 25 (4.4%), Marmara University 25 (4.4%), 19 Mayıs University 24 (4.3%) and Selcuk University 24 (4.3%). Among the private universities, the departments that completed the highest number of theses were Bezmialem University 23 (4.1%), Yeni Yuzyl University 12 (2.1%), Baskent University 11 (2%) and Yeditepe University 7 (1.2%) (Table 3).

DISCUSSION

The aim of this study was to analyze the trends in thesis topics that were presented as a postgraduate orthodontic education completion criterion between 2017-2021. As far as we know, there is no previous study evaluating such data in the literature. For the purpose of data analysis, descriptive and demographic statistics and frequency distributions were evaluated. The absence of a similar study in this area is a limitation in the interpretation of the findings. Another limitation of our study was that those who do not upload their thesis to the national thesis center website were not taken into consideration.

Table 3. Completed total theses numbers by universities between 2017-2021 (descending order)

University	n (%)	University	n (%)
Suleyman Demirel	34 (6.0)	Baskent *	11 (2.0)
Ankara	26 (4.6)	Bolu Abant İzzet Baysal	11 (2.0)
Istanbul	25 (4.4)	Ordu	11 (2.0)
Marmara	25 (4.4)	Cumhuriyet	11 (2.0)
19 Mayıs	24 (4.3)	Bulent Ecevit	11 (2.0)
Selcuk	24 (4.3)	Osmangazi	8 (1.4)
Bezmialem *	23 (4.1)	Hacettepe	8 (1.4)
Gaziantep	22 (3.9)	Cukurova	7 (1.2)
Ataturk	21 (3.7)	Yeditepe *	7 (1.2)
Gazi	19 (3.4)	Hatay Mustafa Kemal	5 (0.9)
Kirikkale	19 (3.4)	Necmettin Erbakan	5 (0.9)
Akdeniz	18 (3.2)	Saglik Bilimleri	5 (0.9)
Ege	18 (3.2)	Adiyaman	4 (0.7)
Izmir Katip Celebi	16 (2.8)	Usak	4 (0.7)
Inonu	16 (2.8)	Van Yuzuncu Yil	4 (0.7)
Karadeniz Teknik	16 (2.8)	Biruni *	3 (0.5)
Erciyes	15 (2.7)	Istanbul Aydin *	3 (0.5)
Kocaeli	14 (2.5)	Altinbas *	2 (0.4)
Pamukkale	13 (2.3)	Medipol *	2 (0.4)
Dicle	13 (2.3)	Recep Tayyip Erdogan	2 (0.4)
Adnan Menderes	12 (2.1)	Afyonkarahisar Saglik Bilimleri	1 (0.2)
Gaziosmanpasa	12 (2.1)	Trakya	1 (0.2)
Yeni Yuzyl *	12 (2.1)		

*: Private universities

Various bibliometric studies aimed to evaluate orthodontic publishing trends in different journals and in different time periods. However, the findings of the relevant studies are generally not comparable to each other, as the parameters, journals, and periods evaluated are in a wide variety. While most of these bibliometric studies only included popular orthodontic journals or particular parameters such as topic or type of study design, others evaluated the highly cited articles. They generally focused on either article-related factors and design or author-related factors; It is rare to find studies that focus on both.⁹ Our study was conducted on evaluating both the characteristics of the topics and characteristic of researchers.

Although 38%² and 29.2%¹² of female residents were reported in two previous studies, the rate of female residents in our study was found to be 58.5%. The fact that a higher rate of 'specialization' thesis 73.6% was found in the range examined by the research can be interpreted as 'specialization' education is more preferred, although both doctoral and specialization education are in effect together in orthodontic postgraduate education.

The reason for such a preference can be interpreted as the fact that, 'specialization' education has a status officially recognized by the state compared to 'doctoral' education. Thus, the patient approvals of specialist orthodontists are recognized by insurance systems; they have official advantages such as being able to work with formal health insurance systems and they are able to work as specialists in public hospitals.

Although the number of theses completed in a unit year does not directly give the number of researchers who started the program in the same year, it can be assumed that there is a relationship between these two parameters. From this point of view, when the data is examined, the number of researchers who submitted thesis in 2017 was 159 in total, while this number decreased to 82 in 2021, a decrease by almost half. Factors such as: the fact that orthodontics has become a service that can be applied by more physicians and is more easily accessible by more patients compared to the past; the number of existing specialists providing this service has increased compared to the past and orthodontic education has become a more expensive education in the economic world conditions that are getting harder day by day could be assumed as the reasons for this.^{2,12,13}

In 2012, 2013 and 2014, the Dental Specialization Exam (DUS) was held twice a year in Turkey. In the following years, it was started to be done once a year. For this reason, a decrease by half in the number of theses completed in 2019 and later was observed. However, some universities made changes in the admission of doctoral residents and continued to accept residents only with DUS. Depending on the needs of the departments, there may be differences in the number of personel to be recruited for orthodontic training each year.

It is observed that the number of academics who supervise the theses, whether they are assistant professors, associate professors or full professors, has decreased over the years. Bruner et al.² reported that interest in full-time academic careers in orthodontics continues to decline, and that about 50% of researchers studying postgraduate orthodontics would consider working as full-time academics if salaries for professors in academia were increased.

In a very recent study, Ozturk and Coban¹¹ evaluated the trending topics in orthodontic treatment practices for the past 5 years and they found the trendy topics in terms of orthodontic research as: Cleft lip-palate, maxillary expansion, functional orthopedics, treatments in patients with problems in general health, multidisciplinary treatments (except maxillofacial surgery), orthognathic surgery, and fixed orthodontic treatments. Fixed orthodontic treatment was the most popular with a percentage of 53.4% while least was found to be functional orthopedics.

In their study, Nikilesh et al.,¹⁴ in which they scanned the publications between 2012 and 2015; in the American Journal of Orthodontics and Dentofacial Orthopedics (AJODO) and Angle Orthodontist (AO), they found that the topic of "CBCT and temporary anchorage devices (TADs)" was the most researched topic. In the same study, the authors revealed that the most researched topics in the European Journal of Orthodontics (EJO) were brackets and TADs. Due to the widespread use of 3-D imaging devices and their diagnostic benefits, 3-D studies are one of the most researched topics. However, miniscrews and mini-plates seem to be among the most researched topics because of the importance of anchorage preparation for a good treatment in orthodontics. Apart from these mentioned topics, molecular researches, expansion, airway and anomalies are among the topics accepted by AJODO. Lateral cephalograms, bonding and bonding materials, bracket systems can be counted among the topics evaluated by AO. EJO and AO evaluated aesthetic and soft tissue studies, growth modification studies and accepted articles on this topic. 3-D diagnosis, digital models, craniofacial growth and patient perceptions are among the articles accepted by EJO.

In the present study, when the main objects of theses were examined, it was observed that the treatment results, material experiments and diagnosis was mostly studied, while the least preferred study object was education. In addition to this finding, when examined in terms of study methodology from most preferred to the least preferred the theses were classified as Clinical study, Laboratory study, Measurement, Survey, Computer based respectively. It can be thought that the fact that clinical studies are mostly preferred is due to the fact that orthodontics is a clinical medicine branch based on practical applications, and that clinical studies have the

potential to turn into publications. While computer-based methods were found to be the least preferred in our study, it cannot be ignored that there has been an increase in computer and technology-based journal articles in recent years^{15,16,17,18,19} and the authors of this study believe that over time, more content will be produced on topics such as artificial intelligence, deep learning and application-based portable technologies as thesis studies.

Considering the sub-titles and sub-methodologies evaluated in addition to the thesis topics in the study, nine parameters that can be counted as the basis of traditional orthodontics "Cephalometrics, Class II Malocclusion, Class III Malocclusion, Soft Tissue, Orthodontic Tooth Movement, Rapid Palatal Expansion, Miniscrews, Brackets and Indexes" was listed under topped title "3D Imaging". The prevalence of digital programs that allow 3D planning and their widespread use not only in orthognathic surgery, but also in the planning of orthodontic treatments can explain the fact that 3D Imaging is at the top of this list.^{20,21,22} The fact that popular orthodontic titles such as 'Lingual orthodontics' and 'Aligners' are at the end of this list can be interpreted as these treatments are high-cost treatments^{23,24} and they are not preferred or cannot be done for middle and low socioeconomic patients who apply to university hospitals, which are the institutions where theses are made.

When the total number of theses completed by universities between 2017-2021 was evaluated in our study, there was only one private university among the top ten universities. When the list is considered as a whole, the number of theses given from private

universities was significantly lower than that of public universities. The reason for this can be thought of as private universities being very young compared to public universities and accordingly they have not yet established a regular and sustainable academic publication and research tradition. In addition, it can be interpreted that private universities are more economically income oriented than public universities, while public universities are more academically oriented and this affects the total academic data produced.^{25,26}

In their study, Aura-Tormos et al.⁹ evaluated current trends in orthodontic publishing by analyzing articles published in orthodontic journals within the scope of Journal Citation Reports (JCR) and found that relevant studies did not provide an accurate analysis of publishing trends and progress due to their limited scopes, small sample sizes and short coverage periods. The short evaluation period, dynamic nature of the content and small sample size were the limitations of our study. Another limitation of our study was that the theses that were not uploaded into the national thesis center could not be included. In able to understand the trends in orthodontic research area further studies should be done.

CONCLUSION

Due to the widespread use of 3-D imaging methods, most of the theses between 2017-2021 were made using these technologies. Deep bite, artificial intelligence, vibration therapy, lingual orthodontics and aligners were the least studied subjects.

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