Prevalence of Dental Anomalies in a Group of Turkish People

Şükriye Neslihan ŞENEL[1], Tamer Lütfi ERDEM[2], Merve YELKEN KENDİRCİ[3]

Abstract

Aim Dental anomalies in tooth number, shape, and position usually result in aesthetic and functional problems. These anomalies can affect both primary teeth and permanent teeth. Careful clinical and radiologic examination are required to diagnose the condition and establish appropriate treatment. The purpose of this study is to determine the prevalence of dental anomalies in a group of Turkish population and to compare our findings with literature knowledge.

Material and method Retrospective orthopantomographs (OPGs), which were already taken in the Department of Oral and Maxillofacioal Radiology of Istanbul University Faculty of Dentistry, of a total of 5000 patients (2480 males, 2520 females) were examined for the presence of the teeth with number, size, position, shape, structure and root anomalies. The cases with dental anomalies were recorded according to localization (maxilla, mandible) and gender.

Results A total of 1295 patients were found to have dental anomalies. 135 patients were found to have more of one dental anomaly. The distribution by sex was 645 males (12,9%), and 650 females (13%). The most common dental anomaly was number anomaly (490 patients), followed by position anomaly (410 patients).

Conclusion This study, which was about the prevalence of dental anomalies, revealed that dental anomalies occur more frequently in the maxilla than the mandibula and the prevalence did not differ between men and women.

Keywords Orthopantomography, Prevalence, Study retrospective, Tooth abnormalities, Turkish people,

Introduction

The concept of dental anomaly refers to abnormal changes in the color, number, shape or size of primary or permanent teeth. The etiology of these conditions is usually attributed to congenital, developmental and acquired factors (1,2,3). Congenital dental anomalies have genetic origin. The development of teeth begins in the sixth week of intrauterine life. Developmental factors associated with dental anomalies occur during the development of teeth. Acquired dental anomalies occur after tooth development is complete (2,4).

Numerous studies have been conducted on dental anomalies in different populations. The prevalence of dental anomalies has been reported at different rates in different studies due to factors such as different populations, patient groups and age ranges in the studies (1,2,5).

Intraoral radiographs, ortopantomographs (OPGs), orthodontic study models and medical photographs were used for the detection and diagnosis of number, size, shape, structure, location and root anomalies. OPG, which enables the combined examination of the teeth in the lower and upper jaws and adjacent anatomical structures in radiographic examination, has advantages such as low radiation dose and low cost (2,6,7,8).

Congenital tooth agenesis constitute the most common anomaly of the human dentition, The congenital absence of six or more permanent teeth other than the third molars is called oligodontia, while hypodontia is the absence of fewer than six teeth. In studies conducted in different countries, the incidence of congenital tooth deficiency has been reported between 0,2% and 26,1% (7,9).

The aim of this study is to determine the prevalence of different dental anomalies.

Material and Methods

Digital ortopantomographies which were already acquired in the Department of Oral and Maxillofacioal Radiology of Istanbul University Faculty of Dentistry, with KODAK 8000 Digital Panoramic System (Rochester, New York) between January 2012-December 2013 were evaluated. The selection criteria of the study group are:

1. No important medical history, such as trauma to the jaw bones.
2. No edentelous jaws.
3. No history of metabolic disorders or genetic syndrome affecting bone and tooth formation.
4. No cleft lip and/or palate, and craniofacial anomalies.
5. No poor quality of radiographic images.

Correspondence: Şükriye Neslihan ŞENEL, neslihan.senel@istanbul.edu.tr

[1] Istanbul University, Faculty of Dentistry, Department of Dentomaxillofacial Radiology, Istanbul, Turkiye

[2] Atlas University, Faculty of Dentistry, Department of Dentomaxillofacial Radiology, Istanbul, Turkiye

[3] Biruni University, Faculty of Dentistry, Department of Dentomaxillofacial Radiology, Istanbul, Turkiye

**This study was presented as an oral presentation at the 2nd Asian Clinical Congress on 3-5 April 2014, Kyoto, Japan.*

Received: 25.02.2023 / Accepted: 27.03.2023 / Published: 30.04.2023

5000 orthopantomographs of 2480 male and 2520 female patients were included in the study. Two different radiologist assessed the radiographs respectively and they recorded the cases with number, size, shape, structure and root anomalies according to gender and localisation (maxilla or mandible).

Statistical Analysis

The data obtained in this study were analyzed using statistics including prevalence and percentage values.

Results

Alterations in number of teeth

The term anodontia describes the congenital absence of all primary or permanent tooth. Total anodontia is a very rare anomaly, whereas oligodontia, which is the absence of six or more teeth, and hypodontia, which is characterized by the absence of less than six tooth, are more common (5,7, 23).

In this study, none of the patients has total anodontia. 385 patients (7,7%) have hypodontia or oligodontia. The common congenital abscence was seen in upper laterals (5,1%), followed by upper third molars (3,96%) and lower second premolars (3,8%). Anomalies related to missing teeth as seen below (Table 1).
A case of oligodontia with more than six permanent tooth germ deficiency as seen in Figure 1.

Table 1: Placement of missing teeth according to jaws.

	Central incisor	Lateral incisor	Canine	First premolar	Second premolar	First molar	Second molar	Third molar
Upper jaw	0	255	25	35	190	0	35	198
Lower jaw	40	45	10	10	105	10	40	90

Figure 1: The orthopantomograph of a 23 years old male patient with oligodontia. The germs of the teeth number 12, 13, 14, 15, 18, 22, 23, 25, 28, 38, 32, 41, 42, 48 were absent.

Mesiodens is a supernumerary tooth that occurs in the anterior maxilla in the midline region near the maxillary central incisors. The tooth crown may be cone-shaped with a short root or may resemble the adjacent teeth. Mesiodens is the most common supernumerary tooth. Paramolar is a supernumerary tooth in the molar region. Distomolar is a supernumerary tooth that is distal to the third molar (10,11,12).

A total of 105 patients have supernumerary teeth. Mesiodens was the most common supernumerary tooth and was seen in 73 teeth (1,46%) followed by distomolars 25 (0,5%). 125 (2,5%) supernumerary teeth was seen in maxilla and 10 of them (0,2%) in mandible. Anomalies related to supernumerary teeth as seen below (Table 2). A case of mesiodens in the upper jaw as seen in Figure 2.

Table 2: Placement of supermerary teeth according to jaws.

	Mesiodens	Central incisor	Lateral incisor	Canine	Premolar	Paramolar	Distomolar
Upper jaw	73	0	10	15	5	5	25
Lower jaw	0	0	10	0	0	0	0

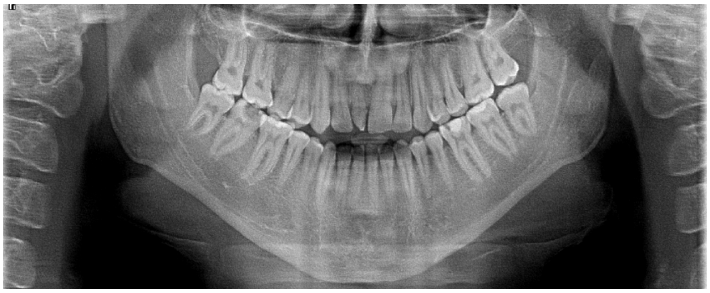

Figure 2: The orthopantomograph of a 38 years old male patient. Mesiodens is seen between the middle incisors in the upper jaw.

Alterations in size of teeth

The term macrodontia, which is one of the anomalies related to the size of the teeth, refers to teeth that are too large than normal, while the term microdontia refers to teeth that are very small than normal (13,14).

215 patients (4,3%) have alterations in size of teeth. Microdontia was seen mostly in third molars, 180 teeth (3,6%), followed by upper and lower laterals 10 teeth (0,2%). None of the patients has macrodontia. Anomalies related to size size of teeth as seen below (Table 3). A case of microdontia in the right upper jaw as seen in Figure 3.

Table 3: Placement of microdont teeth according to jaws.

	Central incisor	Lateral incisor	First molar	Second molar	Third molar
Upper jaw	0	5	5	10	180
Lower jaw	5	5	0	0	0

Figure 3: The orthopantomograph of a 32 years old female patient. A microdont third molar is seen in the upper jaw.

Alterations in position of teeth

Teeth that stay in the jawbone altough their time of eruption and cannot take their normal position are called impacted teeth. The most frequently impacted teeth are third molars, followed by upper canine teeth. Ectopic teeth are teeth that are in a different position than the dental arches in the jaw bones due to genetic or orthodontic problems. Tooth transposition is a rare condition of ectopic eruption. It is defined as an interchange in the

position of two permanent adjacent teeth (6,9).

In our study, 410 patients (8,2%) have anomalies of position. The most common positional anomaly is impacted third molar, 220 teeth (4,4%), followed by impacted canine, 135 teeth (2,7%). In addition, we observed 5 ectopic teeth (0,1%) and 15 teeth transposition (0,3%), which are position anomalies other than impacted teeth. Anomalies related to the position of teeth as seen below (Table 4). A case of impacted third molars as seen in Figure 4.

Table 4: Placement of position anomalies according to jaws.

	Canine	First premolar	Second premolar	Second molar	Third molar	Ectopic teeth	Transposition
Upper jaw	83	2	4	4	80	1	4
Lower jaw	52	1	6	18	140	4	11

Figure 4: The orthopantomograph of a 30 years old male patients. Impacted right and left third molars are seen in the upper jaw.

Alterations in shape of teeth

Although both conditions are often confused with each other, fusion is known the joining of the enamel and dentin of two different teeth, and gemination is the incomplete attempt of a single tooth to separate. Dens invaginatus is a rare malformation that occurs when the enamel and dentin bend into the pulp. Dens evaginatus is a developmental anomaly that occurs by a little protrusion of enamel from occlusal surface of a tooth. Taurodontism is an uncommon anomaly which characterized with the enlargement of pulp chambers with the furcation area being displaced toward the apex of the root (4, 15, 16).

In our study, fusion, gemination, dens invaginatus, dens evaginatus, and taurodontism were investigated in order to identify teeth with shape anomalies.

The most common shape anomaly in the study group was dens evaginatus (2,3%). 0,1% patients have fusion, 0,2% patients have dens invaginatus and 0,4% patients have taurodontism. Gemination was not seen in our study. A case of taurodontism in upper and lower molars as seen in Figure 5.

Alterations in structure of teeth

Amelogenesis imperfecta (AI) is a hereditary anomaly that affects the structure and content of enamel in both primary and permanent teeth. The enamel of teeth affected by AI is usually easily eroded, discolored or heavily pitted. There are three most common types of AI: hypoplastic, hypocalcified, and hypomature. Dentinogenesis imperfecta(DI) is a rare autosomal dominant disease affecting primary and permanent teeth.

Figure 5: The orthopantomograph of a 15 years old male patient. Taurodont upper and lower molars are seen in the right and left maxilla and mandible.

In dentinogenesis imperfecta, the teeth are bluish-gray or yellowish-brown, the dentin is fragile, the roots are thin. Three different types of dentinogenesis imperfecta have been reported by researchers: DI type 1 is seen with Osteogenesis imperfecta, although DI type 2 is similar to type 1, Osteogenesis imperfecta is not seen. DI Type 3 is only seen in the Brandywine community of Maryland, USA. Dentin dysplasia (DD) is rare autosomal dominant affecting dentin and root formation of teeth. Dentin dysplasia is classified into 2 types which are Type I (DD-1) is the radicular type, and type II (DD-2) is the coronal type (4, 17, 18).

In this study, 3 patients have amelogenesis imperfecta. None of the patients has dentinogenesis imperfecta or other dentin anomalies.

Root Anomalies

The most common anomaly among the root anomalies seen in the jaws is dilaceration and has been defined as excessive curvature of the tooth root. Hypercementosis is excessive cementum deposition on tooth root. Short root anomaly is characterized by teeth with normal crown length and very short and blunt root. Accessory root canal is a developmental anomaly that occurs in the primary and permanent teeth. Accessory root anomaly can often be seen in lower anterior teeth, lower premolars or lower first molars (3, 12, 19).

In our study, 265 patients (5,3%) have root anomalies. 165 patients (3,3%) have short root, 56 patients (1,12%) have supernumarary roots, 34 patients (0,68%) have dilaceration and 10 patients (0,2%) have hypercementosis. Prevalence of root anomalies as seen below (Figure 6). A case of short root anomaly as seen in Figure 7.

Discussion

Dental anomalies are mostly of genetic or developmental origin and cause orthodontic, functional and aesthetic problems in patients. Studies investigating the frequency of dental anomalies in different countries have been carried out by various researchers, as well as studies investigating the frequency of dental anomalies in orthodontic patients or investigating the frequency of a specific anomaly (1, 2, 4, 5, 6, 7, 9, 16, 17).

In the present study, the prevalence of number, size, position, shape, structure and root anomalies in a 5000 patients was investigated and a total of 1295 (25,9%) patients were found to have dental anomalies. 135 (2,7%) patients were found to have more of one dental anomaly and no significant difference was found be-

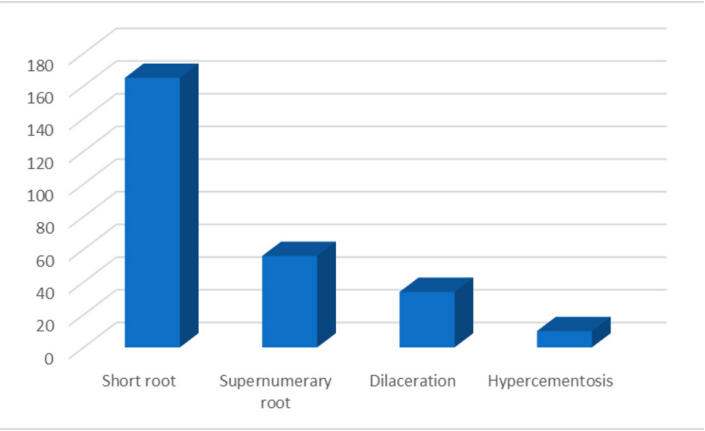

Figure 6: The prevalence of root anomalies.

Figure 7: The orthopantomograph of a 23 years old male patients. Short root anomaly is observed in the incisors and canine teeth in the lower jaw. This anomaly occurred because the patient received radiotherapy from the head and neck region in his childhood.

tween men and women in terms of dental anomaly frequency.

Arslan et al. (2) reported the prevalence of dental anomalies as 6.9% in their study and found that the incidence of dental anomalies in females (7,34%) was higher than in males (5,30%). AlHumaid et al.(3) and Bilge et al. (20) also reported the incidence of dental anomaly to be 36,3% and 39,2% in their study, respectively, and the frequency of dental anomalies in women was higher in both studies. Baron et al.(5) investigated the prevalence of dental anomalies in 551 orthodontic patients. Dental anomaly was found in 31,58% of the patients and more than one dental anomaly was detected in 14,16%. There was no statistically significant relationship between dental anomaly frequency and gender. Laganà et al. (21) reported reported the prevalence of dental anomalies as 6,9% in their study and found that the incidence of dental anomalies 20,9% in the study group and found no difference between men and women. Although our study shows similar features with other studies in the literature, there are some differences in some ratios. The reasons for the different results found in the studies in the literature are the racial differences due to the fact that they are performed in different countries, the study groups consisted of different numbers of patients, and some dental anomalies was not evaluated in some studies.

In our study the most common dental anomaly is number anomaly. 490 (9,8%) patients have number anomaly. While hypodontia or oligodontia was observed in 385 (7,7%) patients, supernumerary teeth were detected in 105 (2,1%) patients. Baron et al. (5), Kositbowornchai et al. (7), and Aren et al.(22) in their studies they reported that the most common dental anomaly was hypodontia and found the rates of 5,81%, 26,1% and 1,77%, respectively. Arslan et al. (2) and AlHumaid et al. (3) number anomalies were found to be the second most common anomaly, with rates of 1,72% and 24,77%, respectively. The reason for the different results in the studies is that certain age groups are excluded from the evaluation in some studies, and the third molar teeth are excluded from the evaluation in some studies.

The most common positional anomaly was found impacted third molars followed by impacted upper canines in different studies. Position anomalies were found to be the second most common anomaly in our study. Arslan et al.(2) reported in their study that the most common anomaly was position anomaly with a rate of 4,09%. The most common positional anomaly was impacted teeth. The most frequently impacted tooth was found to be the upper canine (67%). Third molars were not included in the study because they showed too much variation in terms of position and morphology. Bilge et al. (20) reported that the most common anomaly was impacted teeth, and in a study in which 1200 patients were evaluated, they found the rate of impacted teeth to be 45,53%. Patil et al. (24) reported that the third molar teeth were the most impacted teeth, similar to our study, and reported the incidence of impacted teeth as 15,5%. Gupta et al.(9) reported that the most common dental anomaly was positional anomaly and found that the most common positional anomaly was rotation with a rate of 10,24%. The reason for the different rates in the studies carried out is that the studies were conducted in different countries and some studies did not include third molar teeth.

In this study we found 215 patients (4,3%) which have size anomalies. Microdontia was seen mostly in third molars (3,6%), followed by upper and lower laterals (0,2%). AlHumaid et al.(3), Altuğ-Ataç et al. (14) and Aren et al.(22) reported the rate of size anomalies as 1,72%, 1,61% and 0,54%, respectively. These rates are quite low compared to our study. The results we found in our study are higher than these studies. Kositbowornchai et al. (7) reported the rate of size anomalies as 15,6% in orthodontic patients whom they investigated before treatment. It is thought that the reason why the rates found in this study are very high compared to other studies is that dental anomalies are more common in orthodontic patients.

Dens evaginatus was the most common shape anomalies of the teeth and it was seen at a rate of 2,3% in our study. Besides Dens evaginatus 0,1% patients have fusion, 0,2% patients have dens invaginatus and 0,4% patients have taurodontism. Gemination was not seen in our study. In studies conducted in different countries, shape anomalies such as fusion and gemination are observed very rarely. Arslan et al. (2) reported in their studies that the incidence of gemination is 0,18% and the incidence of dens in dente is 0,09%. AlHumaid et al. (3) reported that the prevalence of taurodontism is 0,09%. Altuğ-Ataç et al. reported that the incidence of the fusion is 0,23% and the incidence of gemination is 0,07%. Gupta et al. (9) reported that the prevalence of microdontia is 2,58%, the prevalence of dens evaginatus is 2,40% and the prevalence of taurodontism is

2,49%. The findings of our study are consistent with the results of studies published in the literature.

In our study, the least common dental anomaly was the structural anomaly. We found that 3 patients have amelogenesis imperfecta. None of the patients has dentinogenesis imperfecta or other dentin anomalies. Baron et al.(5) found in their study 1 patient with amelogenesis imperfecta and they did not found any dentin anomalies or cases of regional odontodysplasia. Gupta et al. (9) reported 2 patients with amelogenesis imperfecta and 1 patient with dentinogenesis imperfecta. Altuğ-Ataç et al. (14), they evaluated 3043 pediatric patients in their study and reported that 13 patients had amelogenesis imperfecta. The reason for the high rate of teeth with structural anomalies in the aforementioned study is that both primary and permanent teeth can be seen together due to the fact that the patients evaluated were children.

Our findings about root anomalies showed that 165 patients (3,3%) have short root, 56 patients (1,12%) have supernumarary roots, 34 patients (0,68%) have dilaceration and 10 patients (0,2%) have hypercementosis. AlHumaid et al. (3) reported that the most common dental anomaly is dilaceration with a rate of 30,2%. They found that mandibular third molars had highest number of dilacerations (21%). Baron et al.(5) reported that the incidence of dilaceration is 0,18%. Kositbowornchai et al (7). reported that the prevalence of mandibular first molars with three roots is 0,2% and the prevalence of hypercementosis is 1,2%. Guttal et al.(12) reported that the incidence of dilaceration is 39%. Bilge et al. (20) reported that the prevalence of dilaceration is 6,41%. Patil et al. (24) reported that the incidence of dilaceration is 0,5%. The reason for the different rates in these studies is that the studies were conducted in different countries and the study groups consisted of different numbers of patients.

Conclusion

This study was conducted to determine the frequency of dental anomalies in the Turkish population. It was found that 1295 (25,9%) patients have dental anomalies and 135 (2,7%) patients have more than one dental anomaly. Our findings showed that there was no diffence between men (12,9%) and women (13%).

Dental anomalies are one of the common clinical problems. Although dental anomalies are often asymptomatic, they cause aesthetic and orthodontic problems. Treatment planning of dental anomalies is necessary after a comprehensive clinical and radiological examination. Since dental anomalies may show different rates in different patient groups, it is important to know their symptoms and types well.

Limitations

In our study, Retrospective panoramic radiographs, which were already recorded in the Department of Oral and Maxillofacioal Radiology of Istanbul University Faculty of Dentistry, a total of 5000 patients (2480 males, 2520 females) were examined. Since this study was a retrospective evaluation of radiographs, we did not perform intraoral examinations of the patients and radiographic images could not be compared with clinical examination findings. Therefore, anomalies such as Carabelli tubercle, which can be seen more clearly in clinical examination, were not included in the study.

In this study, the evaluation of dental anomalies was made with orthopantomographs. Although orthopantomography is a method that allows the examination of the lower and upper jaws and adjacent structures together and has a lower effective dose compared to cone beam computed tomograpraphy (CBCT), there may be errors in the image due to disadvantages such as magnification and superposition. For this reason, image errors will be minimal in a retrospective study with CBCT images taken previously.

Declarations

Author Contributions: *Conception/Design of Study- M.Y.K., N.S.; Data Acquisition- M.Y.K., N.S.; Data Analysis/Interpretation- M.Y.K.; Drafting Manuscript- M.Y.K., N.S.; Critical Revision of Manuscript- T.L.E.; Final Approval and Accountability- T.L.E.; Material and Technical Support- T.L.E.; Supervision- T.L.E.*

Conflict of Interest: *Authors declared no conflict of interest.*

Financial Disclosure: *Authors declared no financial support.*

REFERENCES

1. Çelebi F, Taşkan MM, Turkal M, Turkal H, Hologlu F. Orta Karadeniz toplumunda dental anomalilerin görülme sıklığı. Cumhuriyet Dent J 2015; 18(4): 343-350.

2. Arslan ZB, Yıldız DB, Yaşar F. Dental anomali görülme sıklığının dijital panoramik radyografi ile değerlendirilmesi. Selcuk Dent J 2019; 6(3): 359-365.

3. AlHumaid J, Buholayka M, Thapasum A, Alhareky M, Abdelsalam M, Bughsan A. Investigating prevalence of dental anomalies in Eastern Province of Saudi Arabia through digital orthopantomogram. Saudi J Biol Sci 2021; 28(5): 2900-2906.

4. Rohilla M. Etiology of Various Dental Developmental Anomalies -Review of Literature. J Dent Probl Solut 2017; 4(2): 19-25.

5. Baron C, Houchmand-Cuny M, Enkel B, Lopez-Cazaux S. Prevalence of dental anomalies in French orthodontic patients: A retrospective study. Arch Pediatr 2018; 25(7):426-430.

6. Al-Abdallah M, AlHadidi A, Hammad M, Al-Ahmad H, Saleh R. Prevalence and distribution of dental anomalies: A comparison between maxillary and mandibular tooth agenesis. Am J Orthod Dentofacial Orthop 2015;148:793-8

7. Kositbowornchai S, Keinprasit C, Poomat N. Prevalence and distribution of dental anomalies in pretreatment orthodontic Thai patients. KDJ 2010; 13(2): 92-100.

8. Souza-Silva BN, de Andrade Vieira W, de Macedo Bernardino ´I, Batista MJ, Vieira Bittencourt MA, Paranhos LR. Non-syndromic tooth agenesis patterns and their association with other dental anomalies: A retrospective study. Arc Oral Biol 2018; 96: 26-32.

9. Gupta SK, Saxena P, Jain S, Jain D. Prevalence and distribution of selected developmental dental anomalies in an Indian population. J Oral Sci 2011; 53(2): 231-238.
10. Lara TS, Lancia M, Da Silva Filho OG, Garib DG, Ozawa TO. Prevalence of mesiodens in orthodontic patients with deciduous and mixed dentition and its association with other dental anomalies. Dental Press J Orthod. 2013; 18(6): 93-99.
11. Qamar CR, Bajwa JI, Rahbar MI. Mesiodens - etiology, prevalence, diagnosis and management. POJ 2013:5(2) 73-76.
12. Guttal KS, Naikmasur VG, Bhargava P, Bathi RJ. Frequency of Developmental Dental Anomalies in the Indian Population. Eur J Dent 2010; 4: 263-269.
13. Konjhodžić-Raščić H, Vuković A, Zukić S, Bajsman A, Prcić A. Dental Anomalies among Students of Faculty of Dentistry, University of Sarajevo. Acta Medica Academica 2006; 35: 23-29.
14. Altuğ-Ataç AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. Am J Orthod Dentofacial Orthop 2007;131: 510-514.
15. Venkatesh A, Mitthra S, Prakash V, Prasad TS. Gemination or Fusion? A case report. Biomed Pharmacol J 2016; 9(3): 1225-1228.
16. Çapar İD, Ertaş H, Arslan H, Ertaş ET. A Retrospective Comparative Study of Cone-beam Computed Tomography versus Rendered Panoramic Images in Identifying the Presence, Types, and Characteristics of Dens Invaginatus in a Turkish Population. J Endod 2015; 41(4): 473-478.
17. Demirci F, Tanik A, Güven S. Amelogenezis İmperfecta: Sınıflama, Teşhis ve Tedavi. J Dent Fac Atatürk Uni 2015; Suppl. 12: 149-155.
18. Bayındır YZ, Bayındır F, Seven N. Dentinogenezis İmperfekta Tip I: Bir olguda konservatif ve protetik tedavi yaklaşımları. J Dent Fac Atatürk Üni 2005; 15(3): 65-70.
19. Ponraj RR, Samson RS, Nayak VS, Mathew M. Unilateral short root anomaly: an incidental finding on routine radiographic examination
20. Bilge NH, Yeşiltepe S, Törenek Ağırman K, Çağlayan F, Bilge OM. Investigation of prevalence of dental anomalies by using digital panoramic radiographs. Folia Morphol 2017; 77(2): 323-328.
21. Laganà G, Venza N, Borzabadi-Farahani A, Fabi F, Danesi C, Cozza P. Dental anomalies: prevalence and associations between them in a large sample of non-orthodontic subjects, a cross-sectional study. BMC Oral Health 2017; 17(1): 62.
22. Aren G, Güven Y, Güney Tolgay C, Özcan İ, Bayar ÖF, Köse TE, Koyuncuoğlu G, Ak G. The Prevalence of Dental Anomalies in a Turkish Population. J Istanbul Univ Fac Dent 2015;49(3):23-28.
23. Rakhshan V. Congenitally missing teeth (hypodontia): A review of the literature concerning the etiology, prevalence, risk factors, patterns and treatment. Dent R J 2015; 12(1): 1-13.
24. Patil S, Doni B, Kaswan S, Rahman F. Prevalence of dental anomalies in Indian population. J Clin Exp Dent 2013;5(4): e183-186.