Acta Odontologica Turcica
The official journal of Gazi University Faculty of Dentistry

DOI: https://doi.org/10.17214/gaziaot.1410956

Original research article

Determination of orthodontic anomaly patterns in patients in the Thrace region and assessment of the relationship between orthodontic anomalies and DMFT indices: a retrospective study

Hande Uzunçıbuk,[1] Meltem Tekbaş Atay,[2]

[1]Department of Orthodontics, Faculty of Dentistry, Trakya University, Edirne, Turkey [2]Department of Restorative Dentistry, Faculty of Dentistry, Trakya University, Edirne, Turkey

Abstract

Objective: The aim of this study was to investigate the prevalence of dental and skeletal anomalies that could be a cause of malocclusion and their relationship with caries distribution in the western region of Türkiye.

Materials and Method: A retrospective study was conducted with 1815 digital panoramic and lateral cephalometric radiographs taken from patients, age ranging between 6 and 47 years, who applied for orthodontic treatment. The lateral cephalometric radiographs, panoramic radiographs, and dental records were reviewed according to skeletal anomaly, dental malocclusion (Angle classification), and decay-missing-filling teeth (DMFT) index. Kruskal Wallis test was used in intergroup comparisons of variables that did not show normal distribution, and Dunn's multiple comparison test was used in subgroup comparisons. The chi-square test and Yates correction were used in comparisons of qualitative data.

Results: The mean DMFT of the dental Class I malocclusion group was statistically and significantly lower than Class II division 1 and Class III malocclusion groups ($p < 0.05$). The mean DMFT index of Class II subdivision malocclusion group was statistically and significantly lower than that of Class III malocclusion group ($p < 0.05$). The DMFT index was significantly lower in the skeletal Class I group compared to the skeletal Class II and Class III anomaly groups ($p < 0.05$).

Conclusion: There is a correlation between DMFT indices and dental malocclusions as well as skeletal anomalies. By correcting dental malocclusions and skeletal anomalies with orthodontic treatment and providing ideal occlusion, it becomes easier for patients to maintain oral hygiene and DMFT indices might decrease.

Keywords: Angle classification; decay; malocclusion; orthodontics; retrospective study.

Citation: Uzunçıbuk H, Tekbaş Atay M. Determination of orthodontic anomaly patterns in patients in the Thrace region and assessment of the relationship between orthodontic anomalies and DMFT indices: a retrospective study. Acta Odontol Turc 2024;41(3):105-112

Editor: Nehir Canıgür Bavbek, Gazi University, Ankara, Turkey

Funding: None declared.

Conflict of Interest: The authors declare no conflict of interest related to this study.

[Abstract in Turkish is at the end of the manuscript]

Introduction

Orthodontic dental and skeletal anomalies include irregularities or deviations in the growth and structure of teeth and the skeletal structure, which can impact the positioning and functionality of the teeth and jaws. The anomalies include a range of dental irregularities, including anomalies in tooth form (e.g., peg-shaped lateral incisors), tooth number (e.g., hypodontia or hyperdontia), tooth location (e.g., ectopic eruption or impacted teeth), and structural dental anomalies. Anomalies have the potential to appear in individuals from both genders, with variations among levels of prevalence and specific forms of anomalies. Research has indicated that there is a notable occurrence of dental malformations, with a prevalence that varies between 13.06% and 40.3% among populations of patients receiving orthodontic treatment.[1] It is crucial

Received: January 01, 2024; Accepted: May 06, 2024.
*Corresponding author: Dr. Hande Uzunçıbuk, Trakya University, Faculty of Dentistry, Edirne, Turkey
E-mail: handeuzuncibuk@trakya.edu.tr

DMFT Index	Description
0.0-1.1	Very Low
1.2-2.6	Low
2.7-4.4	Moderate
4.5-6.5	High
6.6>	Very High

Figure 1. *The quantification of the DMFT index as established by the World Health Organization (WHO)*

to comprehend the incidence and distribution of these defects to effectively design and manage orthodontic treatment.[2]

Dental caries is a chronic medical condition with multiple contributing factors that leads to the demineralization of tooth tissue, ultimately resulting in the formation of a cavity if left untreated within an appropriate timeframe.[3]

The Decayed-Missing-Filled Teeth (DMFT) index is a widely employed metric for evaluating the occurrence and intensity of dental caries, often known as tooth decay, within a given population.[3] The calculation involves the summation of the number of teeth that have decayed (D), are missing owing to caries (M), and have been filled (F) in a person (Figure 1).[4] The determination of the index is achieved through a comprehensive assessment conducted by a dental professional, involving both visual and tactile examination techniques, as well as the utilization of radiographic imaging.[5]

The existence of dental caries might contribute to the development of various forms of malocclusion. Research has indicated a possible correlation between dental caries and malocclusions.[6–8] An instance of a cross-sectional survey conducted in an area of South India revealed that children who had experienced caries (as shown by a DMFT score higher than zero) were twice as likely to exhibit any form of malocclusion in comparison to children who had not had caries (as indicated by a DMFT score of zero).[9] Furthermore, there has been a focus on investigating the effects of untreated cavitated dentin carious lesions in primary teeth on the development of permanent dentition. However, the findings from various studies have been unclear.[10] Several cross-sectional investigations have documented a correlation between the DMFT score and malocclusion[11–13], while contrasting findings have also been reported in other studies.[9] It is imperative to acknowledge that the development of malocclusion can be influenced by additional factors, including orthodontic anomalies and plaque retention.

Tooth deficiencies refer to the condition where one or more teeth are missing in the mouth. The occurrence of missing teeth can be attributed to a multitude of factors. Congenitally missing teeth are a prevalent developmental abnormality in the human dentition, affecting around 25% of individuals.[14] The principal causative component of tooth agenesis is attributed to hereditary factors[15], with a higher prevalence observed in families with affected individuals.[16] A genetic mutation in the MSX1 gene located on chromosome 4 was discovered in a familial cohort with agenesis of second premolars and third molars.[17] Tooth decay, also known as dental caries, can result in the deterioration of tooth structure as a consequence of the erosion of the outermost layer of enamel on the teeth. The extraction of severely decaying teeth may result in the appearance of gaps.[6] Periodontal disease has the potential to impact the periodontium, which encompasses the supporting structures around the teeth, ultimately resulting in tooth loss.[18]

Numerous researchers have conducted investigations on the occurrence of diverse dental defects[19–21]; nevertheless, there has been very limited investigation of their association with orthodontic treatment needs.[22] The DMFT score is utilized as a quantitative indicator of oral health and does not exhibit a direct correlation with malocclusions. However, malocclusions have the potential to impact oral well-being and may necessitate orthodontic treatment for correction, hence providing positive results for dental health. The primary objective of this research was to examine the prevalence of orthodontic anomalies, and the relationship between dental malocclusions and skeletal anomalies, with the frequency of dental defects within the population of Thrace Region.

Materials and Method

The study was conducted following the Helsinki Declaration standards and authorized by the Ethics Committee of Trakya University, Edirne, Türkiye (Protocol number: 18/29, Date: 27/11/2023).

The analysis involved examining dental records, panoramic radiographs, and lateral cephalometric radiographs of 1815 patients who applied for orthodontic treatment at the Department of Orthodontics, Faculty of Dentistry, Trakya University, during the period from November 2021 to August 2023. Intraoral examinations were performed in the clinic by dentists and orthodontists with a minimum of three years of experience in the orthodontic department. A total of 1069 lateral cephalometric radiographs were acquired from a sample of 1815 patients, and a total of 1097 patients had panoramic radiography. Therefore, the relationship between dental malocclusion and DMFT index could be compared in 1097 patients. Since 1069 patients

had panoramic radiographs with lateral cephalometric radiographs, skeletal anomalies, and DMFT index were compared. The lateral cephalometric and panoramic radiographs of the patients were analyzed under optimal lighting conditions, with standard screen brightness and resolution. X-ray images exhibiting artifacts and inadequate clarity were excluded from the investigation. The dental malocclusions were categorized into five classes, namely Class I, Class II division 1, Class II division 2, Class II subdivision, and Class III, based on the data obtained from clinical examinations and panoramic radiography. The classification of skeletal anomalies was based on the findings obtained from the analysis of lateral cephalometric radiographs, resulting in the categorization into Class I, Class II, and Class III. The DMFT indices were calculated based on panoramic radiographs. Wisdom teeth were not included in the calculations. Impacted teeth were not recorded separately on the radiographs but were evaluated together with other teeth depending on whether the impacted teeth were decayed, missing, or filled.

Statistical Analysis

Statistical analyses were conducted using the NCSS 2007 statistical software (Number Cruncher Statistical System, 2007, Utah, USA). The study utilized descriptive statistical methods such as mean and standard deviation. The distribution of variables was assessed using Shapiro-Wilk normality test. Intergroup comparisons of variables that did not follow a normal distribution were conducted using Kruskal-Wallis test. Subgroup comparisons were performed using Dunn's multiple comparison test. Comparisons of qualitative data were carried out using Chi-square test with Yates correction. The results were assessed with a significance level of $p<0.05$.

Error of the study

The investigators (H.U. and M.T.A.) repeated all calculations at one-week intervals on the panoramic and lateral cephalometric radiographs of 50 randomly selected patients to determine the method error. The intraclass correlation coefficient (ICC) for DMFT index calculations and skeletal anomaly determinations on lateral cephalometric radiographs was approximately 1.00, indicating that the calculations can be repeated with a negligible error that will not affect the results.

Results

Among the cohort of patients at the Department of Orthodontics, Faculty of Dentistry, Trakya University, during the years November 2021 and August 2023, a total of 1815 individuals were admitted for treatment.

Among the individuals who were admitted to the clinic, it was found that 25.79% were between 6-12 years of age and required early orthodontic treatment. 54.21% of the patients were in the age range of 13-18 years, while the remaining 20% were adults.

Analysis of the gender distribution revealed that 36.20% of the patients were male, while the remaining 63.80% were female. Based on the analysis of intraoral dental records and radiographic examinations, it was observed that 31.57% showed Class I dental malocclusion, 44.79% showed Class II division 1 malocclusion, 6.06% showed Class II division 2 malocclusion, 6.83% showed Class II subdivision malocclusion, and 10.74% showed Class III dental malocclusion. Upon measuring the lateral cephalometric radiographs of the patients, it was observed that 32.55% showed Class I skeletal anomalies, 54.91% showed Class II skeletal anomalies, and 12.54% showed Class III skeletal anomalies. There was no statistically significant difference observed in the distribution of dental malocclusion and skeletal anomalies between male and female individuals ($p>0.05$) (Table 1).

A statistically significant difference was observed in dental malocclusion subgroups according to age distribution ($p<0.05$). The prevalence of Class II subdivision was observed to be quite low among individuals aged 6-12. The prevalence of Class III was seen to be significantly higher among those aged 13-18. The prevalence of Class II division 1 malocclusion was determined to be quite low among those aged 26 and above (Table 2).

Table 1. *Assessment the distribution of dental malocclusion and skeletal anomalies according to gender*

		Total		Male		Female		p*
		n	%	n	%	n	%	
Gender		1815	100	657	36.20	1158	63.80	
Dental Malocclusion	**Class I**	573	31.57	217	33.03	356	30.74	0.258
	Class II division 1	813	44.79	274	41.70	539	46.55	
	Class II division 2	110	6.06	40	6.09	70	6.04	
	Class II subdivision	124	6.83	45	6.85	79	6.82	
	Class III	195	10.74	81	12.33	114	9.84	
Skeletal Anomaly	**Class I**	348	32.55	124	31.55	224	33.14	0.330
	Class II	587	54.91	212	53.94	375	55.47	
	Class III	134	12.54	57	14.50	77	11.39	

**Chi-Square test; p < 0.05*

Table 2. *Assessment the relation between dental malocclusions with age and skeletal anomalies*

Dental Malocclusion		Total		Class I		Class II division 1		Class II division 2		Class II subdivision		Class III		p⁺
		n	%	n	%	n	%	n	%	n	%	n	%	
Age	**6-12**	468	25.79	149	26.00	210	25.83	24	21.82	15	12.10	70	35.90	**0.001***
	13-18	984	54.21	311	54.28	453	55.72	58	52.73	78	62.90	84	43.08	
	19-25	242	13.33	70	12.22	105	12.92	21	19.09	21	16.94	25	12.82	
	>26	121	6.67	43	7.50	45	5.54	7	6.36	10	8.06	16	8.21	
Skeletal Anomaly	**Class I**	348	32.55	337	98.54	4	0.85	1	2.00	3	4.41	3	2.19	**0.0001***
	Class II-III	721	67.45	5	1.46	468	99.15	49	98.00	65	95.59	134	97.81	

⁺ *Chi-Square test and Yates Correction; p < 0.05*

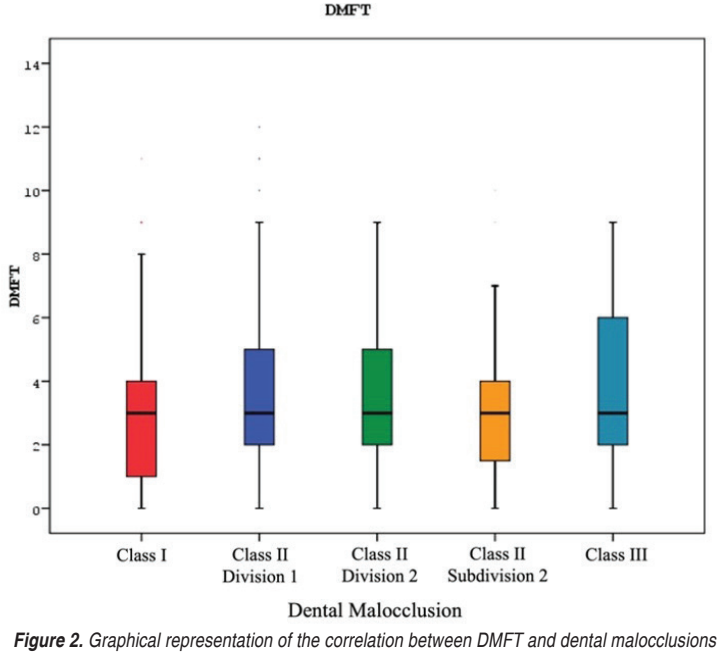

Figure 2. *Graphical representation of the correlation between DMFT and dental malocclusions*

A statistically significant difference was observed between dental malocclusions and skeletal anomalies (p<0.05). A high prevalence of dental Class I malocclusion was observed among those diagnosed with skeletal Class I patients. A high prevalence of dental Class III malocclusion was observed among individuals diagnosed with skeletal Class II and Class III anomaly (Table 2).

Table 3. *Assessment the relation between dental malocclusions and DMFT indices*

	n	DMFT (Mean ± SD)	Median (IQR)
Class I (a)	331	2.92±2.20	3 (1-4) [a]
Class II division 1 (b)	500	3.36±2.26	3 (2-5) [a-b]
Class II division 2 (c)	54	3.17±2.16	3 (2-5) [c]
Class II subdivision (d)	75	2.93±2.10	3 (1-4) [d]
Class III (e)	137	3.82±2.66	3 (2-6) [a-e, d-e]
p		**0,001***	

SD: Standard Deviation; Kruskal Wallis Test; p<0.05
a-b, a-e, d-e p<0.05

Tables 3 and 4 provide a concise representation of the data distribution by presenting the median and interquartile range (IQR) of the DMFT indices according to dental malocclusion and skeletal anomaly, respectively.

In Table 3, Class I dental malocclusion is denoted by the letter 'a', Class II division 1 with the letter 'b', Class II division 2 with the letter 'c', Class II subdivision with the letter 'd', and Class III was coded with the letter 'e'. In Class I dental malocclusion, the median DMFT score was 3, with an IQR of 1-4. This indicates a relatively low spread of DMFT scores around a central value of 3, suggesting that most individuals with Class I malocclusion have a DMFT score within this range. In Class III dental malocclusion, the median DMFT score was at 3 with an IQR of 2-6, indicating a significantly wider spread of DMFT scores, reflecting higher variability in dental health among individuals with Class III malocclusion (Table 3).

A statistically significant difference was observed between dental malocclusions and DMFT indices (p< 0.05) (Table 3). The mean DMFT of the Class I group

Table 4. *Assessment the relation between skeletal anomalies and DMFT indices*

	n	DMFT (Mean ± SD)	Median (IQR)
Class I (a)	272	2.91±2.02	3 (2-4)
Class II (b)	478	3.31±2.17	3 (2-5) [a-b]
Class III (c)	115	3.80±2.74	3 (2-6) [a-c]
p		**0.001***	

SD: Standard Deviation; Kruskal Wallis Test; p < 0.05
a-b, a-c p<0.05

was found to be statistically significantly lower than the Class II division 1 (p=0.002) and Class III (p=0.001) groups (p<0.05). The mean DMFT index of the Class II subdivision group was statistically significantly lower than that of the Class III group (p=0.021) (p<0.05). There was no statistically significant difference observed in the DMFT averages in the other groups (p>0.05) (Table 3) (Figure 2).

In Table 4, Class I skeletal anomaly is denoted by the letter 'a', Class II by the letter 'b', and Class III by the letter 'c'. In Class I skeletal anomaly, the median DMFT score was 3 with an IQR of 2-4, showing a moderate spread of DMFT scores. In Class III skeletal anomaly, the median DMFT score remained at 3, with an IQR of 2-6, showing the widest variability among the three skeletal anomaly classes, similar to what was observed with Class III dental malocclusion in Table 3 (Table 4).

A statistically significant difference was determined between skeletal anomalies and DMFT indices (p<0.05) (Table 4). The DMFT index was shown to be significantly lower in the skeletal Class I group compared to the skeletal Class II (p=0.008) and Class III (p=0.005) anomaly groups (p<0.05). There was no statistically significant difference observed in the mean DMFT values between the skeletal Class II and Class III anomaly groups (p>0.05) (Table 4) (Figure 3).

Discussion

The definition of a universal classification for orthodontic anomalies is quite difficult due to the wide range of available methods for their classification.[23] According to Tang and Wei.[24], Angle's classification fails to include the proportion between the teeth and the face. Variations in measurement techniques employed by different individuals in Angle's classification resulted in inaccuracies within the classification system. In addition, Proffit and Ackerman[25] expressed criticism towards some elements of Angle's classification, considering them as lacking validity. Despite all these challenges, Angle's classification continues to be the prevailing and widely accepted classification system up to the present day, owing to its reliable nature, simplicity, and effectiveness in clinical settings.[26] In this study, dental malocclusions were classified as Class I, Class II division 1, Class II division 2, Class II subdivision, and Class III according to their dental anomalies using Angle's classification. Considering the limited scope of previous studies, this study aimed to conduct a more comprehensive dental categorization by consolidating Class II division 1, Class II division 2, and Class II subdivision anomalies into a unified category referred to as Class II.

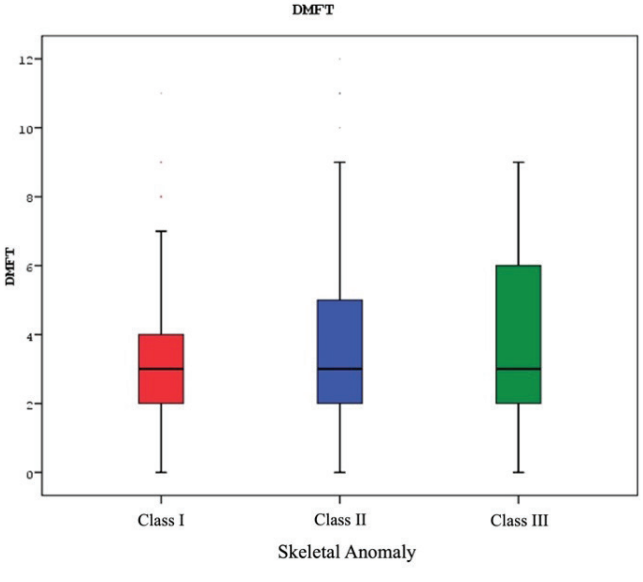

Figure 3. *Graphical representation of the correlation between DMFT and skeletal malocclusions*

There is an additional important aspect of the present study to the existing literature, which has primarily focused on examining the distribution of dental anomalies when investigating the prevalence of such anomalies in various populations.[12,13] Examining the prevalence of dental anomalies in conjunction with skeletal anomalies is a fundamental component of the present investigation. The dental malocclusions and skeletal anomalies presented by the patients were examined regarding age and gender. Furthermore, the DMFT indices of all patients were computed, and their association with dental malocclusion and skeletal anomalies was investigated.

The study done by Celikoglu *et al*.[27] aimed to determine the prevalence of orthodontic anomalies through the analysis of dental casts, intraoral photos, and panoramic radiographs obtained from a sample of 1507 orthodontic patients. The findings of the study revealed that only 52 individuals (equivalent to 3.5% of the sample) exhibited normal occlusion. A total of 626 individuals (41.5%) were diagnosed with Class I malocclusion, while 435 individuals (28.9%) exhibited Class II division 1 malocclusion. Additionally, 142 individuals (9.4%) had Class II division 2 malocclusion, and 252 individuals (16.7%) were identified as having Class III malocclusion.[27] However, this study reported a higher frequency of patients with dental Class II malocclusion. These results are in line with studies indicating that the prevalence of different types of malocclusions can vary greatly even in a population of the same origin.[28] Also, it is important to note that these findings may not accurately reflect the prevalence of anomalies in the entire population. In addition, according to the results of this study, the highest percentage of patients who applied for orthodontic treatment was in the 13-18 age range by 54.21%. The age range of 6-12 years, which is the age range required for early orthodontic treatment, constitutes only 25.79% of the patients. According to these findings, it can be concluded that more emphasis should be placed on the need to refer patients to an orthodontist to determine their early orthodontic treatment needs.

Onyeaso *et al*.[8] showed that males had a considerably higher prevalence of Class II and III molar relationships compared to females. According to the systematic review and meta-analysis of Ahangar-Atashi *et al*.[29], there was no significant difference in the prevalence of malocclusion between males and females in the population. The findings of this study exhibit similarity to the outcomes reported by Ahangar-Atashi *et al*.[29] There was no relationship between dental malocclusion and skeletal anomalies between male and female individuals.

A correlation exists between dental malocclusion and skeletal anomalies. Dental malocclusion pertains to the condition in which the teeth are not properly aligned, whereas skeletal malocclusion includes the misalignment of the jaws or maxillofacial bones.[30] The interrelationship between these two forms of malocclusion is attributable to the fact that the positioning and arrangement of the dentition are regulated by the underlying skeletal components.[7] Skeletal anomaly has the potential to impact the alignment of the teeth, resulting in dental malocclusion.[31] In contrast, dental malocclusion has the potential to contribute to skeletal anomaly by the application of stresses on the jaws, so influencing their growth and developmental processes.[32] Hence, it is essential to take into account both dental and skeletal parameters in the diagnosis and treatment of malocclusion in order to attain the most optimal functional and aesthetic results in orthodontic treatment.[33] Based on the findings of this study, it was observed that dental Class I malocclusions had a higher prevalence among patients with skeletal Class I, whereas dental Class III malocclusions were more prevalent among patients with skeletal Class III anomalies, as hypothesized.

The DMFT index is employed for the statistical determination of the carious, extracted, and filled teeth per individual, as well as the mean value of this index within the population during the examination. The DMFT index is selected due to its widespread usage as an assessment tool for evaluating the dental condition of populations.[34] This index exclusively refers to the existence of the disease, its effects, and the necessity for treatment.[35] It is possible for this index to exhibit higher values, particularly within communities such as ours, where the prevalence of dental caries and tooth extractions is very prominent.

In the study conducted by Baskaradoss *et al*.[13], it was found that a DMFT score of >0 was observed in 91.8% of the study subjects. The study also revealed that children with a Dental Aesthetic Index (DAI) score >35 had significantly higher caries experience compared to other children. Additionally, there was a significant correlation between the DAI scores and the mean DMFT scores. Therefore, the current literature concluded that there is a positive correlation between the severity of malocclusion and dental caries.[6,13] Based on the findings of this study, it was observed that dental Class I patients exhibited a low DMFT index. The dental Class III patients exhibited the highest DMFT rate. Considering these results, it can be concluded that patients face challenges in maintaining oral hygiene as the severity of dental malocclusion increases. Orthodontic treatment has a significant role in enhancing the oral hygiene of patients by facilitating the achievement of an optimal occlusion.

Current literature suggests that dental malocclusion, which can be related to skeletal discrepancies, may have an impact on the DMFT index.[9] However, there are no studies that directly address the relationship between dental malocclusions/skeletal anomalies and oral health. This characteristic sets our study apart from other studies.

This study has some limitations. The DMFT index remains to be a valuable and extensively utilized

instrument for assessing and comparing oral health within various populations. This metric offers a basic and important assessment of the frequency of dental caries. However, the DMFT index does not include early stages of tooth decay, which are commonly known as non-cavitated or incipient lesions. This phenomenon has the potential to result in an underestimate of the actual prevalence of dental caries within a given community. Also, the DMFT index exclusively assesses dental health and does not encompass an evaluation of periodontal health, oral cancer, or oral lesions. Therefore, doing a comprehensive clinical examination of the oral cavity is necessary. This retrospective study provides valuable insights into the relationship between dental malocclusions, skeletal anomalies, and DMFT indices in the population of the Thrace Region. However, it is important to assess the applicability of these findings to other populations. The study group's particular demographic and geographic attributes may restrict the direct generalization of the findings to groups with distinct genetic backgrounds, environmental factors, and dental care accessibility. Furthermore, differences in the occurrence of dental and skeletal anomalies among various groups may impact the connection between malocclusions and DMFT scores. Hence, although the outcomes emphasize significant correlations that can guide clinical practices and preventive measures in comparable environments, additional research including varied populations is imperative to authenticate and build upon these discoveries.

Conclusion

The analysis of epidemiological data about the occurrence of malocclusion plays a crucial role in creating appropriate levels of orthodontic treatment plans. The DMFT score is utilized as a quantitative indicator of oral health and has a direct correlation with malocclusions. Nevertheless, malocclusions have the potential to impact dental health and may necessitate orthodontic treatment for the purpose of correcting this condition, hence providing positive results for dental health. Ideally, an orthodontist will evaluate an individual's oral health, considering both dental malocclusion and skeletal anomaly.

Acknowledgement

None

References

1. Abdelgader I, Gnaiber T, Emnina K, Orofi S. Radiographic investigation of dental anomalies in Libyan orthodontic patients. Libyan Dent J 2015;5:22119441.

2. Kazanci F, Celikoglu M, Miloglu O, Ceylan I, Kamak H. Frequency and distribution of developmental anomalies in the permanent teeth of a Turkish orthodontic patient population. J Dent Sci 2011;6:82-9.

3. Grund K, Goddon I, Schüler IM, Lehmann T, Heinrich-Weltzien R. Clinical consequences of untreated dental caries in German 5- and 8-year-olds. BMC Oral Health 2015;15:140.

4. Milona M, Janiszewska-Olszowska J, Szmidt M, Kłoda K, Olszowski T. Oral health related behaviors in relation to DMFT Indexes of teenagers in an urban area of north-west Poland—dental caries is still a common problem. Int J Environ Res Public Health 2021;18:2333.

5. García-Cortés JO, Medina-Solís CE, Loyola-Rodriguez JP, Mejia-Cruz JA, Medina-Cerda E, Patino-Marin N, *et al.* Dental caries' experience, prevalence and severity in Mexican adolescents and young adults. Rev Salud Pública 2009;11:82-91.

6. Hasegawa Y, Batbayar N, Sukhbaatar N, Bazar A, Kageyama I. Relationship between index of orthodontic treatment need dental health component (IOTN-DHC) and caries prevalence in school-age children. Int J Dent Hyg 2023;21:582-89.

7. Fernandez CCA, Pereira CVCA, Luiz RR, Vieira AR, De Castro Costa M. Dental anomalies in different growth and skeletal malocclusion patterns. Angle Orthod 2018;88:195-201.

8. Onyeaso CO, Aderinokun GA, Arowojolu MO. The pattern of malocclusion among orthodontic patients seen in Dental Centre, University College Hospital, Ibadan, Nigeria. Afr J Med Med Sci 2002;31:207-11.

9. Disha P, Poornima P, Pai S, Nagaveni N, Roshan N, Manoharan M. Malocclusion and dental caries experience among 8–9-year-old children in a city of South Indian region: A cross-sectional survey. J Educ Health Promot 2017;6:98.

10. Gomide RT, Frencken JE, Leal SC, Kuijpers-Jagtman AM, Faber J. Impact of proximal cavities and primary molar absence on space in the dental arches. Peer J 2020;8:e8924.

11. Claudino D, Traebert J. Malocclusion, dental aesthetic self-perception and quality of life in a 18 to 21 year-old population: a cross sectional study. BMC Oral Health 2013;13:3.

12. Memon M, Qureshi AMN, Memon AA, Ramzan S, Shaikh AG, Shams S. Association of dental caries with body mass index in patients attending dental OPD of tertiary care hospital, Pakistan: A Cross-Sectional Study. J Pharm Res Int 2021;13:23-8.

13. Baskaradoss JK, Geevarghese A, Roger C, Thaliath A. Prevalence of malocclusion and its relationship with caries among school children aged 11 - 15 years in southern India. Korean J Orthod 2013;43:35-41.

14. Garib DG, Peck S, Gomes SC. Increased occurrence of dental anomalies associated with second-premolar agenesis. Angle Orthod 2009;79:436-41.

15. Shapira Y, Finkelstein T, Shpack N, Lai YH, Kuftinec MM, Vardimon A. Mandibular second molar impaction. Part I: Genetic traits and characteristics. Am J Orthod Dentofacial Orthop 2011;140:32-7.

16. Mossey PA. The heritability of malocclusion: part 2. The influence of genetics in malocclusion. Br J Orthod 1999;26:195-203.

17. Vastardis H. The genetics of human tooth agenesis: new discoveries for understanding dental anomalies. Am J Orthod Dentofacial Orthop 2000;117:650-56.

18. Marcenes W, Kassebaum NJ, Bernabé E, Flaxman A, Naghavi M, Lopez A, *et al.* Global burden of oral conditions in 1990-2010. J Dent Res 2013;92:592-97.

19. Hong CL, Broadbent JM, Thomson WM. Long-term survival of enamel-defect-affected teeth. Caries Res 2020;54:350-57.

20. Oliveira AFB, Chaves AMB, Rosenblatt A. the influence of enamel defects on the development of early childhood caries in a population with low socioeconomic status: a longitudinal study. Caries Res 2006;40:296-302.

21. Hong L, Levy SM, Warren JJ, Broffitt B. Association between enamel hypoplasia and dental caries in primary second molars: a cohort study. Caries Res 2009;43:345-53.

22. Seow W. Developmental defects of enamel and dentine: challenges for basic science research and clinical management. Aust Dent J 2014;59:143-54.

23. Baume LJ. Uniform methods for the epidemiologic assessment of malocclusion. Results obtained with the World Health Organization standard methods (1962 and 1971) in South Pacific populations. Am J Orthod 1974;66:251-72.

24. Tang EL, Wei SH. Recording and measuring malocclusion: a review of the literature. Am J Orthod Dentofacial Orthop 1993;103:344-51.

25. Proffit WR, Ackerman JL. Rating the characteristics of malocclusion: a systematic approach for planning treatment. Am J Orthod 1973;64:258-69.

26. Dodda KK, Prasad SER V, Kanuru RK, Nalluri S, Mittapalli R, Raghavendra. Diagnostic features of Angle's Class II div 2 malocclusion. J Int Soc Prev Community Dent 2015;5:513-17.

27. Celikoglu M, Akpinar S, Yavuz I. The pattern of malocclusion in a sample of orthodontic patients from Turkey. Med Oral Patol Oral Cir Bucal 2010:791-96.

28. Sayin MO, Türkkahraman H. Malocclusion and crowding in an orthodontically referred Turkish population. Angle Orthod 2004;74:635-39.

29. Ahangar-Atashi MH, Dabaghi-Tabriz F, Ahangar-Atashi S, Rahbar M. Prevalence of Dental Malocclusions in Patients admitted to the Department of Orthodontics, School of Dentistry, Tabriz, in 2016. J Contemp Dent Pract 2017;18:1034-39.

30. Joshi N, Hamdan AM, Fakhouri WD. Skeletal malocclusion: a developmental disorder with a life-long morbidity. J Clin Med Res 2014;6:399-408.

31. Costa AMG, Trevizan M, Matsumoto MAN, da Silva RAB, da Silva LAB, Horta KC, *et al.* Association between tooth agenesis and skeletal malocclusions. J Oral Maxillofac Res 2017;8:e3.

32. Li J, He Y, Wang Y, Chen T, Xu Y, Xu X, *et al.* Dental, skeletal asymmetries and functional characteristics in Class II subdivision malocclusions. J Oral Rehabil 2015;42:588-99.

33. Mageet AO. Classification of skeletal and dental malocclusion: revisited. Stoma Edu J 2016;3:205-11.

34. Petrovski M, Ivanovski K, Minovska A. DMFT index among institutionalized elderly. Balk J Dent Med 2015;19:221-25.

35. Zander A, Sivaneswaran S, Skinner J, Byun R, Jalaludin B. Risk factors for dental caries in small rural and regional Australian communities. Rural Remote Health 2013;13:2492.

Trakya bölgesindeki hastalarda ortodontik anomali paternlerinin belirlenmesi ve bu anomalilerin DMFT indeksleri ile ilişkisinin değerlendirilmesi: retrospektif bir çalışma

Özet

Amaç: Bu çalışmanın amacı, Türkiye'nin batı bölgesindeki popülasyonda maloklüzyona neden olabilecek dental ve iskeletsel anomalilerin yaygınlığını ve bunların çürük dağılımı ile ilişkisini araştırmaktır.

Gereç ve Yöntem: Ortodontik tedavi için başvuran, yaşları 6 ile 47 arasında değişen 1815 hastanın dijital panoramik ve lateral sefalometrik radyografileri retrospektif olarak incelenmiştir. Lateral sefalometrik radyografiler, panoramik radyografiler ve dental kayıtlar ile iskeletsel anomali, dental maloklüzyon (Angle Sınıflaması) ve çürük-eksik-dolgulu diş (DMFT) indeksi belirlenerek, bu anomalilerin çürük dağılımı ile ilişkisi incelenmiştir. Normal dağılım göstermeyen değişkenlerin gruplar arası karşılaştırmalarında Kruskal Wallis testi, alt grup karşılaştırmalarında Dunn's çoklu karşılaştırma testi ve nitel verilerin karşılaştırmalarında ki-kare testi ve Yates düzeltmesi kullanılmıştır.

Bulgular: Dental Sınıf I maloklüzyon grubunun DMFT ortalaması Sınıf II Bölüm 1 ve Sınıf III maloklüzyon gruplarından istatistiksel olarak anlamlı derecede düşük bulunmuştur (p<0.05). Sınıf II Subdivizyon maloklüzyon grubunun ortalama DMFT indeksi, dental Sınıf III maloklüzyon grubundan istatistiksel olarak anlamlı derecede düşüktür (p<0.05). DMFT indeksi, iskeletsel Sınıf I hastalarda iskeletsel Sınıf II ve Sınıf III hastalara kıyasla anlamlı derecede düşüktür (p < 0.05).

Sonuç: DMFT indeksleri ile dental maloklüzyonlar ve iskeletsel anomaliler arasında bir korelasyon bulunmaktadır. Ortodontik tedavi ile dental maloklüzyonların ve iskeletsel anomalilerin düzeltilerek ideal oklüzyonun sağlanması ile hastaların ağız hijyenini sağlamaları kolaylaşmakta ve DMFT indeksleri düşmektedir.

Anahtar Kelimeler: Angle sınıflaması; çürük; maloklüzyon; ortodonti; retrospektif çalışma.