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Original Article

Prevalence and influence of dental development anomalies in smile esthetics: a cross-sectional analysis

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Aim: To determine the prevalence of dental development anomalies and type of influence on the smile of adolescent students. **Method:** This was a cross-sectional and analytical study carried out in two public (A1) and two private (A2) schools chosen by lot in the city of Parnaíba-Piauí. The sample calculation was based on the target population: number of people enrolled in public and private schools between 15 and 19 years, in the city of Parnaíba-PI, which totaled 6209 students in 2020, according to a survey carried out by the Brazilian Institute of Geography and Statistics – IBGE. A questionnaire on epidemiological data and aesthetic self-perception of the smile was applied to 160 adolescents between 15 and 19 years old, from August 2020 to July 2021. The clinical examination was carried out under natural light, to check for the presence of anomaly(s) in the dental development. Students who presented only one pathology would be called group 1 (G1), those who presented two would be called group 2 (G2) and those who presented 3 or more would be called group 3 (G3). On the other hand, adolescents in whom no anomaly was evidenced would participate in the control group (CG), both in A1 and A2. **Results:** It was observed that 37.5% of the sample had only a type of dental anomaly, corresponding to 60 individuals. The most prevalent were enamel hypoplasia, fusion, transposition, agenesis, ectopic eruption, microdent and dens-in-dent. It was possible to verify a higher prevalence in the maxilla, private schools (76.6%) and females (86.6%). In 45% of adolescents with dental anomalies, embarrassment was observed when smiling. **Conclusion:** The prevalence was relatively high, highlighting the enamel hypoplasia, influencing the smile esthetics of a reasonable number of adolescents, whether for acquaintances, strangers or even for photographs.

Keywords: Tooth abnormalities. Prevalence. Adolescents. Esthetics, dental.

Introduction

Dental developmental anomaly (DDA) is any disorder or deviation of an anatomical characteristic or structure, relative to normality, whose etiology may be congenital, genetic in the periods of prenatal and postnatal development, or due to environmental factors, during training and cell differentiation. They can be characterized by disorders in the following aspects: shape, size, number, position, and eruption[1-4].

In a recent study with panoramic radiographs of Brazilian children, a prevalence of DDA of 27.5% was observed, with hypodontia being the most common (7.3%)[3]. Compared to other common oral cavity diseases and disorders, such as tooth decay and periodontal diseases, they are less common, however, treatment and control are often associated with difficulty and complexity[5,6].

A radiographic examination should be performed to confirm the diagnosis when DDA is suspected after the clinical examination. Early diagnosis in primary, mixed or early permanent dentition is recommended, suggesting greater simplicity in the treatment plan, with a reduction in complications. Thus, controlling the eruption and developing the dentition is an integral part of achieving occlusal, functional and esthetic harmony[7-12].

Although DDA can be found in any age group, adolescents are one of the groups most affected psychologically by the effects of these anomalies, because the aesthetic standards exert a direct influence on their self-esteem and social behavior[13-17].

The early diagnosis of a given dental anomaly, such as agenesis or the presence of a conoid tooth, can alert the clinician to the possibility of developing other associated anomalies in the same patient or in other family members, allowing for early diagnosis and timely dental intervention[12-14].

In this context, as it is a public health problem, dental aesthetics acts by improving social interaction, improving the patient's self-esteem and self-confidence, reinforcing the importance of dental treatment in adolescents, both in the aesthetic-functional and psychosocial scope[18].

The null hypothesis of this research was that the prevalence of DDA among adolescents is low, but when present, an association of anomalies can be found in the same individual, with the predominant etiological factor being genetic.

Based on this context, it became justifiable to investigate the presence of DDA, the self-perception and the impact generated by it, to encourage the incorporation of treatment in the public service, and thus make dental care more accessible to less socioeconomically favored.

The aim of this research was to determine the prevalence of dental development anomalies and type of influence on the smile of adolescent students.

Material and Methods

The research was carried out after the ethical opinion of approval of the Research Ethics Committee of the State University of Piauí - CEP/UESPI, with CAAE

number: 26139419.0.0000.5209. This was a cross-sectional and analytical study carried out in from August 2020 to July 2021.

The sample calculation was based on the target population: number of people enrolled in public and private schools between 15 and 19 years, in the city of Parnaíba-PI, which totaled 6209 students in 2020, according to a survey carried out by the Brazilian Institute of Geography and Statistics - IBGE[19]. In this way, from the sample size formula, a number of 396 was obtained, with approximation to 400. According to the sample calculation, the minimum number of 396 participants for this research would be enough, taking into account the proposed analyses, a sampling error of 5%, in addition to a 95% confidence level, according to the guidelines addressed by Fonteles et al.[20]. Due to the research being carried out during the Covid-19 pandemic period, the minimum estimated population value was not obtained.

The inclusion criteria adopted were: adolescent students between 15 and 19 years old, who were studying in public and private schools and accepted to participate in the research, with permission from their parents (underage). The exclusion criteria were all students unable to understand and answer the questionnaires, such as those with cognitive impairment, syndromes or hearing and visual impairment, those who did not wish to participate in the research or those whose parents not authorized.

Before the pilot study, in order to standardize the diagnosis of DDA, clinical and radiological training was carried out to calibrate two examiners at the Clinic School of Dentistry (CSD), based on the study previously carried out by other authors[16]. Twenty adolescents who did not participate in the study were examined to determine intra- and inter-examiner agreement. Kappa values were 0.84 for inter-examiner agreement (between the two examiners), 0.85 and 0.87 for intra-examiner agreement, and 0.86 and 0.85 for inter-examiner agreement between each examiner and the gold standard. For this, the individuals were examined twice, with an interval of two weeks. The same was done with regard to the interpretation of panoramic radiography.

Before data collection, a pilot study was carried out with 30 adolescents from municipal schools that did not participate in the sample, to evaluate the methods and check whether there would be a need to make changes in the initially proposed methodology. There was no need to reformulate the method.

Two public (A1) and two private (A2) schools were chosen by drawing lots, so that the number of students participating in the sample was evenly distributed. The schools were adopting the hybrid education system due to the current moment of the COVID-19 pandemic. Students were also chosen by lottery according to their schoolbook number.

A questionnaire was applied to each research participant about epidemiological data and the aesthetic self-perception of the smile, based on a previously validated study with Brazilians[21] (Figure 1). The clinical examination was carried out under natural light, in a school environment, by two examiners using previously calibrated personal protective equipment (PPE's), with the aid of a wooden spatula, mouth

mirror and dental probe. Students who presented only one pathology would be called group 1 (G1), those who presented two would be called group 2 (G2) and those who presented 3 or more would be called group 3 (G3). On the other hand, adolescents in whom a DDA was not evidenced participated in the control group (CG), both in A1 and A2.

1. Gender: female ( ) male ( )
2. Age of adolescent: 15 years ( ) 16 years ( ) 17 years ( ) 18 years ( ) 19 years ( )
3. Race: white ( ) black ( ) brown ( )
4. School: public ( ) private ( )
5. Are you embarrassed to smile in photographs? Yes ( ) No ( )
6. Are you ashamed to smile at acquaintances? Yes ( ) No ( )
7. Are you ashamed to smile at strangers? Yes ( ) No ( )
8. If yes, why not have sought dental treatment?
( ) lack of interest ( ) financial issues ( ) lack of information ( ) fear of treatment ( ) family characteristic

Figure 1. Epidemiological questionnaire and self-perception of smile

After the initial clinical examination to verify the presence of the pathology, the students were examined again for classification of the DDA (number, shape, position or eruption disorder) in CSD, one week after, if present in the upper, lower arch or in both arches, if on the right side or left, or on both sides. Then, panoramic radiography was taken to confirm the diagnosis of DDA.

SPSS statistical software (version 25) was used to perform descriptive statistics, with percentages and frequencies, association analyzes using the chi-square and mean comparisons using the t test, all with the significance level measured by p value >0.05. The chi-square test was applied because, in the data collection, only two groups were found: students who had a single dental anomaly (G1) and those who did not (GC).

Results

Due to the period of Covid-19, the schools adopted the hybrid or strictly remote mode of classes, making it difficult to obtain an estimated sample, and the fact that 12 male students after answering the questionnaire did not wish to be examined, there was only participation of 160 adolescents. Of these, 37.5% had anomalies, corresponding to 60 individuals, and these had only one type of anomaly, corresponding to G1, being 46.6% brown, 41.6% white and 11.8% black. In Figure 2, it is possible to verify the frequency distribution according to gender and type of school.

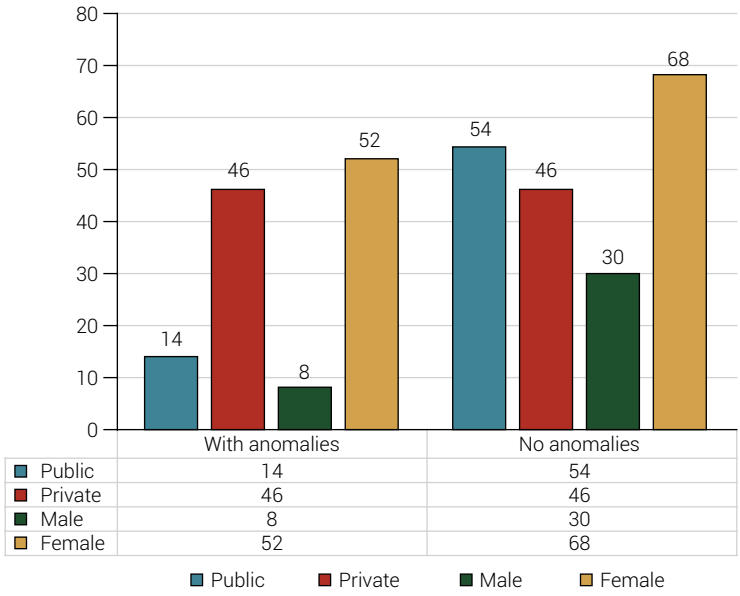

Figure 2. Prevalence of anomalies regarding gender and type of school of adolescents (15-19 years old)

It was observed that 37.5% of the sample had only a type of dental anomaly, corresponding to 60 individuals. The most prevalent were enamel hypoplasia, fusion, transposition, agenesis, ectopic eruption, microdent and dens-in-dent. It was possible to verify a higher prevalence in the maxilla, private schools (76.6%) and females (86.6%).

In addition, the t test was performed to compare the mean age between the sample with and without anomalies, and it was possible to verify that there was no statistically significant difference (t = 0.24; p = 0.81) between the groups with and without anomalies in adolescents. Finally, in general, Tables 1 and 2 show the variables and their association with the presence or absence of anomalies in the arch and side, respectively.

Based on Table 1, using the chi-square test, it was possible to observe that it is associated with the presence of anomalies in the arch in 83.3% of adolescents in the upper,15% in the lower and in no adolescent in both arches. Specifically, no anomalies of the supernumerary type, conoid tooth, gemination, retained, infraocclusion and supraocclusion were found.

Table 1. Distribution of variables associated with arch anomalies in adolescents (15 to 19 years old). Parnaíba, 2021.

Anomalies		CG (n = 100)	Upper arch (n = 51)	Lower arch (n = 9)	χ^2 *p* valor
Agenesis	No	100	43	7	$\chi^2 = 18.76$ p = 0.001
	Yes	0	8	2	

Continue

Continuation

Supernumerary	No	100	51	9	---
	Yes	0	0	0	
Microdontics	No	101	47	9	$\chi^2 = 9.03$ p = 0.001
	Yes	0	4	0	
Macrodontia	No	101	48	9	$\chi^2 = 4.56$ *p* = 0.09
	Yes	0	3	0	
Dens-in-tooth	No	101	48	9	$\chi^2 = 4.56$ *p* = 0.09
	Yes	0	3	0	
Conoid tooth	No	101	51	9	----
	Yes	0	0	0	
Fusion	No	101	40	9	$\chi^2 = 23.47$ p = 0.001
	Yes	0	11	0	
Twinning	No	101	51	9	---
	Yes	0	0	0	
Transposition	No	101	40	9	$\chi^2 = 23.47$ p = 0001
	Yes	0	11	0	
Ectopic eruption	No	101	46	6	$\chi^2 = 19.58$ p = 0.001
	Yes	0	5	3	
Withheld	No	101	51	9	---
	Yes	0	0	0	
Impacted	No	101	51	5	$\chi^2 = 68.83$ p = 0.001
	Yes	0	0	4	
Infraocclusion	No	101	51	9	---
	Yes	0	0	0	
Superocclusion	No	101	51	9	---
	Yes	0	0	0	
Enamel hypoplasia	No	101	40	9	$\chi^2 = 23.47$ p = 0.001
	Yes	0	11	0	

Foot note: CG: control group; *p < 0.05; (--)Chi-square test not applicable

However, anomalies with a statistically significant distribution (p < 0.05) were found from the agenesis-type chi-square test in the upper arch of 8 and the lower arch in 2 adolescents. In the upper arch, 4 adolescents had microdontia, 10 had fusion, 10 had transposition, and finally, 10 had enamel hypoplasia. As for the ectopic eruption, there were 4 adolescents with this type of anomaly in the upper arch and 3 in the lower arch. In this same arch, 4 anomalies of the impaction type of third molars were also found.

Table 2. Distribution of variables associated with dental development anomalies on the dental arch side in adolescents (15 to 19 years old). Parnaíba, 2021.

Anomalies		Dental arch side				χ^2 *p* valor
		None (n = 101)	Right (n = 23)	Left (n = 4)	Both (n = 32)	
Agenesis	No	101	21	4	25	χ^2 = 18.60 p = 0.001
	Yes	0	2	0	7	
Supernumerary	No	101	23	4	32	---
	Yes	0	0	0	0	
Microdontics	No	101	23	4	28	χ^2 = 16.41 p = 0.001
	Yes	0	0	0	4	
Macrodontia	No	101	23	4	30	χ^2 = 8.10 p = 0.001
	Yes	0	0	0	2	
Dens-in-tooth	No	101	21	4	32	χ^2 = 12.06 p = 0.01
	Yes	0	2	0	0	
Conoid tooth	No	101	23	4	32	----
	Yes	0	0	0	0	
Fusion	No	101	13	4	32	χ^2 = 63.,57 p = 0.001
	Yes	0	10	0	0	
Twinning	No	101	23	4	32	---
	Yes	0	0	0	0	
Transposition	No	101	25	2	32	χ^2 = 53.89 p = 0.001
	Yes	0	8	2	0	
Ectopic eruption	No	101	22	2	27	χ^2 = 29.99 p = 0.001
	Yes	0	1	2	5	
Withheld	Não	101	23	4	32	---
	Yes	0	0	0	0	
Impacted	No	101	23	4	28	χ^2 = 16.41 p = 0.001
	Yes	0	0	0	4	
Infraocclusion	No	101	23	4	32	---
	Yes	0	0	0	0	
Superocclusion	No	101	23	4	32	---
	Yes	0	0	0	0	
Enamel hypoplasia	No	101	23	4	22	χ^2 = 42.67 p = 0.001
	Yes	0	0	0	10	

Foot note: *$p < 0.05$

Such anomalies were found with a statistically significant distribution from the chi-square: agenesis in 2 adolescents on the right side and in 7 on both sides, microdontia in 4 adolescents on both sides and macrodontia in both sides of 2 adolescents. Dens-in-dental anomaly was found only in 2 adolescents on the right side and fusion was also found only on the right side in 10 adolescents.

As for the type of transposition anomaly, this was found in 8 adolescents on the right side and in 2 on the left side. Ectopic eruption appeared in 1 adolescent on the right side, in 2 on the left side, and in 5 on both sides. On both sides, impacted tooth position anomaly was found in 4 adolescents on both sides and enamel hypoplasia in 10 adolescents.

Discussion

It was possible to observe the prevalence rate of dental anomalies of 37.5%, corroborating the values found by other authors[9,10,22] which presented approximate values to those of this research, 39.2%, 31.3%, 39.31%. But diverging from the value found by Carneiro et al.[23] (2021), of 22.7%. This probably explains the fact that there are divergent values of prevalence, due to the studies being carried out in different populations, under the influence of specific genetic and environmental factors.

The presence of these anomalies suggests that they are related to genetic, hereditary and environmental factors, with the exception of enamel hypoplasia, which may be exclusively associated with environmental factors that interfere with odontogenesis. Some authors[2,12,13] have verified this statement by stating that there is a genetic interrelationship in the development of some DDA, with different degrees of severity.

In the present study, there was a difference between genders, with females having a higher prevalence, possibly due to the fact that all students accepted to be examined in schools, unlike some males who objected. This fact was also observed by some authors[4,9] when they found that females seek dental treatment more frequently than males. However, in the studies carried out by Braga et al.[24] (2020) the prevalence was higher in males.

As for location, it was observed in this study that DDA was more prevalent in the maxilla than in the mandible, with the most common being: enamel hypoplasia, fusion, transposition, agenesis, ectopic eruption, microdent, dens-in-dent, corroborating the findings by Carneiro et al.[23] (2021) and diverging from the research by Martins Neto et al.[4] (2019) who observed a greater presence of number anomalies in the mandible.

The null hypothesis was rejected because the prevalence of DDA in this study sample was high and no teenager had more than one type of anomaly.

In the current study, anomalies in number, position, shape and eruption disorders were observed, with enamel agenesis, fusion, transposition and hypoplasia being the most prevalent. However, some authors[22,24-26] found that the number anomaly (agenesis) was more prevalent, emphasizing that the genetic mutation is the most relevant etiological factor. In this research, the teeth most affected by agenesis were the maxillary central incisors, maxillary lateral incisors, and third molars. Tooth transposition observed, as in another study[27], had a high prevalence, affecting mainly the canine and first premolar on the right side. However, the number of fusions in this study was as high as the transposition, mainly affecting the central and lateral incisors on the right side, in contrast to other studies[28,29], with microdontia and conoid tooth more prevalent.

Regarding eruption disorders, the prevalence of ectopic eruption was high, as observed by Lagana et al.[28] (2017), with a decreasing number of upper canines and lower second premolars. Enamel hypoplasia, as in the research by Ramos et al.[30] (2019) affected the upper central incisors on both sides in adolescents.

The presence of DDA can also be highlighted which, although not having a high prevalence, reached a part of the sample, such as microdontia and Dens-in-dent in upper lateral incisors, as in other studies[4,31]. Macrodontia was observed in the maxillary central incisors, as well as in the studies by Yassin[29] (2016). Impacted third molars were also observed by other authors[3,22] probably because they are the last teeth to erupt in the oral cavity.

It is noteworthy that regardless of the etiological factors, knowledge of the prevalence of DDA serves as a guide for dentists to pay attention to the early diagnosis to prevent malocclusions, delay in tooth eruption or deviations from its trajectory.

It was possible to observe that 45% of adolescents who had anomalies are afraid to smile in some situation during social life, whether for acquaintances, strangers or even for photographs, probably due to the aesthetic value of the smile. Such findings corroborate those found by other authors[17,18] whose presence of these anomalies generates both situations of bullying and self-criticism, however, diverging from the findings of other authors[32] who found no association between the practice of bullying and the presence or absence of malocclusion.

It is believed that with globalization, a greater number of patients are aware of their dental conditions, due to the ease of access to information on smile esthetics on social networks. This reinforces the need for early diagnosis, intervention and treatment of such anomalies. In this study, the sample of females was larger than males, with the finding that dental anomalies directly affect aesthetics, with females being more concerned with appearance. This can be considered a limitation of this study. Another relevant factor limiting this study was that the sample number was lower than the minimum value indicated by the sample calculation, with a different number of participants in the groups.

It is suggested that other studies be carried out with a greater number of Brazilian participants, addressing both the prevalence and possible etiological factors, since variations in dental anomalies highlight the need to establish data from various geographic regions to examine the effect of genetics and environment on tooth development.

In conclusion, the prevalence was relatively high, highlighting the enamel hypoplasia, influencing the smile esthetics of a reasonable number of adolescents, whether for acquaintances, strangers or even for photographs.

Conflict of Interests

All our affiliations, corporate or institutional, and all sources of financial support to this research are properly acknowledged, except when mentioned in a separate letter. We certify that do not have any commercial or associate interest that represents a conflict of interest in connection with the submitted manuscript.

Author Contribution

All authors actively participated in the manuscript's findings and have revised and approved the final version of the manuscript.

References

1. Torres PF, Simplício AHM, Luz ARCA, Lima MDM, Moura LFAD, Moura MS. [Dental anomalies of number in orthodontic patients]. Rev Odontol UNESP.2015;44(5):280-4. Portuguese. doi:10.1590/1807-2577.0066 Portuguese.
2. Bandaru BK, Thankappan P, Nandan SRK, Amudala R, Annem SK, Santosh ABR. The prevalence of developmental anomalies among school children in Southern district of Andhra Pradesh, India. J Oral Maxillofac Pathol. 2019 Jan-Apr;23(1):160. doi: 10.4103/jomfp.JOMFP_119_18.
3. Reis JC, Fraga MAA, De Azevedo-Vaz SL, Miotto MHMB, Pereira TCR, Camisasca DR. Prevalence of dental anomalies and bone alterations in children's panoramic radiographies. RGO. 2020;68:e20200058. doi: 10.1590/1981-86372020000582018 0073.
4. Martins Neto RS, Alves IFS, Machado AL, Barbosa Neto LA, Alencar AA, Esses DFS. [Prevalence of dental anomalies in panoramic radiographies]. Arch Health Invest. 2019;8(2):68-73. Portuguese. doi: 10.21270/archi.v8i2.3247.
5. Saberi EA, Ebrahimipour S. Evaluation of developmental dental anomalies in digital panoramic radiographs in Southeast Iranian Population. J Int Soc Prev Community Dent. 2016 Jul-Aug;6(4):291-5. doi: 10.4103/2231-0762.186804.
6. Chandrika,V, Collooru M, Sarath C, Yagnesh M, Sri H. Prevalence of dental anomalies in south Indian population attending orthodontic treatment. Indian J Orthod Dentofac Res. 2018; 4(2):80-82. doi: 1.8231/2455-6785.2018.0016.
7. Patil S, Doni B, Kaswan S, Rahman F. Prevalence of dental anomalies in Indian population. J Clin Exp Dent. 2013 Oct;5(4):e183-6. doi: 10.4317/jced.51119.
8. Anitha RG, David MP. Prevalence of developmental dental anomalies–a clinical study. Int J Contemp Med Res. 2018 Mar;5(3):22-4.
9. Bilge NH, Yeşiltepe S, Törenek Ağırman K, Çağlayan F, Bilge OM. Investigation of prevalence of dental anomalies by using digital panoramic radiographs. Folia Morphol (Warsz). 2018;77(2):323-8. doi: 10.5603/FM.a2017.0087.
10. Chandak R, Pandharipande R, Sathawane R, Lanjekar A, Gaikwad R, Bansod, R. The prevalence of dental anomalies in the Vidarbha region of Maharashtra: a cross sectional study. Int J Curr Rese. 2019;11(7):5268-71. doi: 10.24941/ijcr.35873.07.2019.
11. Haghanifar S, Moudi E, Abesi F, Kheirkhah F, Arbabzadegan N, Bijani A. Radiographic evaluation of dental anomaly prevalence in a selected iranian population. J Dent (Shiraz). 2019;20(2):90-4. doi: 10.30476/DENTJODS.2019.44929.
12. Garib DG, Alencar BM, Ferreira FV, Ozawa TO. Associated dental anomalies: the orthodontist decoding the genetics that govern dental development disorders]. Dental Press J Orthod. 2010;15(2):138-57. Portuguese. doi: 10.1590/S2176-94512010000200017.
13. Barbosa SO, Aguiar SMHCA, Hall KB. [Tooth eruption disorders: myth or reality?] Arch Health Invest. 2017;6(3):102-5. Portuguese. doi: 10.21270/archi.v6i3.1979.
14. Lövgren ML, Dahl O, Uribe P, Ransjö M, Westerlund A. Prevalence of impacted maxillary canines—an epidemiological study in a region with systematically implemented interceptive treatment. Eur J Orthod. 2019 Sep;41(5):454-9. doi: 10.1093/ejo/cjz056.

15. Lopes AJF, Santos CB, Ritzmann M, Tiago CM, Nouer PRA. [Prevalence of malocclusion in schoolchildren aged 10 to 15 years in the city of Santo Antônio de Pádua-RJ]. J Orofac Invest. 2019;6(2):47-58. Portuguese.

16. Luke AM, Kassem RK, Dehghani SN, Mathew S, Shetty K, Ali IK, et al. Prevalence of dental developmental anomalies in patients attending a Faculty of Dentistry in Ajman, United Arab Emirates. Pesq Bras Odontop Clin Integr. 2017;17(1):1-5. doi: 10.4034/PBOCI.2017.171.38.

17. Gatto RCJ, Garbin AJI, Corrente JE, Garbin CAS. Self-esteem level of Brazilian teenagers victims of bullying and its relation with the need of orthodontic treatment. RGO. 2017;65(1):30-6. doi:10.1590/1981-86372017000100053304.

18. Boffi JC, Franzin LCDS. [Bullying and practice of dentistry]. Rev Uningá Rev. 2017; 29(2):38-41. Portuguese.

19. Brazilian Institute of Geography and Statistics. [An overview of health in Brazil: access and use of services, health conditions and risk factors and health protection]. Rio de Janeiro: IBGE; 2010.

20. Fontelles MJ, Simões MG, Almeida JC, Fontelles RGS. [Research methodology: guidelines for calculating the sample size]. Rev Para Med. 2010;24(2):57-64.

21. Pithon MM, Santos CR, Santos NL, Lima SOAS, Coqueiro RS, Santos R L. Impact of malocclusion on affective / romantic relationships among young adults. Angle Orthod. 2016;86(4):638-43. doi: 10.2319/030915-146.1.

22. Da Silva BX, Rossi SB, Ribeiro RA, Sendyk WR, Roman-Torres CVG, de Melo Quintela M. Prevalence of anomalies of shape and number in orthodontic patients: observational study. Res Soc Develop. 2021;10(9):e3910917504–e3910917504. Portuguese. doi: 10.33448/rsd-v10i9.17504.

23. Carneiro GKM, Rodrigues MC, Araújo WAF, Cremonese PPF. [Radiographic analysis of dental anomalies in children from 4 to 12 years of age]. Arch Health Invest. 2021;10(2):282-6. Portuguese. doi: 10.21270/archi.v10i2.5282.

24. Braga HF, Lima LMNB, Sá LMA, Nascimento RSG, Firmino BS, Sousa ALA, et al. The prevalence of dental anomalies in patients 4 to 12 years of age: a radiographical study. Focus Oral Res. 2020;2(3):140-8.

25. Fauzi NH, Ardini YD, Zainuddin Z, Lestari W. A review on non-syndromic tooth agenesis associated with PAX9 mutations. Jpn Dent Sci Rev. 2018 Feb;54(1):30-6. doi: 10.1016/j.jdsr.2017.08.001.

26. Paravizo CA, Pinto MS, Caetano RM, Netto AG, Cassab MTF. [Prevalence of dental agenesis in patients submitted to orthodontic treatment: a radiographic study]. Rev Uningá. 2021;58:eUJ3643–eUJ3643. Portuguese. doi: 10.46311/2318-0579.

27. Alassiry A. Prevalence and distribution of selected dental anomalies in Najran city of Saudi Arabia. Egypt Dent J. 2020;66(3):1471-82. doi: 10.21608/EDJ.2020.31399.1133.

28. 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):1-7. doi: 10.1186/s12903-017-0352-y.

29. Yassin SM. Prevalence and distribution of selected dental anomalies among saudi children in Abha, Saudi Arabia. J Clin Exp Dent. 2016 Dec;8(5):e485-90. doi: 10.4317/jced.52870.

30. Ramos LP, Suárez VOR, Rodríguez SG, Soler DB. [Structural anomalies of the enamel and aesthetic affection in schools children of 6-17 years of Cojímar]. Rev Elect Medimay. 2019;26(1):4-13. Spanish.

31. Magalhaes GP, Paz EC, Silva YTCS, Carvalho Leite CM, Falcão CAM, et al. Diagnosis of anomalies in dental panoramic x-ray]. ROBRAC. 2019;28(87):244-7. Portuguese. doi: 10.36065/robrac.v28i87.1315.

32. Alves DO, Barbosa FR, Colares V, Santos CFBF, Menezes VA, Godoy F. Maloclusão e bullying em adolescentes escolares. Res Soc Devel. 2020;9(10):1-18. Portuguese. doi: 10.33448/rsd-v9i10.8403.