Frequency of Dental Anomalies at a University Pediatric Dental Clinic

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Abstract

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Purpose: The purposes of this study are to 1) determine the prevalence of dental anomalies and factors related to their occurrences, and 2) create a database of patients with dental anomalies (amelogenesis imperfecta, dentinogenesis imperfect, dentin dysplasia, oligodontia, hypodontia, and hyperdontia) for future organizational research opportunities.

Methods: This is a cross-sectional chart review study of patients seen at the University of Washington (UW) Center for Pediatric Dentistry (CPD) from 2010-2020. Initial cases will be identified in electronic health records using word recognition from Info Manager in axiUm. Comprehensive assessment will follow to confirm dental anomaly cases. Each subject will be counted once, at first date of entry, within axiUm records. To determine factors related to the occurrence of dental anomalies, we will select 3 charts per case matched by age and sex (control group). Descriptive statistics, regression analyses, and trend tests will be conducted ($p<0.05$).

Results: From the 2010-2019 period, dental anomalies were identified in 657 subjects representing 2.21% of all new patients seeking care at the pediatric university clinic. Through the decade of data assessment among new patients at the CPD, the percentage of dental anomalies fluctuated between 0.97% and 3.24%. Compared to Medicaid insurance, individuals with Other insurance and Self-Pay had significantly decreased odds of having dental anomalies.

Conclusion: This study shows that type of insurance is significantly associated to individuals with dental anomalies seeking care at a university pediatric dental clinic. It shows that the frequency of Medicaid insurance is higher in patients with dental anomalies than in patients without dental anomalies.

FREQUENCY OF DENTAL ANOMALIES AT A UNIVERSITY PEDIATRIC DENTAL CLINIC

BACKGROUND

A dental anomaly is defined as an irregular difference in the number, structure, size, shape, and/or position of a tooth or teeth.[1] While these occurrences are often associated to syndromes,[2] non-syndromic dental anomalies have been linked to local or systemic factors (before or after birth), and can affect the primary and permanent dentition.[1,3,4] Most common dental anomalies include oligodontia, hypodontia, hyperdontia, mesiodens, amelogenesis imperfecta (AI), dentinogenesis imperfecta (DI), and dentin dysplasia (DD). The last three of these anomalies are the most complex and often require the most treatment.[5–7] Like most common oral diseases, dental anomalies can have lifelong effects on the affected individual.[8–11]

AI, DI, and DD are genetic conditions, either hereditary or congenital, that can cause defects in the enamel or dentin of the dentition. AI is a disorder of enamel development with multiple phenotypes that can affect the primary and permanent dentition. While defects in genes responsible for enamel matrix proteins have been identified, the expression varies and ranges from mild changes to severe esthetic and functional consequences.[3,5,6] Meanwhile, DI and DD are disorders of dentin development in the primary and permanent dentition. Like AI, phenotypical expression varies and can cause minor or severe changes to the structure of the teeth.[7,12] Individuals with AI, DI, or DD can experience chronic pain, suffering, mild to severe loss or complete absence of tooth structure, [4,13–15] requiring additional intervention to restore form and function.[13,16,17] In some cases full mouth rehabilitation is needed to restore normal function of the dentition and if not completed, an altered tooth structure can lead to oral diseases such as caries, periodontal disease, or complete loss of a tooth or multiple teeth.[4] While the prevalence of these conditions has been well studied and documented, it is unclear whether these anomalies affect low and high socioeconomic populations at the same rate.[3,6,16,18–20]

Latest evidence based research has demonstrated the link between low socioeconomic status (SES) and oral diseases.[21–24] According to the World Health Organization (WHO), caries prevalence worldwide affects nearly 100% of individuals and children in socially marginalized groups and those living in poverty are among the groups most affected by oral diseases.[24,25] Latest data from the Global Burden of Disease study showed that untreated caries in the permanent dentition is the most prevalent (35%) health condition of the global population[21] while in the primary dentition, it was the 10th most prevalent disease affecting 7.8% of the global child population.[26] Social determinants of health are vital factors in identifying high risk populations and in informing policy makers for the development of interventions for improving oral health at a populational level.[21,27] One of such social determinants of health is dental insurance and is often used as a proxy in determining an individual's SES in the United States (U.S.).[28] Children of lower SES are often enrolled in Medicaid insurance, a federal program sponsored by the U.S government that provides health coverage to nearly all low-income

Americans under the age of 65.[29] Dental anomalies are related to oral diseases in that they can increase risk of other oral disease, decrease quality of life, and require close and long-term management by an oral health professional.[30,31] More evidence will assess the impact and influence that SES has on dental anomalies.

Due to the breadth of the long-term impact of dental anomalies in a growing child, referrals from the dental community to large educational institutions are common practice making them suitable settings for investigating the role of social demographic characteristics on the occurrence of dental anomalies.[32,33] The purpose of this study is to determine occurrence of the most common dental anomalies in children and adolescents (2010-2019) and to identify sociodemographic factors associated to its prevalence. We hypothesized that type of insurance will be significantly associated to the occurrence of dental anomalies. Results from this study will expand the body of knowledge concerning factors that influence presence of dental anomalies in children and adolescents seeking dental care at a university pediatric dental clinic.

METHODS

Study design and population

The project was approved by the University of Washington (UW) Institutional Review Board (STUDY00012045). This cross-sectional study utilized data from electronic charts of patients (0-18 years of age) seeking care at the UW Center for Pediatric Dentistry (CPD) from 2010-2019.

Variables

UW CPD uses axiUm as the electronic health record (EHR) software. The axiUm software is specifically developed for use at dental educational institutions and is used to gather and store patient health and dental records. Based on information available from axiUm, we defined the following variables:

Sociodemographic variables, it included subject's age in months at their first visit; date of birth in the day, month, year format; sex assigned at birth, male or female; and the subject's insurance status identified as, Medicaid insurance, Other (private insurance or private insurance and Medicaid insurance), and Self-Pay (no insurance). Subjects with a Developmental Disabilities Association[34] (DDA) benefit, an expanded insurance benefit available to patients with special healthcare needs (SHCN), were excluded from this study population due to the large prevalence of dental anomalies among patients with complex medical histories. The CPD sees a large number of patients with SHCN and is a known referral destination for patients with SHCN on Medicaid insurance. This study focused on the otherwise healthy population at the CPD.

Medical history, it included information on general health history grouped by systems as well as presence of syndromes. Data were categorized into the following categories: otherwise healthy, cardiovascular, endocrine, neurologic, respiratory, and Other which included

hematology/oncology diseases, psychiatric disorders, gastrointestinal disease, and ectodermal disease.

Dental variables, it included diagnosis of AI, abnormal changes to the enamel structures of the primary and/or permanent dentition; DI and DD, abnormal changes to the dentin structures of the primary and/or permanent dentition; hypodontia (including oligodontia), absence of 1 or more teeth in the primary and/or permanent dentition; and hyperdontia, the presence of supernumerary teeth in the primary and/or permanent dentition.

Data collection

We collected data from the CPD in a comprehensive search of EHR for all patients from 2010-2019. To determine yearly prevalence, we calculated the number of individuals seeking care (denominator) from January 1st until December 31st in any given year (2010-2019). Each subject (numerator) was counted once at the first date of entry of the dental anomaly within the axiUm EHR. Dental anomalies cases were obtained through Info Manager, a report builder module, in axiUm using word recognition. The following phrases were used in word recognition: amelogenesis imperfecta, dentinogenesis imperfecta, oligodontia, hypodontia, congenitally missing tooth, supernumerary tooth, mesiodens, dentin dysplasia, dental anomaly, and dental anomalies. Each identified case was further investigated by a research team member to verify accuracy and later grouped based on type of dental anomaly. An inter and intra Kappa test was conducted to verify reliability of data extraction. The inter and intra Kappa test scores were 0.76 and 0.76 respectively (95% CI; SD [0.44, 1.00]). To further analyze differences and association in the distribution of the variables collected, we randomly matched each case to three non-dental anomaly individuals based on the date of first visit to the clinic (+/- 1 month of first visit).

Data analysis

Password protected data from axiUm EHR was sent to the research team in Excel version 16.0 (Microsoft Corp., Redmond, Wash.). Individuals were assigned a study number for identification and the link to the original data was kept locked. De-identified data was later entered into and managed using Research Electronic Data Capture (REDCap) tools hosted by the UW. REDCap is a secure, web-based application designed to support data capture for research studies.[35] Differences in demographics characteristics was analyzed using descriptive statistics. Through the decade of data collected, we assessed presence of trends of dental anomalies using yearly prevalence. Utilizing data from 2010 to 2019, associations of sociodemographic variables and dental anomalies were analyzed using unadjusted and adjusted logistic regression. The year 2019 was used as a cutoff because it was the latest one non-impacted by COVID-19 pandemic. Critical value was set at 5%.

RESULTS

From the 2010-2019 period, dental anomalies were identified in 657 subjects representing 2.21% of all new patients seeking care at the pediatric university clinic. The majority were males (63%), in primary dentition (38%) and with Medicaid insurance (79%). The mean age of subjects with dental anomalies was 8.6 years (SD: 3.7). Most subjects with dental anomalies were otherwise healthy (65%). Compared to individuals without dental anomalies (controls), subjects were significantly more likely to be male (62% vs. 51%; p=0.016), to have Medicaid insurance (79% vs. 70%; p<0.001), and to be otherwise healthy (65% vs. 61%; p=0.002). In addition, there was no difference in age (8.6 vs. 8.5 years; p=0.865), in the stage of dentition (p=0.158), or in the prevalence of syndromic diagnoses (1% vs. 2%; p=0.308) (Table 1).

Through the decade of data assessment among new patients at the CPD, the percentage of dental anomalies fluctuated between 0.97% and 3.24% (p=0.242) (Table 2). In the permanent dentition, the percentage of dental anomalies fluctuated between 0.16% and 1.20% (p=0.231) (Table 3). Meanwhile, in the primary dentition, the percentage of dental anomalies fluctuated between 0.36% and 1.64% (P=0.231) (Table 4). Overall, the percentage of dental anomalies among total new patients per year rose from 2010 to 2016. Between 2017-2018, there was a visible marked drop in the frequency of subjects with dental anomalies, in all dentition types, which continued into 2019 (Figure 1 & 2). Hyperdontia was the most frequently encountered dental anomaly while DD was the least observed (Figure 3-6; Table 2-4). Specifically, the prevalence of hyperdontia at the CPD varied from 0.38-2.75%, hypodontia from 0.03-0.38%, AI from 0-0.11%, DI from 0.03-0.11%, and DD from 0-0.03% (Table 2).

Unadjusted and adjusted (by insurance status, sex, stage of dentition, age, and syndromes) regression models were conducted to identify factors associated to the odds of having dental anomalies. Compared to Medicaid insurance, individuals with Other insurance and Self-Pay had significantly decreased odds of having dental anomalies (OR: 0.33 (P=0.001) and 0.13 (P=0.014), respectively). Sex (OR: 1.17 (P=0.467)) or having a syndrome (OR: 0.875 (P=0.875)) had no significant correlation to dental anomalies. Additionally, the stage of dentition at initial presentation, being in the Mixed Dentition (OR: 1.35 (P=0.277)) or being in Permanent Dentition (OR: 1.18 (P=0.509)), compared to the primary dentition, had no significant correlation to dental anomalies (Table 5).

DISCUSSION

The purpose of this study was to determine occurrence of the most common dental anomalies in children and adolescents (2010-2019) at a university dental clinic and to identify sociodemographic factors associated to its prevalence. We hypothesized that type of insurance would be significantly associated to the occurrence of dental anomalies. Results of this study confirm the hypothesis that there is a difference in the distribution of the type of dental insurance among patients with dental anomalies seeking care at a pediatric university dental clinic.

As a university clinic, the CPD is the dental home of a significant number of patients with Medicaid insurance and a major referral destination for dental services from the region. Thus, one strength of this study is that it includes a wide range of demographic characteristics providing a significant snapshot that strongly represents the surrounding communities. Current reports in this topic often include subjects of a narrow population like individuals seeking orthodontic care.[9–11,14,36–39] In this study, we found males to be significantly associated with dental anomalies compared to controls (P=0.016) (Table 1). This is likely due to hyperdontia being the most prevalent dental anomaly identified in this study (Table 2). Since males are twice as likely to experience hyperdontia[11,16,40] our findings corroborate existing evidence on the impact of sex in the occurrence of dental anomalies. We also found having a significant medical history was a significant factor associated to the presence of dental anomalies (P=0.002). (Table 1). Complex medical histories and SHCN are often associated with dental anomalies.[1,2]

The frequency of dental anomalies identified at the CPD shows some differences compared to existing published literature.[1,3,13,16,20(p)] Specifically, the prevalence of hypodontia at the CPD was lower than most reports in the literature.[17,20,38,41] One possible explanation could be in our robust sample and the length of data collected. Meanwhile, the prevalence of AI and DI in this study was higher than current published evidence.[7,13,39] AI and DI are challenging dental conditions as they require management by an interdisciplinary team thus patients are often referred to the CPD to receive such treatment. This data justifies public funding for the CPD as an important destination for clinical care. Regarding the trends, this study found that the percentage of patients with dental anomalies rose from 2010 to 2016 followed by a marked drop between 2017-2019. Non-dental factors might explain the observed trends. Notably, in 2010 the UW opened a brand-new clinic to treat pediatric patients and their dental needs. The rise of subjects with dental anomalies from 2010 to 2016 could be explained by the University increasing its effectiveness in treating complex patients and therefore receiving more referrals. In 2016, the dental school went through financial challenges that affected the community perception for long-term care. Additionally, in 2016, the U.S. federal administration restricted access for refugees and immigrants entering the country.[42,43] Because Washington is the top three state welcoming refugees, political changes might have played a relevant factor of immigrant population seeking care at the CPD. Regarding stage of dentition, the frequency of dental anomalies in the primary dentition was higher than those found in the permanent dentition but not higher when compared to the mixed and permanent dentitions together (Figure 1). This is understandable based on the patient distribution seen at this pediatric dental clinic which serves a large young population. The most common dental anomaly found when a patient presented in the primary or permanent dentition is hyperdontia (Table 3 and 4).

Subjects with dental anomalies at this University pediatric dental clinic have significantly higher rates of Medicaid insurance compared to controls (Table 1) and subjects with Self-Pay or Other insurance have decreased odds of having dental anomalies compared to those with

Medicaid insurance (Table 6). While it is understandable that no significant difference in age is observed in subjects with dental anomalies, we expect insurance status to influence the odds due to its indication of socioeconomic factors. While dental anomalies are congenital conditions known to be caused by genetic factors,[1,3,14] it has also been shown that they can be influenced by environmental factors.[44–46] This would explain why subjects with Other insurance or Self-Pay are at decreased odds of having dental anomalies compared to those with Medicaid insurance. Patients with Medicaid insurance experience more socioeconomic hardships such as food insecurity, barriers in access to healthcare, higher levels of stress, and more. These environmental factors, especially when experienced at a young age when the teeth are developing may help explain the difference in dental anomalies between patients with Medicaid and Other or Self-Pay insurance. Another explanation is that individuals with dental anomalies and Other insurance may have more access to care in private practice or businesses, therefore, skewing the frequency of anomalies in this group. Dental anomalies potentially cause social and financial burdens to patients and families. They often require treatment plans that necessitate significant time and management by a large team of dental specialists. The University of Washington School of Dentistry has an interdisciplinary course devoted to treating patients with dental anomalies such as AI, DI, DD, and oligodontia.

This study has limitations. First, it was constricted by the type of data that the EHR captures. Secondly, as a university dental clinic, there are many providers thus notes and records are affected. However, the CPD has available templates aimed at standardized chart notes. While data presented only includes the CPD, as a university clinic, it serves as a referral location for the entire region providing a good representation of the community it serves. The strengths of this comprehensive study are in the length of data over 10 years. Additionally, the implementation of software, axiUm Info Manager, used in this study presents a novel way of completing comprehensive chart reviews. This large database sets up a line of research that investigates other relevant variables such as the time and resources spent by families of patients with dental anomalies and inter-professional collaborations for areas that include but are not limited to genetics and quality of life.

CONCLUSION

This study shows that type of insurance is significantly associated to individuals with dental anomalies seeking care at a university pediatric dental clinic. It shows that the frequency of Medicaid insurance is higher in patients with dental anomalies than in patients without dental anomalies. This study created a database that opens the door for future research like the financial burden of dental anomalies. The database may also be used to for studies involving the genetics of dental anomalies. More research is needed to investigate which socioeconomic factors may play a role in expression of dental anomalies.

Table 1: Demographics (from 2010 to 2019)

	Dental Anomalies N=657	No Dental Anomalies N=1971	P Value*
Sex , N(%)			0.016
Male	412 (63)	1011 (51)	
Female	245 (37)	960 (49)	
Dentition, N(%)			0.158
Primary Dentition	249 (38)	797 (40)	
Mixed Dentition	203 (31)	450 (23)	
Permanent Dentition	203 (31)	716 (36)	
Missing Information	2 (0)	8 (0)	
Insurance Status, N(%)			0.001
Medicaid	522 (79)	1389 (70)	
Self-Pay	26 (4)	2 (0)	
Other**	95 (14)	495 (25)	
Missing	14 (2)	85 (4)	
Medical Diagnosis, N(%)			0.002
Cardiovascular	5 (1)	18 (1)	
Endocrine	2 (0)	1 (0)	
Healthy	426 (65)	1204 (61)	
Neurologic	6 (1)	94 (5)	
Respiratory	42 (6)	76 (4)	
Other ***	175 (27)	577 (29)	
Missing Information	1 (0)	1 (0)	
Syndrome, N(%)			0.308
Yes	7 (1)	48 (2)	
No	648 (99)	1921 (97)	
Missing	2 (0)	2 (0)	
Age (years)			0.865
Mean (SD)	8.6(3.7)	8.5(5.5)	
Median (IQR)	8.0(6.0-11.0)	8.0(4.0-13.0)	

*chi-square test is conducted for goodness fit of categorical variable, t-test is performed for continues variables
**Private insurance or private insurance + Medicaid
***Common Disease including: Cardiovascular Disease, Respiratory Disease, Neurologic Disorders, Endocrine Disorders, Hematology/oncology, Psychiatric Disorders, Gastrointestinal Disease, Ectodermal (hair, nails, skin) disease

Figure 1: Percentage of Dental anomalies among Total New Patients per Year

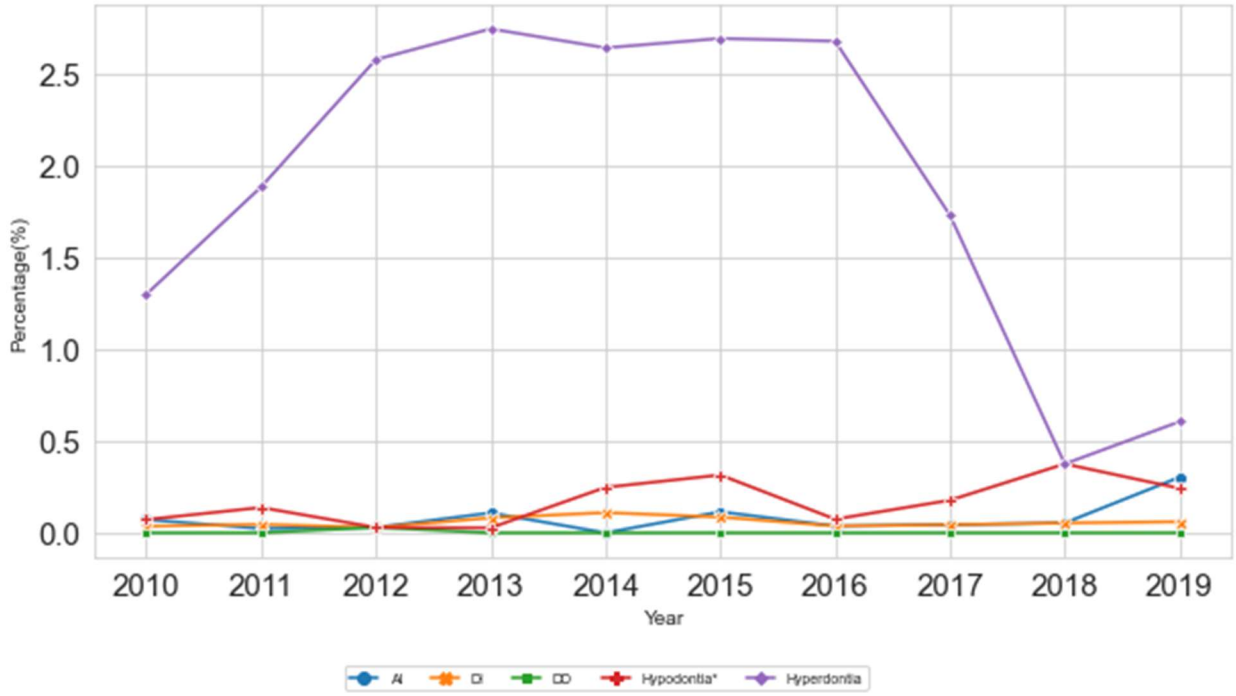

Figure 2. Frequency of Dental anomalies in Permanent and Primary Dentition

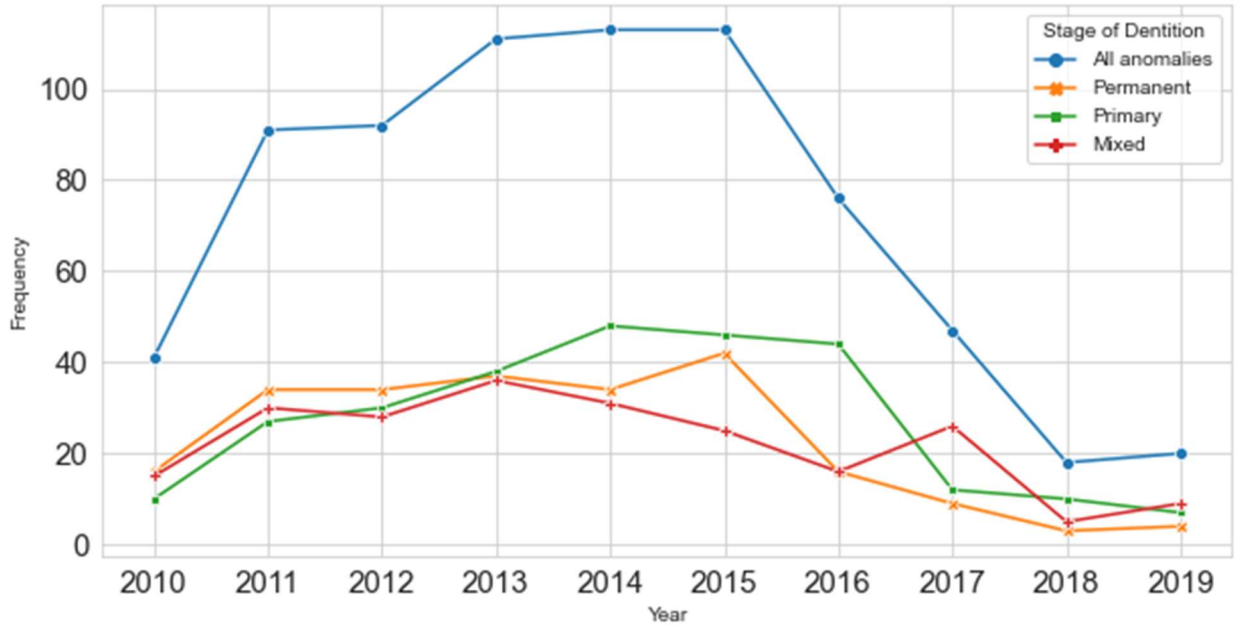

Table 2: Frequency of Dental Anomalies

Total new patient visits	2010 N=2770	2011 N=4350	2012 N=3411	2013 N=3676	2014 N=3631	2015 N=3488	2016 N=2686	2017 N=2252	2018 N=1863	2019 N=1650	P Value
All anomalies N(%)	41 (1.48)	91 (2.09)	93 (2.73)	111 (3.02)	113 (3.11)	113 (3.24)	76 (2.83)	47 (2.09)	18 (0.97)	20 (1.21)	0.242
AI, N(%)	2 (0.07)	1 (0.02)	1 (0.03)	4 (0.11)	0 (0)	4 (0.11)	1 (0.04)	1 ((0.04)	1 (0.05)	5 (0.05)	0.254
DI, N(%)	1 (0.04)	2 (0.05)	1 (0.03)	3 (0.08)	4 (0.11)	3 (0.09)	1 (0.04)	1 (0.04)	1 (0.05)	1 (0.06)	0.267
DD,N(%)	0 (0)	0 (0)	1 (0.03)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	NA
Hyperdontia, N(%)	36 (1.30)	82 (1.89)	88 (2.58)	101 (2.75)	96 (2.64)	94 (2.69)	72 (2.68)	39 (1.73)	7 (0.38)	10 (0.61)	0.231
Hypodontia*, N(%)	2 (0.07)	6 (0.14)	1 (0.03)	1 (0.03)	9 (0.25)	11 (0.32)	2 (0.07)	4 (0.18)	7 (0.38)	4 (0.24)	0.254
Other , N(%)	0 (0)	0 (0)	1 (0.03)	2 (0.05)	4 (0.11)	1 (0.03)	0 (0)	2 (0.09)	2 (0.11)	0 (0)	0.297

Figure 3. Distribution of Dental Anomalies

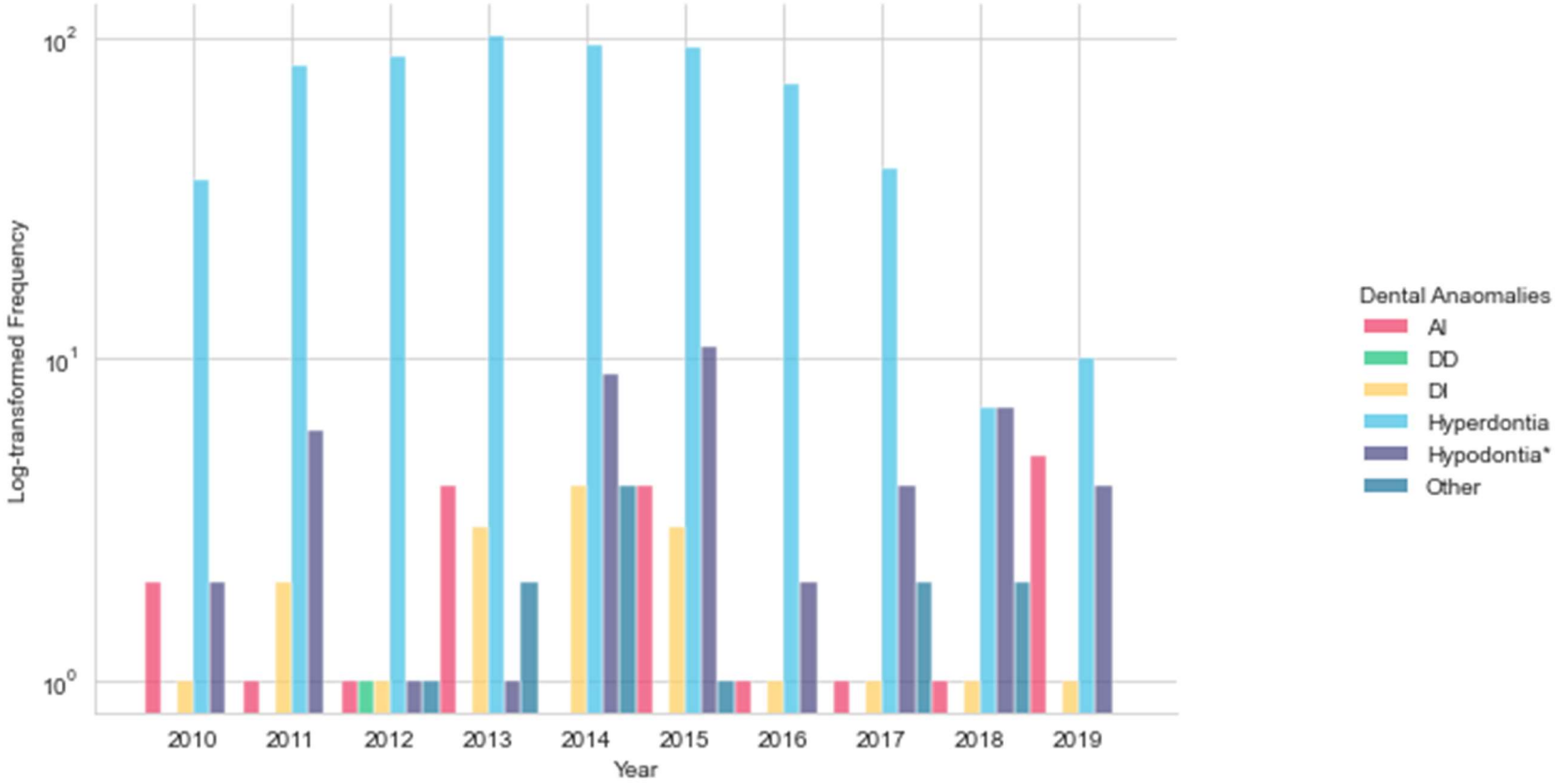

Table 3: Frequency of Dental Anomalies in the Permanent Dentition

Total new patient visits	2010 N=2770	2011 N=4350	2012 N=3411	2013 N=3676	2014 N=3631	2015 N=3488	2016 N=2686	2017 N=2252	2018 N=1863	2019 N=1650	P Value*
All anomalies, N(%)	16 (0.58)	34 (0.78)	34 (1.00)	37 (1.01)	34 (0.94)	42 (1.20)	16 (0.60)	9 (0.40)	3 (0.16)	4 (0.24)	0.231
AI, N(%)	1 (0.04)	1 (0.02)	0 (0)	2 (0.05)	0 (0)	2 (0.06)	1 (0.04)	1 (0.04)	0 (0)	3 (0.18)	0.281
DI, N(%)	1 (0.04)	0 (0)	1 (0.03)	0 (0)	1 (0.03)	1 (0.03)	0 (0)	0 (0)	0 (0)	0 (0)	0.333
Hyperdontia, N(%)	12 (0.43)	29 (0.67)	32 (0.94)	35 (0.95)	29 (0.80)	35 (1.00)	15 (0.56)	7 (0.31)	1 (0.05)	0 (0)	0.231
Hypodontia*, N(%)	2 (0.07)	4 (0.09)	1 (0.03)	0 (0)	3 (0.08)	4 (0.11)	0 (0)	0 (0)	2 (0.11)	1 (0.06)	0.267
Other, N(%)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.03)	0 (0)	0 (0)	1 (0.04)	0 (0)	0 (0)	NA
*chi-squared test was performed to estimate the association between years and anomalies											

Figure 4. Distribution of Dental Anomalies Among Permanent Dentition

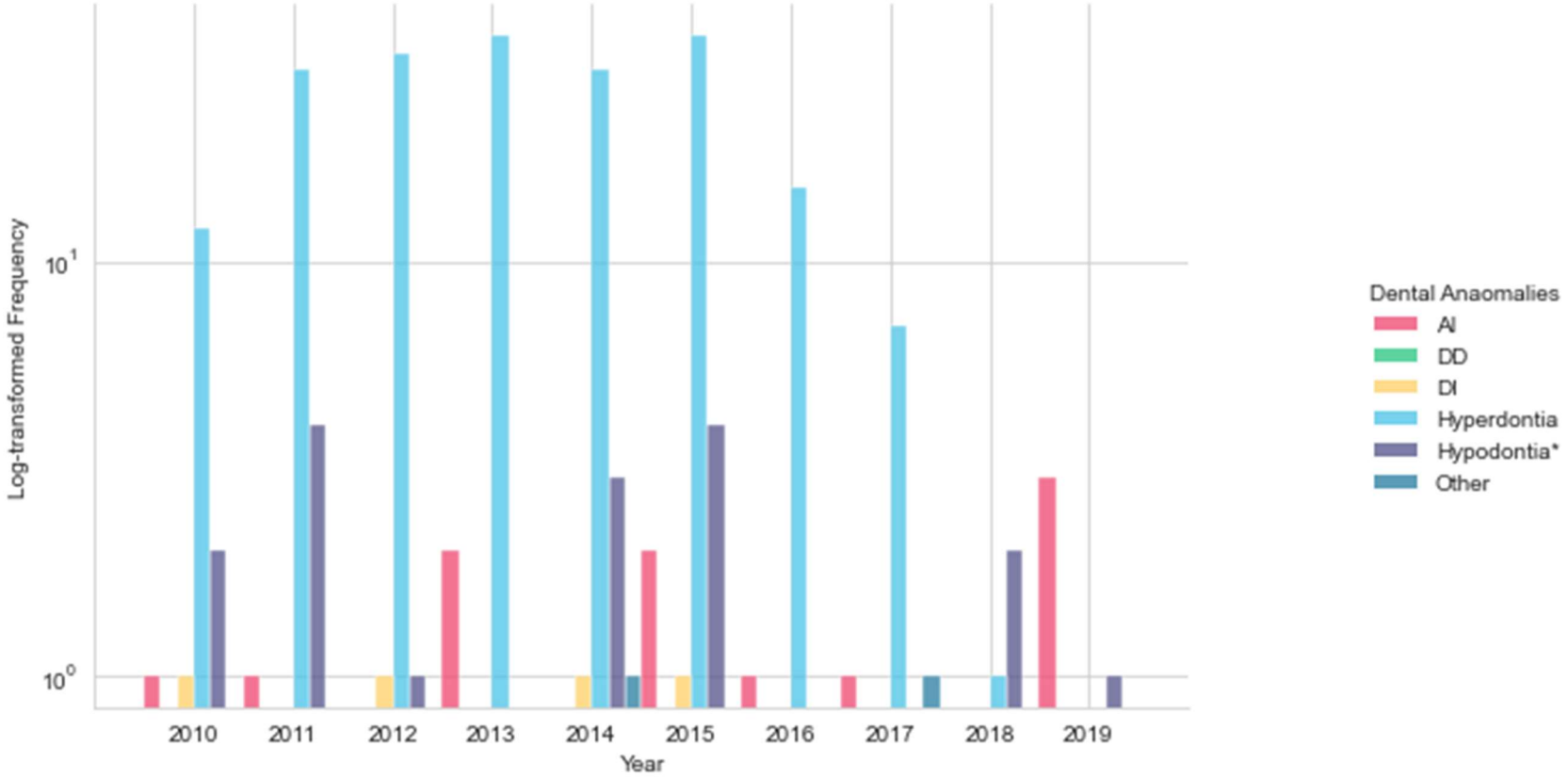

Table 4: Frequency of Dental Anomalies in the Primary Dentition

Total new patient visits	2010 N=2770	2011 N=4350	2012 N=3411	2013 N=3676	2014 N=3631	2015 N=3488	2016 N=2686	2017 N=2252	2018 N=1863	2019 N=1650	P Value*
All anomalies, N(%)	10 (0.36)	27 (0.62)	30 (0.85)	38 (0.98)	48 (1.27)	46 (1.29)	44 (1.64)	12 (0.53)	10 (0.48)	7 (0.42)	0.231
AI, N(%)	0 (0)	0 (0)	0 (0)	1 (0.03)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.350
DI, N(%)	0 (0)	0 (0)	0 (0)	3 (0.08)	2 (0.06)	2 (0.06)	1 (0.04)	1 (0.04)	1 (0.05)	0 (0)	0.297
DD, N(%)	0 (0)	0 (0)	1 (0.03)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0(0)	0 (0)	NA
Hyperdontia, N(%)	10 (0.36)	26 (0.60)	28 (0.82)	32 (0.87)	42 (1.16)	43 (1.23)	41 (1.53)	10 (0.44)	6 (0.32)	6 (0.36)	0.242
Hypodontia*, N(%)	0 (0)	1 (0.02)	0 (0)	0 (0)	2 (0.06)	0 (0)	2 (0.07)	1 (0.04)	2 (0.11)	1 (0.06)	0.281
Other, N(%)	0 (0)	0 (0)	1 (0.03)	2 (0.05)	2 (0.06)	1 (0.03)	0 (0)	0 (0)	1 (0.05)	0 (0)	0.314
*chi-squared test was performed to estimate the association between years and anomalies											

Figure 5. Distribution of Dental Anomalies Among Primary Dentition

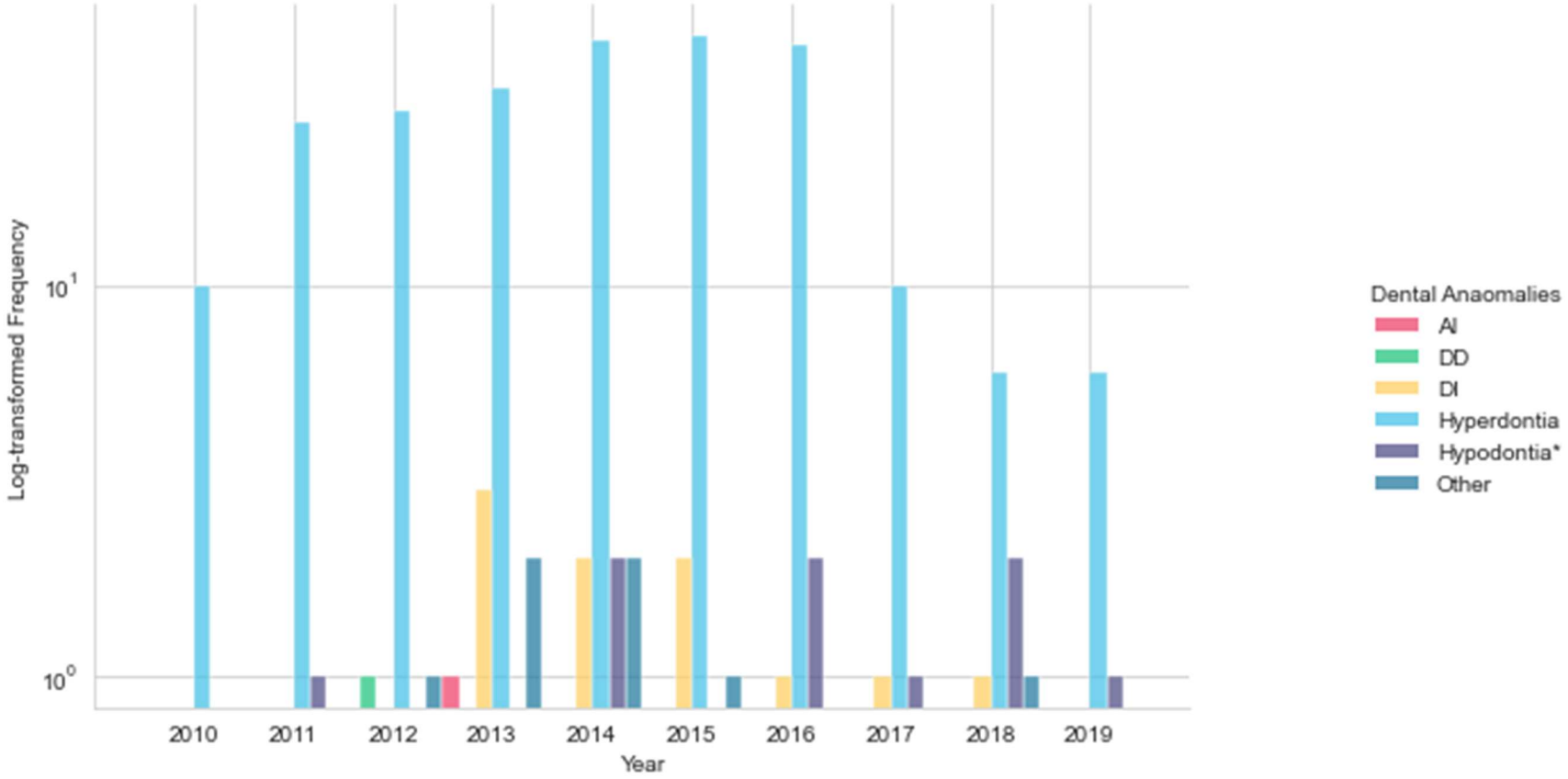

Table 5: Frequency of Dental Anomalies in the Mixed Dentition

Total new patient visits	2010 N=2770	2011 N=4350	2012 N=3411	2013 N=3676	2014 N=3631	2015 N=3488	2016 N=2686	2017 N=2252	2018 N=1863	2019 N=1650	P Value*
All anomalies, N(%)	15(0.54)	30(0.69)	28(0.82)	36(0.98)	31(0.85)	25(0.72)	16(0.60)	26(1.15)	5(0.27)	9(0.55)	0.231
AI, N(%)	1 (0.04)	0 (0)	1 (0.03)	1 (0.03)	0 (0)	2(0.06)	0 (0)	0 (0)	1 (0.05)	2 (0.12)	0.281
DI, N(%)	0 (0)	2 (0.05)	0 (0)	0 (0)	1 (0.03)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.06)	0.314
DD, N(%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	NA
Hyperdontia, N(%)	14 (0.50)	27 (0.62)	27 (0.79)	34 (0.92)	25 (0.69)	16 (0.46)	16 (0.60)	22 (0.98)	0 (0)	4 (0.24)	0.242
Hypodontia*, N(%)	0 (0)	1 (0.02)	0 (0)	1 (0.03)	4 (0.11)	7 (0.20)	0 (0)	3 (0.13)	3 (0.16)	2 (0.12)	0.254
Other, N(%)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.03)	0 (0)	0 (0)	1 (0.04)	1 (0.05)	0 (0)	0.314
*chi-squared test was performed to estimate the association between years and anomalies											

Figure 6. Distribution of Dental Anomalies Among Mixed Dentition

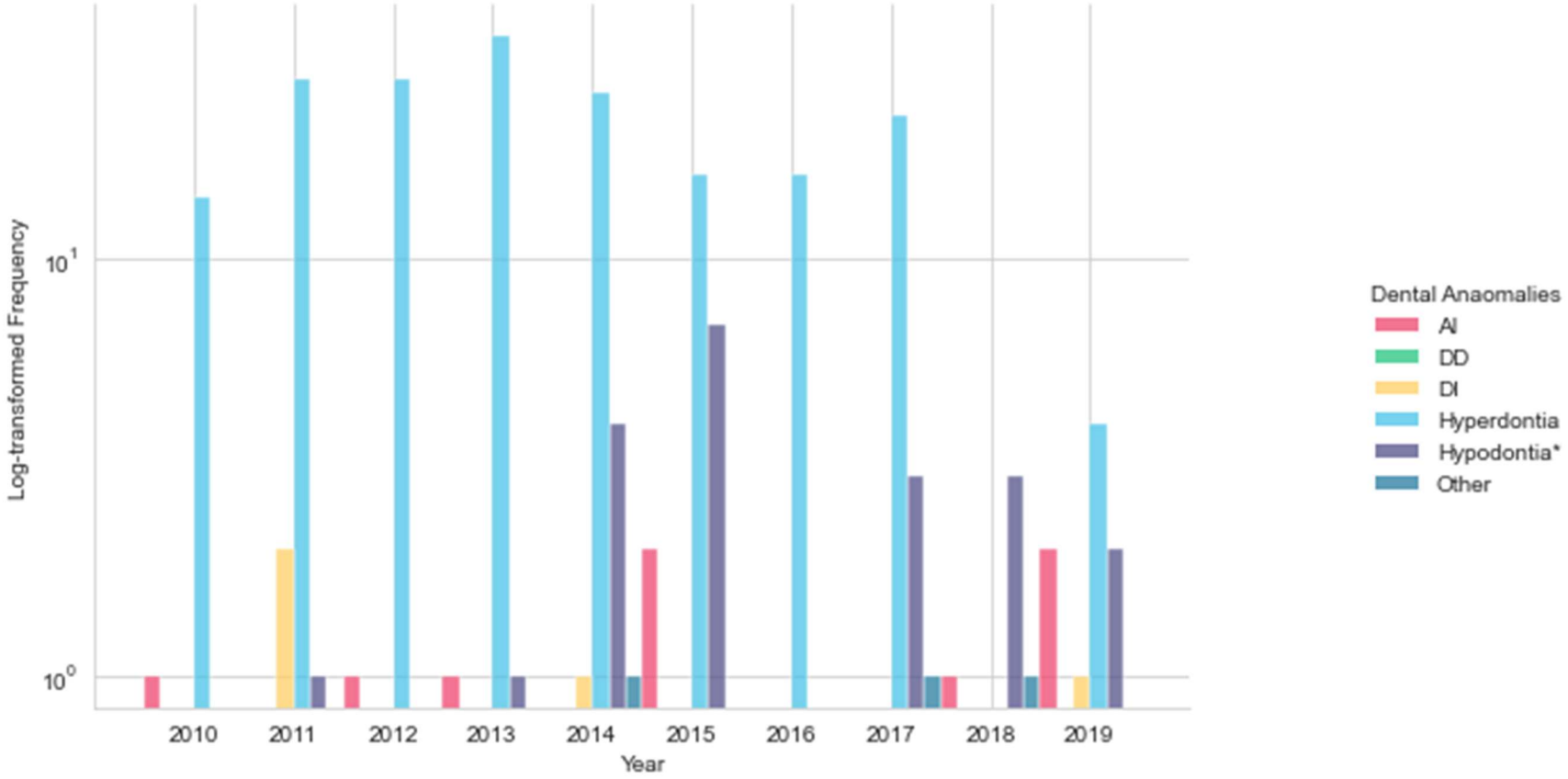

Table 6: Unadjusted and Adjusted Associations Between all Dental Anomalies and Insurance Status

Dental Anomalies	Unadjusted odds ratios (95% CI)	P Value	Adjusted odds* ratios risk (95% CI)	P Value
Insurance Status				
Medicaid	ref		Ref	
Self-Pay	13.67 (4.72-39.57)	<0.001	0.13 (0.03-0.66)	0.014
Other Insurance	0.46 (0.37-0.59)	<0.001	0.33 (0.17-0.63)	0.001
Sex				
Female	ref		ref	
Male	1.55 (1.30-1.85)	<0.001	1.17 (0.77-1.79)	0.467
Dentition				
Primary Dentition	ref		ref	
Mixed Dentition 6-11	1.46 (1.18-1.80)	0.001	1.35 (0.79-2.31)	0.277
Permanent Dentition 12+	0.94 (0.77-1.16)	0.582	1.18 (0.72-1.94)	0.509
Syndrome				
Yes	ref		ref	
No	1.96 (0.96-4.03)	0.066	0.90 (0.23-3.51)	0.875

*adjusted by group

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