ORIGINAL ARTICLE

Smile Stories: Investigating Pediatric Dental Anomalies a Cross-Sectional Study

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ABSTRACT

Objective: Determination of the frequency and distribution of dental anomalies across different age groups and gender within the pediatric population.

Study Design: Cross-sectional observational study.

Place and Duration of Study: Tertiary care hospitals of Karachi from 1st February 2023 to 15th December 2023.

Materials and Methods: After obtaining informed verbal consent via the individual, his or her parent, or legal guardian, demographics and medical records were entered onto a predesigned proforma that contained all dental anomalies details of the pediatric population which were diagnosed by clinical interpretations. Outcomes were analyzed using SPSS version 21.00.

Results: Among 278 participants 16.5%(n=46) of the population suffered from dental anomalies. Total males were 57.5%(n=160) and females were 42% (n=118) among which 56.5% (n=26) males and 5.2 %(n=20) females had dental anomalies. Most dental anomalies were observed at ages 6,7, and 9. The most prevalent dental abnormality in males was peg lateral incisor, followed by fusion and macrodontia, but in females, it was peg lateral incisor, fusion, and hypodontia. Anomalies with a significant association with gender were hypodontia, macrodontia, fusion/gemination, and peg lateral having p-values of 0.03, 0.04, 0.02, and 0.05 respectively. Most common abnormalities detected at ages of 12 years, and 11 years, were peg laterals, fusion/germination, and hypodntia, with p-values of 0.04 and 0.03, respectively.

Conclusion: Peg lateral incisor was the most common dental abnormality among the local pediatric population of Karachi, Pakistan. Dental abnormalities were more common in men, and they most often occurred during the mixed dentition phase.

Key Words: *Dental Anomalies, Hypodontia, Dentition, Mixed, Oral Health, Pediatric Dentistry.*

Introduction

Teeth are an intricate component of the body of an individual which has complex and difficult growth patterns. The complete growth of the teeth depends upon a complicated reciprocal relationship between dental epithelium and the essential ectomesenchyme.[1] Relationship is mediated by a complicated network of chemicals, receptors, and transcript regulatory mechanisms.[2]

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Received: March 12, 2024 ; Revised: November 23, 2024
Accepted: November 26, 2024

An anomaly is any abnormality that differs from the normal. A developmental anomaly is a defect that develops when a tooth structure is being formed and developed.[3] Oral anomalies are caused by variances in tissues of dental hard and soft tissues, which can be caused by enamel, dentin, or cementum. Anomalies might be significant abnormalities or minor aberrations. They can be induced by a variety of factors or by a single tiny change in the environment.[4] Some anomalies are caused by internal factors such as inheritance, metabolic malfunction, or mutations, while others are caused by external factors such as corporal or biological damage, biological mediators, dietary deficiencies, stress, habits, or environmental circumstances. These abnormalities are caused by both intrinsic and external variables. [5] These anomalies may be heredity, congenital, and acquired. Hereditary refers to a disorder that arises as a result of an individual's hereditary makeup. Congenital refers to a condition that develops at or before birth. A congenital disease is occasionally caused by inheritance, while a

hereditary ailment may not become apparent until many years after birth. [6] A family inclination is sometimes used to describe a disease that has some indication of a hereditary tendency but is inconclusive. During the dental examination of a child, complete oral hygiene along with examination of bones, mucosa, and other abnormalities was performed.[7]

The dental anomalies' aberrations might be a single defect or part of a larger grouping of disorders. Detection of dental anomalies is very important. Dental anomalies are less common than other common oral diseases and disorders, such as dental caries and periodontal disease, but the management and therapy are sometimes challenging and complicated. Such diseases may lead to malocclusion, and cosmetic problems, and render root canal or tooth extraction difficult.[8] As the presence of the abnormalities has an impact on the aesthetics of the tooth, in addition, they make different dental treatments difficult. For example, the presence of peg laterals involves management involving multiple specialties orthodontics, restorative dentistry, etc. Dental malformations can have a big influence on how pediatric kids get dental care, including how complicated it is. Supernumerary teeth, hypodontia (missing teeth), and enamel abnormalities are examples of anomalies that frequently need unique treatment regimens distinct from those used in routine dentistry. If left untreated, these disorders can make orthodontic procedures more difficult, complicate restorative procedures, and increase the risk of tooth cavities or periodontal problems. In addition, irregularities such as malocclusions or misaligned teeth may need lengthy orthodontic treatment, sometimes including the cooperation of several dental professionals to guarantee the best possible results for the patient.[9]

Similarly, Structural anomalies such as dilacerations, taurodontism, fusion, germination, and dens invagination can influence the root canal system as well as the person's appearance.[10] As a result, efficient endodontic treatment requires careful and specific consideration of their unique structure. Abnormalities in the quantity and position of teeth in the jaws are linked to cosmetic and occlusion problems. The prevalence of peg-shaped lateral incisors varies greatly between racial/ethnic groups, providing support to the hypothesis that genetics play an important part in the condition's development. In a Minnesota study, the incidence of peg-shaped lateral incisors was shown to be 1.6% among other races and 7.5% among Asians.[11]

Data on dental anomalies is useful when dealing with therapeutic and ethnographic patient care. The frequency and degree of manifestation of abnormalities may provide valuable information for phylogenic and genetic investigations, as well as aid in comprehending variances within and across populations.[12] There have been scant studies available to determine the prevalence of dental abnormalities among pediatric patients coming to tertiary care facilities in Pakistan and Karachi.

Dental abnormalities that damage the enamel and dentin of teeth can have a serious negative effect on children's oral health and quality of life. The frequency and distribution of congenital abnormalities among pediatric patients in Karachi have not been thoroughly investigated, especially about age and gender. Comprehending these variables is essential for formulating focused preventative and therapeutic approaches that address the unique requirements of various populations. Healthcare practitioners in Karachi can enhance pediatric oral health outcomes by implementing tailored therapies based on the incidence of dental abnormalities observed in children of different ages and genders.

Therefore, the purpose of our study was to determine the frequency and distribution of dental anomalies across different age groups and genders within the pediatric population.

Materials and Methods

The cross-sectional observational study was an investigation conducted in Karachi spanning 1st February 2023 to 15th December 2023. Permission was granted from the institutional review board of the institution (KMDC/COD/ ESRC/0640/21). Children of both genders between 2-12 years of age, having deciduous or mixed dentition were included in the study. The exclusion criteria were patient or the patients. guardian not given consent. and noncooperative patients. Non-probability: Convenience sampling was used for the data collection. The sample size of 278 participants was

https://doi.org/10.57234/jiimc.december24.2021

computed using Open Epi software with a population size of 1000 [13], a 95% confidence level, a 5% margin of error, and a 50% response distribution.

After receiving informed verbal consent from the patient, his or her parents, or legal guardian, demographics and a detailed medical history were documented on a proforma. The proforma includes questions related to basic demographics and findings related to dental anomalies. Two trained dentists performed the dental examination. The clinical examination was conducted under adequate light to determine the presence of abnormalities or dental defects. All teeth were assessed in terms of abnormality of size, shape, number, and structure. For intra-observer reliability, the same observer reassessed a subset of patients at different times to check for consistency in diagnosis. For inter-observer reliability, a trained senior dentist assessed the same patients independently, and their results were compared.

Data was entered and evaluated through SPSS 22:00. Descriptive and inferential statistics were performed Qualitative variables like gender were calculated as frequencies, and percentages. The quantitative variables like age and presence of dental hard tissue anomalies were calculated as mean + standard deviation. The mean scores for the detection of dental hard tissue abnormalities were compared across gender and age. Inferential statistics were judged significant with a p-value < 0.05 by using chi-square statistics.

Results

It is evident from the results that in a sample of 278 participants 16.5%(n=46) of the population suffered from dental anomalies. Total males were 57.5%(n=160) and females were 42% (n=118) among which 56.5% (n=26) males and 5.2 %(n=20) females had dental anomalies. (Figure - I)

The dental anomaly most seen in males was peg lateral incisor followed by fusion and macrodontia while in females it was peg lateral incisor, fusion, and hypodontia respectively. Table I. The table also shows significant p-values for dental anomalies and gender. The anomalies that showed a significant relationship with gender were hypodontia, macrodontia, fusion/gemination, and peg lateral having p-values of 0.03, 0.04, 0.02, and 0.05 respectively.

Concerning age, the most frequent anomalies were found at the age of 12 years, 11 years, and 02 years, and these were peg laterals, fusion/ germination, and hypodontia respectively. (table- II) significant association of age with dental anomaly was observed at the age of 11 and 12 years with peg lateral and Supernumerary teeth (paramolar) was 0.04 and 0.03 respectively.

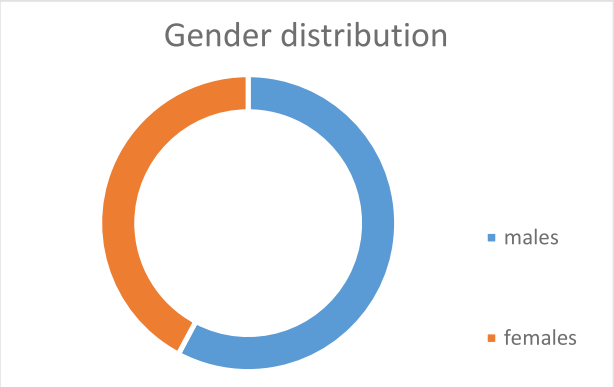

Figure 1: Percentage Distribution of Gender Suffering from Dental Anomalies

Table I: Gender Association with Incidence of Dental Anomalies

Anomalies	Male(%)	Female (%)	P- value
Hypodontia	11.5 (3)	15 (3)	0.03*
Microdontia	11.5(3)	0	0.67
Macrodontia	15.3 (4)	0	0.04*
Amelogenesis Imperfecta	0.4(1)	0	0.09
Fusion/Gemination	23 (6)	35 (7)	0.02*
Peg Lateral	26.9 (7)	45 (9)	0.05*
Talon Cusp	0	0	0.89
Supernumerary teeth(mesiodens)	3.8 (1)	5 (1)	0.65
Supernumerary teeth(paramolar)	3.8 (1)	0	0.07

*p- value <0.05

Table II: Age Association with Incidence of Dental Anomalies

Anomalies	Age(years)	Percentage(%)	P value
Hypodontia	2	8.7	0.06
Microdontia	8	2.8	0.68
Macrodontia	6	2.3	0.91
Amelogenesis Imperfecta	9	2.1	0.09
Fusion/Gemination	11	13.1	0.45
Peg Lateral	12	15.8	0.03*
Supernumerary teeth (mesiodens)	8	2.6	0.67
Supernumerary teeth (paramolar)	11	5.6	0.04*

*p- value <0.05

Discussion

Children in the pediatric population of Pakistan, particularly those attending tertiary care dental clinics or hospitals. Comparison between children with dental anomalies and those without, or comparison of prevalence rates across different regions or demographic groups. Screening and diagnosis of dental anomalies, including early detection programs helps to improve early detection and treatment of dental anomalies, leading to better oral health outcomes and prevention of long-term complications. The time frame for assessing the effectiveness of interventions or screening programs typically ranges from initial diagnosis to follow-up over months or years. Dental anomalies are abnormalities in tooth development that can impact the quantity, size, form, and structure of teeth. These abnormalities are becoming more and more concerning for the pediatric population in Pakistan since they may affect dental health and general well-being. To minimize long-term consequences and enhance quality of life, early identification and management are critical, and this requires an understanding of the incidence and kinds of dental abnormalities in children.

Males were more likely to suffer from dental anomalies than females. This is in contrast with research published in 2021, which found that the frequency of various dental abnormalities was equal in males (36.5%) and girls (35.5%).[11] Although the dental anomalies in males were less as compared to females in a study conducted in Serbian Orthodontic patients.[14]

The highest number of diseases were found at the age of seven. This might be because children are more likely to attend the hospital for systemic illnesses or dental issues caused by mixed dentition. In 2020, a survey of the Greek orthodontic population found that the average age of reporting tooth anomalies was 11.76 years. [13] This might be attributed to greater children's understanding of puberty at the rising age and prominence of facial characteristics, as well as higher awareness of patients and their parents' aesthetics.

The most common anomaly found in both males and females was peg lateral incisor. However, a study conducted in Saudi Patients reported that peg lateral incisors report about 8.4% and only hypodontia shows statistically significant differences among genders.[15]

However, in a study published in 2020 by Alhabib S, the Saudi Arabian area has the highest frequency of peg laterals, followed by Egypt. Except for the groups in Pakistan and the Philippines, males were more likely than females to have peg laterals across all geographic areas. When comparing the frequency of peg laterals in the Saudi population, it was shown that the right lateral incisor had more cases than the left.[16]

Fusion has been encountered as the second most common anomaly reported by the participants. Two different morphological dental abnormalities are referred to as fusion and gemination. The number of teeth in the mouth can be used to clinically determine the difference between fusion and gemination. However, fusion can also happen between two normal teeth or between a normal tooth and a supernumerary tooth. Gemination often provides a single root and a root canal with two crowns that are either totally or partially divided. [17]

A systematic review conducted by Akay G in 2020 revealed that the prevalence of fusion and germination in permanent dentition is high and dentists should know the difference between the two dental anomalies.[18]

Macrodontia and hypodontia were reported as the third most common anomalies found in males and females respectively. This is in consistent with the studies published in a retrospective study in Turkey, in 2020. They identified hypodontia and hyperdontia, together with taurodontism, microdontia, and macrodontia in their study population.[19]

The study's weaknesses include limited sample size, the fact that all of the participants were recruited from the same teaching hospital and the use of a single clinical examination for analysis. The study did not examine the relationship between the various anomalies, and their association with syndromic patients[20] which is considered a drawback. The current study neglected to look at the distribution and relationship of dental malformations to their successors, which may be considered a study drawback.

Knowledge about dental anomalies is essential as it requires a far more comprehensive treatment

https://doi.org/10.57234/jiimc.december24.2021

approach. To establish the optimal treatment choice, it is recommended that each case should be studied using an interdisciplinary approach. This assists in long-term and successful treatment planning according to a child's particular needs. Furthermore, research into the prevalence, causes, and treatment of dental anomalies in Pakistan is imperative for developing tailored interventions and improving oral healthcare infrastructure. Dental anomalies are common among syndromic patients, [21] therefore collaboration between healthcare professionals, policymakers, and communities is essential in fostering a proactive approach to mitigate the burden of dental anomalies, especially among syndromic patients, and promote oral health equity across the nation.

Recommendations include enhancing dental education programs, implementing community-based oral health initiatives, and investing in infrastructure to expand access to affordable and quality dental services, particularly in underserved areas. Recommendations also entail bolstering public education on oral hygiene, expanding dental infrastructure, and implementing policies to ensure equitable access to affordable dental services nationwide. Addressing these anomalies requires comprehensive strategies encompassing education, prevention, and accessible dental healthcare services to ensure optimal oral health outcomes for the population.

Conclusion

Peg lateral incisor was the most common dental abnormality among the local pediatric population of Karachi, Pakistan. Dental abnormalities were more common in men, and they most often occurred during the mixed dentition phase.

Conflict of Interest: None

Funding Disclosure: None

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors have declared no specific grant for this research from any funding agency in public, commercial or nonprofit sector.

DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.