International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html

Assessing The Prevalence of Developmental Dental Anomalies Using OPG in a Rural Hospital in Chennai -A Retrospective Study

*Tamil Selvi Gopinath. R *, Subha. M, Sarumathi. T, Hema Malini. A, Kavitha. M, Niveditha. B*

Madha Dental College and Hospital, Kundrathur, Chennai 600069, India.

Abstract

Developmental dental anomalies are an important category of dental stomatology and are frequently observed in routine oral health examination. Only clinical examination without radiographic study tends to underestimate the prevalence of these anomalies. The purpose of the present study is to estimate the frequency of occurrence of dental anomalies using Orthopantomogram (OPG) in the Chennai population. Developmental anomalies can result in multiple complications and their early detection is necessary to prevent permanent changes in the dentition and stomatognathic system. The early detection also offers preventive modality in treatment. A retrospective study of 4502 digital panoramic radiographs of patients age group 20-40 years collected from database of department of oral medicine and radiology, of our institution. These OPG were evaluated and 12 dental anomalies were assessed, which are third molar impaction, impaction other than third molars, dilacerations, taurodontism, supernumerary teeth, microdontia, hypodontia, dens in dente, dens evaginatus, fusion, Talon's cusp, and macrodontia. Other anomalies like odontomas, hypercementosis, transposition or any other unusual finding were commonly grouped as "others". The results showed that the third molar impaction was most commonly found with a prevalence percentage of 28.05% (N=1263), followed by dilaceration (18. 06%, N=813), impaction other than third molars (8=31%, N =374), Microdontia (6.51%, N=293), supernumerary teeth (5.51%, N =248) and Taurodontism (2.89%, N=130). No dental anomalies were seen in 14.46% (N=651) of the study sample. The less prevalent anomalies were Talon's cusp (4.49%, N=202), dens in dente (3.49%, N=157), Macrodontia (2.93%, N=132), fusion (1.87%, N=84), dens evaginatus (1.80%, N=81), hypodontia (1.33%, N=60), and other dental anomalies (0.31%, N=1). The findings of the present study can be considered as representative of Chennai population. Multicentric studies in different geographical areas is recommended so that the incidence and degree of expression in different population groups can provide important information for genetic studies and helps to understand variations within and between different population groups.

Keywords: Developmental Anomalies of Dentition, Dental anomalies, OPG, Orthopanthomogram, Prevalence

Full length article **Corresponding Author*, e-mail: *drtamilselvigopinath@gmail.com*

1. Introduction

Dental anomalies as its name suggests, these are anomalies of dental structures. The suggested etiology of these anomalies is mainly genetic factors. Other additional reasons are traumatic events during prenatal and postnatal development periods, environmental and pathological factors. These disturbances during tooth formation causes alteration in tooth number, shape, structure, and position [1]. Dental anomalies are relatively common and frequently observed in the routine oral health examination. However, only clinical examinations without radiographic study tend to underestimate the prevalence of the anomalies. The global prevalence of these anomalies ranges from 12% and 45% among the different populations [2]. Genetics, ethnic background, age, gender and other systemic diseases are known to play a major role in the prevalence of dental anomalies. Understanding the prevalence is crucial for the early diagnosis and proper treatment planning. The degree of expression in different population groups can provide important information for phylogenic and genetic studies, which inturn help in understanding the variations within and between the different populations. [3] The aim of the present study is to estimate the prevalence of dental anomalies using digital OPG in the rural population in a dental hospital in Chennai.

2. Materials and methods

In this retrospective study, 4502 digital panoramic radiographs of patients aged 20-40 years. The digital OPG were collected from the Department of Oral Medicine and Radiology, Madha Dental College between September 2020 to December 2022. Ethical committee clearance was obtained from the concerned authority. All the OPG were taken by PLANMECA PROMAX machine with tube voltage of 66

kvp, tube current of 9 mAs, and exposure time of 17 secs. Individuals of the age group 20-40 years with no significant medical history were included. The inclusion criteria for the anomalies were based on the descriptions presented by White and Pharoah. Individuals with a history of Maxillofacial trauma or surgery. Metabolic disorders affecting teeth and jaw bone formation, Craniofacial syndromes were excluded from the study. Radiographic images with deformations were also excluded. After the examination of the patient records and OPGs, patients who exhibited any pathological conditions, trauma or fracture of the jaw that might have affected the normal growth of permanent dentition or any hereditary diseases or syndromes were excluded from the study. Demographical data, (gender, age, address, medical history at the time of taking OPG) and dental records were also collected from the database records. The OPGs and the dental records of the study sample were analyzed. The study sample was grouped into two based on age; 20-29 years and 30-40 years. A single examiner conducted evaluation to avoid variation in examination criteria due to difference in personal interpretation. A total of 12 dental anomalies were assessed, which are third molar impaction, impaction other than third molars, dilacerations, taurodontism, supernumerary teeth, microdontia, hypodontia, dens in dente, dens evaginatus, fusion, Talon's cusp, and macrodontia. Other anomalies like odontomas, hypercementosis, transposition or any other unusual finding were commonly grouped as "others". Patients who exhibited hypodontia, were correlated with dental records for history of dental extraction. The data was analyzed using Statistical package software, version 20 (SPSS 20.0). The mean Prevalence percentage was calculated for all dental anomalies. In addition, Standard chi-squared test was used for all comparisons of all dental anomalies in relation to gender and two age group. P value was set at 0.05.

3. Results and Discussions

In the total sample of 4502 digital OPG, 1897 (42.1%) were males and 2605 (57.9%) were females (Table 1). In the study sample, 55.4% (N=2496) belonged to 20-29 years age group and 44.5% (N=2006) belonged to 30-40 years age group (Table 2). Third molar impaction was most found with a prevalence percentage of 28.05% (N=1263), followed by dilaceration (18. 06%, N=813), impaction other than third molars (8=31%, N =374), Microdontia (6.51%, N=293), Supernumerary teeth (5.51%, N =248) and Taurodontism (2.89%, N=130). No dental anomalies were seen in 14.46% (N=651) of the study sample. The less prevalent anomalies were Talon's cusp (4.49%, N=202), dens in dente (3.49%, N=157), Macrodontia (2.93%, N=132), fusion (1.87%, N=84), dens evaginatus (1.80%, N=81), hypodontia (1.33%, N=60), and other dental anomalies (0.31%, N=1). (Graph-1). On assessing the Prevalence of dental anomalies based on gender, females (N=2605: 57.9%) presented with higher prevalence of dental anomalies compared to males and was statistically significant (P=0.001). Dental anomalies such as third molar impaction, impaction other than third molars, dilacerations, supernumerary teeth. Hypodontia, dens in dente, dens evaginatus and others were found to be highly prevalent in females than males. In contrast, Taurodontism. Fusion, and Macrodontia were highly prevalent in males compared to females. OPGs with no anomalies were found to be high in male study samples (Table-3). On assessing the prevalence of dental anomalies based on age, a statistically significant result was obtained (P=0.001). A higher prevalence of dental anomalies was seen in 20-29 years age group compared to 30-40 years age group. Third molar impaction, supernumerary teeth, hypodontia, dens in dente, dens evaginatus and Macrodontia were more prevalent in 20-29 years age group. Impaction other than third molars, dilacerations, taurodontism, microdontia, Talon's cusp and fusion were more prevalent in 30-40 years age. (Table-4)

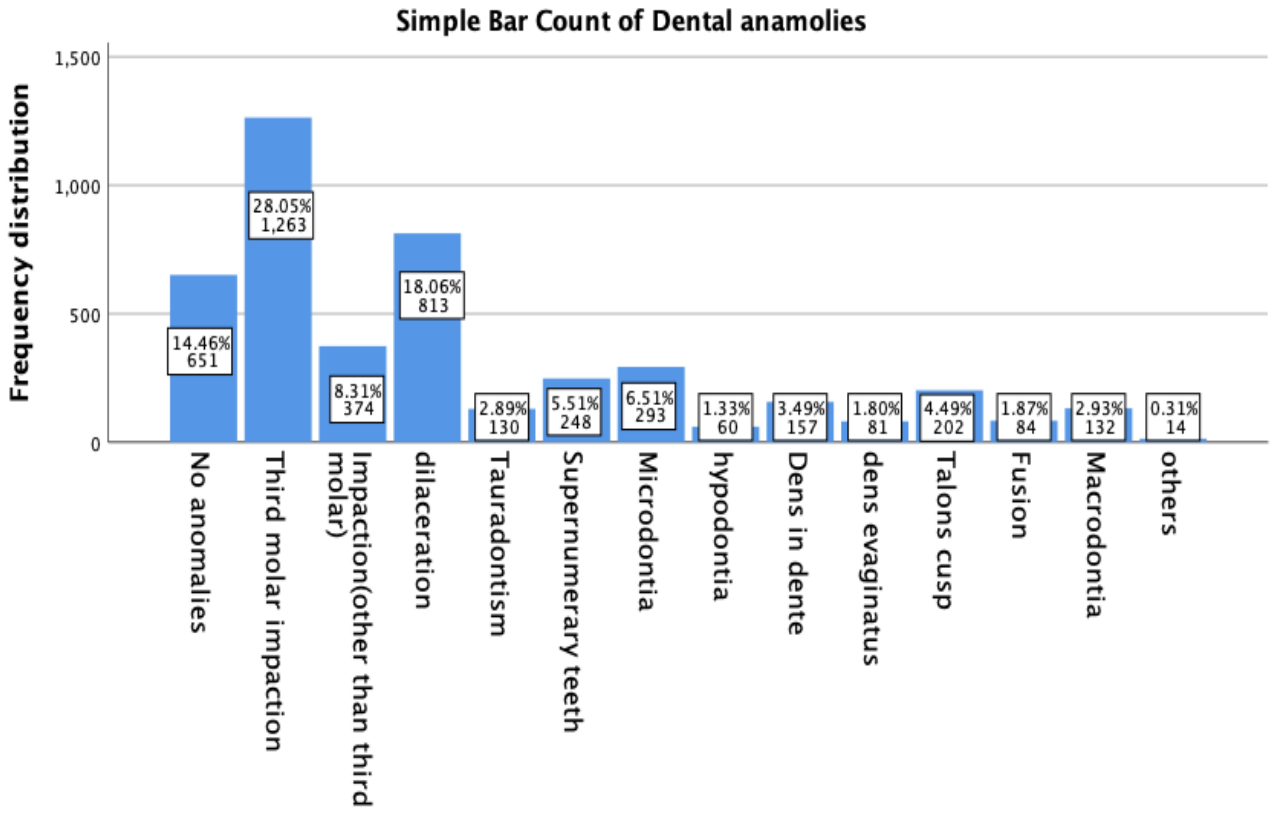
Morphological dental anomalies are relatively common in the world. There have been several studies investigating the prevalence of morphological and growth dental anomalies in the world. Different prevalences were reported in different ethnic groups. The early recognition of dental anomalies is important from the therapeutic point of view. In addition, there are many complications with these anomalies and early detection of them is most important if such complications are to be avoided. Ardakani et al; 2004 conducted a retrospective study, to determine the prevalence of developmental dental anomalies and gender differences of these anomalies in the Iran population. In a total of 480 OPGs evaluated, 40.8% of the patients had dental anomalies. The more common anomalies were Dilaceration (15%), impacted teeth (8.3%) and taurodontism (7.5%), and supernumerary teeth (3.5%). Macrodontia and fusion were detected in a few radiographs (0.2%). 49.1% of male patients had dental anomalies compared to 33.8% of females. Dilaceration, taurodontism, and supernumerary teeth were found to be more prevalent in men than women, whereas impacted teeth, microdontia, and germination were more frequent in women [11]. Family history of dental anomalies was positive in 34% of the cases. Similar to the present study, the prevalence of anomalies is more frequent in patients younger than 20 years old. This may be due to the increased prevalence of third molar impaction in the younger age group. Khalid A Aldhorae et al, 2019 conducted a retrospective study in Yamen population. A sample of 1675 digital OPGs were analyzed. The most frequent anomaly among the subjects were impaction (14%–47%), macrodontia (11.8%), microdontia (9.23%), hypodontia (7.48%), dilaceration (5.07%), dens evaginatus (1.91%), dens invaginatus (1.58%), hyperdontia (0.99%), and taurodontism (0.91%) The distribution of anomalies was 30.61% among the orthodontic patients and 22.96% through non-orthodontic patients [2]. Similar to the present study a significant difference in gender was found. Similar to the present study, in studies conducted by Herrera-Atochebet al [8], Khalid A Aldhorae et al, Laganà et al, and Ardakani et al the prevalence of third molar impaction is found to be highest. Liu et al (1995) studied Taiwanese patients. The results showed that the prevalence of supernumerary teeth in men was three times more than that in women. However, in contrast to the present study, the prevalence of dental anomalies was distributed equally in both sexes in study conducted by Vani et al. Mavrodisz et al (2003) reported the prevalence of 2.5% for talon cusp in patients aged between 7 and 18 years; the prevalence in men was higher than that in women.

Table 1: Age distribution among study sample

Gender	Frequency (n)	Percentage (%)
Male	1897	42.1
Female	2605	57.9
Total	4502	100.0

Table 2: Gender distribution among study sample

AGE GROUPS	FREQUENCY (N)	PERCENTAGE (%)
20-29	2496	55.4
30-40	2006	44.5
Total	4502	100.0



Graph 1: Frequency of distribution of dental anomalies

Table 3: Prevalence of dental anomalies based on gender

DENTAL ANOMALIES	MALE N (%)	FEMALE N (%)	TOTAL N (%)
No anomalies	345 (7.7%)	306 (6.8%)	651(14.5%)
Third molar impaction	589 (13.1%)	674 (15.0%)	1263(28.1%)
Impaction (other than third molar)	135(3.0%)	239(5.3%)	374(8.3%)
Dilaceration	319(7.1%)	494(11.0%)	813(18.1%)
Taurodontism	75(1.7%)	55(1.2%)	130(2.9%)
Supernumerary teeth	44(1.0%)	204(4.5%)	248(5.5%)
Microdontia	76(1.7%)	217(4.8%)	293(6.5%)
Hypodontia	3(0.1%)	57(1.3%)	60(1.3%)
Dens in dente	63(1.4%)	94(2.1%)	157(3.5%)
Dens evaginatus	26(0.6%)	55(1.2%)	81(1.8%)
Talon's cusp	80(1.8%)	122(2.7%)	202(4.5%)
Fusion	58(1.3%)	26(0.6%)	84(1.9%)
Macrodontia	78(1.7%)	54(1.2%)	132(2.9%)
Others	6(0.1%)	8(0.2%)	14(0.3%)
Total	1897(42.1%)	2605(57.9%)	4502(100.0%)
Chi-square test value	233.92		
P value	0.001**		

Table 4: Prevalence of dental anomalies based on age

DENTAL ANOMALIES	20-29 YEARS N (%)	30-40 YEARS N (%)	TOTAL N (%)
No anomalies	391(8.7%)	260(5.8%)	651(14.5%)
Third molar impaction	885(19.7%)	378(8.4%)	1263(28.1%)
Impaction (other than third molar)	186(4.1%)	188(4.2%)	374(8.3%)
Dilaceration	332(7.4%)	481(10.7%)	813(18.1%)
Tauradontism	36(0.8%)	94(2.1%)	130(2.9%)
Supernumerary teeth	175(3.9%)	73(1.6%)	248(5.5%)
Microdontia	102(2.3%)	191(4.2%)	293(6.5%)
hypodontia	35(0.8%)	25(0.6%)	60(1.3%)
Dens in dente	110(2.4%)	47(1.0%)	157(3.5%)
Dens evaginatus	78(1.7%)	3(0.1%)	81(1.8%)
Talon's cusp	25(0.6%)	177(3.9%)	202(4.5%)
Fusion	27(0.6%)	57(1.3%)	84(1.9%)
Macrodontia	107(2.4%)	25(0.6%)	132(2.9%)
others	7(0.2%)	7(0.2%)	14(0.3%)
Total	2496(55.4%)	2006(44.6%)	4502(100.0%)
Chi-square test value	578.00		
P value	0.001**		

It was concluded that early diagnosis of this anomaly is important for successful treatment.

4. Conclusions

The findings of the present study can be considered as representative of rural Chennai population. The data from this

study and comparison with other studies showed that dental anomalies occur with different frequencies around the world. The dissimilarities could be attributed to the differences in sample selection, number of samples, method and place of study, area of the patient, as well as racial and genetic differences. Understanding the general patterns and variations within and between different population groups are necessary to provide early diagnosis, prevention of complications and better treatment outcome. Multicentric studies in different geographical areas is recommended so that the incidence and degree of expression in different population groups can provide important information for genetic studies.

References

[1] B.W. Neville, D.D. Damm, C.M. Allen, et al. Oral and maxillofacial pathology. 16th ed., St. Louis MO: Elsevier; 2016

[2] K.A. Aldhorae, Z.M. Altawili, A. Assiry, B. Alqadasi, K.A. Al-Jawfi, H. Hwaiti. (2019). Prevalence and distribution of dental anomalies among a sample of orthodontic and non-orthodontic patients: A retrospective study. Journal of International Oral Health. Volume: 11, Issue: 5 , Page : 309-317

[3] E.A. Saberi, S. Ebrahimipour (2016). Evaluation of developmental dental anomalies in digital panoramic radiographs in Southeast Iranian Population. Journal of International Society of Preventive and Community Dentistry, Jul-Aug;6 (4):291-5. Doi: 10.4103/2231-0762.186804.

[4] G. Laganà, N. Venza, A. Borzabadi-Farahani. (2017). Dental anomalies: Prevalence and associations between them in a large sample of non-orthodontic subjects, a cross-sectional study. BMC Oral Health. DOI: 10.1186/s12903-017-0352-y

[5] A. Jain, A. Saxena, S. Jain, A.P.S. Parihar, A. Rawat. (2021). Prevalence of Developmental Dental Anomalies of Number and Size in Indian Population According to Age and Gender. International journal of clinical Pediatric Dentistry. 2021 Jul-Aug;14(4):531-536. doi: 10.5005/jp-journals-10005-1980. PMID: 34824509; PMCID: PMC8585914.

[6] Goutham, Balasubramanya, Bhuyan, N C Lipsa, Sangamesh, Kundu, Madhurima Jha, Kunal & Behura, Shyam. (2017). Prevalence of Dental Anomalies in Odisha Population: A Panoramic Radiographic Study. Journal of Contemporary Dental Practice. 18. 549-553. 10.5005/jp-journals-10024-2082.

[7] J.R. Herrera-Atoche, N.A. Huerta-García, M. Escoffié-Ramírez, F.J. Aguilar-Pérez, F.J. Aguilar-Ayala, E.A. Lizarraga-Colomé, G.E. Colomé-Ruiz, I.D. Zúñiga-Herrera. (2022). Dental anomalies in cleft lip and palate: A case-control comparison of total and outside the cleft prevalence. Medicine (Baltimore). 2022 Aug 5;101(31):e29383. doi: 10.1097/MD.0000000000029383. PMID: 35945732; PMCID: PMC9351879.

[8] A.E. Ajao, Adeoye. (2019). Prevalence, risk factors and outcome of congenital anomalies among neonatal admissions in OGBOMOSO, Nigeria. BMC Pediatrics volume 19, Article number: 88 (2019) https://doi.org/10.1186/s12887-019-1471-1

[9] A.R. Afify, K.H. Zawawi. (2012). The prevalence of dental anomalies in the Western region of Saudi Arabia. ISRN Dentistry 2012. DOI: 10.5402/2012/837270

[10] A. Yamunadevi, M. Selvamani, V. Vinitha, R. Srivandhana, M. Balakrithiga, S. Prabhu, et al (2015). Clinical evaluation of nonsyndromic dental anomalies in Dravidian population: A cluster sample analysis. Journal of pharmacy and bioallied sciences, 2015;7; S499–503. doi: 10.4103/0975-7406.163517

[11] F.E. Ardakani, M. Sheikhha, H. Ahmadi. (2007). Prevalence of dental developmental anomalies: A radiographic study. Community Dent Health. 2007; 24:140–4.

[12] U. Thongudomporn, T.J. Freer. (1998). Prevalence of dental anomalies in orthodontic patients. Australian Dental Journal. 43:395–8. PMID: 9973708.

[13] B.J. Polder, M.A. Van't Hof, F.P. Van der Linden, A.M. Kuijpers-Jagtman. (2004). A meta-analysis of the prevalence of dental agenesis of permanent teeth. Community Dental Oral Epidemiolgy. 2004; 32:217–26. DOI: 10.1111/j.1600-0528.2004.00158.x