PREVALENCE OF INCIDENTAL FINDINGS IN PRETREATMENT DENTAL OPGs

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ABSTRACT

Background: Radiographs play a crucial role in orthodontic practice, aiding in the diagnosis, treatment planning, and monitoring of malocclusion.

Objective: The objective of our study was to determine the prevalence of incidental findings in pretreatment dental panoramic radiographs (OPGs).

Methods: The cross-sectional study was conducted at department of dentistry Niazi Medical & Dental College, Sargodha from 8 January 2021 to 8 May 2021 and included patients aged 18 years and above who underwent pretreatment dental OPGs for various dental indications, excluding those with a history of maxillofacial trauma or previous craniofacial surgery or those with incomplete or inadequate OPGs.

Two trained radiologists independently reviewed the OPGs to identify and classify incidental findings according to predefined criteria. Statistical analysis was performed using SPSS version 22.

Results: The mean age of patients was 33.2 ± 5.71 years. Gender distribution was 55.69% male and 42.30% female. The prevalence of incidental findings was 60%, with 78 patients having present findings. Notably, Talon's Cusp was the most prevalent anomaly (47.69%), followed by Dilaceration (19.23%) and Peg Laterals (11.53%). Less common anomalies included Localized Microdontia (6.92%), Taurodontism (9.38%), and Fusion (1.53%). In the Maxilla, there were 80 cases, accounting for 61.5% of the total occurrences. The Mandible exhibited 11 cases, representing 8.5%. Anomalies affecting both arches simultaneously were observed in 39 cases, comprising 30.0%.

Conclusion: Finally, the results of our work shown that 60% of the patients have experienced incidental findings in their OPGs taken before receiving treatment, while the most common

structures detected were the Talon's Cusp with a percentage of 47.69%. Besides, our results also pointed out that there was a higher frequency of dental anomalies in the maxilla as an overall prevalence (61.5%) compared to the prevalence of the mandible (8.5%); therefore, oral assessment and possible diagnosing have confirmed the need for thorough investigations to treat dental anomalies

Keywords: Incidental findings, Mandible, Maxilla, OPGs, Prevalence, Radiographs

INTRODUCTION

Abnormality that may not be evident clinically but appear on a radiograph are considered incidental findings of radiographic abnormalities and these are the abnormalities for which the radiographs were taken to reveal those that are associated with the main complaint of the patient. As for the properties of the OPGs modality, it used to be widely utilised in the pretreatment evaluation in dental imaging, the OPG provides a panoramic examination of the general extraoral oral and maxillofacial region [1,2]. This is where PAN method takes a full anterior-posterior radiograph of the teeth, jaws, the entire temporomandibular joint and the associated structures. OPGs are particularly useful in assessing some features of the dentition include the shape of the teeth, the phase and stage of eruption, and positional interrelationship of the teeth in the jaws and Dental Occlusion [3]. Dental anomalies can be categorized in the primary and permanent dentitions; they are observed frequently with an incidence between 9% and %. 7% in Malaysian studies to as high as 81.The above statistics were filtered after looking into the credibility and relevance of the sources used in the respective studies. In Italian investigations, Miglioretti points to a 3% rate of incorrect diagnoses. In particular, the Pakistani population and the information from the epidemiological studies states that 60. Community dental prevalence of caries experience among the selected individuals aged 12 years and above was at 8%, which present with at least one oral anomaly [5].

The cause of dental anomalies is however still not well understood, but research carried out indicates that it could be hereditary or by virtue of ecological influences. Some of them are taurodontism, odontoma, bifid roots, supernumerary teeth, and others may be discovered during the course of normal or standard orthodontic evaluation or in dental surveys. Supernumerary teeth and tooth transpositions cause aesthetic and functional problems because they lead to the formation of malocclusion, tooth decay, and periodontitis [6,7].

Depending on the type of dental abnormality present, the range of treatments that can be offered will vary. Hence, it becomes important to recognize such problems at an early stage to enable the practitioner to archive the goals of the therapy program, as well as to avoid any future implications. It is on the base of such characteristics of human and etiologic and clinical data of an individual patient with dental abnormalities that decision making will be made about essential clinical, radiographic, and sometimes laboratory examination of dental patients [7,8].

This research will help to determine the frequency of occurrence, and specific features of dental anomalies observed in the people of Pakistan, since there is very limited data available on the oral health state in the Pakistani population. As our study presents the data regarding frequency and characteristics of dental abnormalities occurring in the population of Pakistan, the results will potentially help to expand the knowledge in the area of dental epidemiology worldwide. Furthermore, the present research aims to fill the research gap in identifying the prevalence, distribution, and cause of dental anomalies among the Pakistani population to support tailored address and subsequent enhanced oral health for this demographic group.

METHODS

After approval from the hospital's ethical review board (Ref: It is stated that this cross-sectional study was conducted at the Department of Niazi Medical & Dental College, Sargodha from 8 January 2021 to 8 May 2021 (Study proposal number: NMDC/PMC/78/21; Date: 10-08-2020). From the preliminary study, 130 patients were sampled for the study with the sample size being determined by the formula; margin of error of 5%, the level of confidence being 95% and the

assumed frequency of dental anomalies being 88% [14]. The participants were patients of 18 years and above with pretreatment dental OPGs for various dental indications of dental implants, exclusion criteria included maxillofacial trauma or previous craniofacial surgery, incomplete or inadequate OPGs were considered. Patient details in terms of their age, gender or sex were also taken. Panoramic radiographs were produced with the digital panoramic apparatus (Planmeca Pro Max X-ray unit, Helsinki, Finland) that has a magnification coefficient of 1.2. Additionally, patients' dental records were consulted to corroborate specific diagnoses identified from the radiographs. Two trained radiologists independently reviewed the OPGs to identify and classify incidental findings according to predefined criteria. Statistical analysis was performed using SPSS version 22. Descriptive statistics for demographic characteristics and prevalence rates were calculated. Chi-square tests and logistic regression analyses were applied to assess the association between hearing loss and the presence of diabetes mellitus and hypercholesterolemia, controlling for potential confounding variables.

STUDY RESULTS
The mean age of patients was 33.2± 5.71 years. Patient distribution by age group was as follows: 7-20 years (35.38%), 21-45 years (29.23%), 46-60 years (23.07%), and 61 years and above (12.30%). Gender distribution was 55.69% male and 42.30% female given in table 1.

The prevalence of incidental findings was 60%, with 78 patients having present findings and 52 patients having absent findings. The study group exhibited a range of dental anomalies. Notably, Talon's Cusp was the most prevalent anomaly (47.69%), followed by Dilaceration (19.23%) and Peg Laterals (11.53%). Less common anomalies included Localized Microdontia (6.92%), Taurodontism (9.38%), and Fusion (1.53%). Additionally, Supernumerary root, localized microdontia and Supernumerary teeth were each present in 1.53% or less of the cases given in table 3.

Localized Microdontia was observed in 3 cases (4%) among males and 6 cases (10.9%) among females. Peg Laterals were noted in 9 cases (12%) among males and 6 cases (10.9%) among females. Fusion was identified in 1 case (1.3%) in both males and females. Talon's Cusp was prevalent, with 40 cases (53.3%) among males and 22 cases (40%) among females. Taurodontism was observed in 6 cases (8%) in both males and females. Dilaceration was recorded in 14 cases (18.7%) among males and 11 cases (20%) among females. Localized microdontia was noted in 1 case (1.3%) among males and 2 cases (3.6%) among females. Additionally, Supernumerary teeth were found in 1 case (1.3%) among both males and females. Overall, a total of 75 cases (100%) were observed among males and 55 cases (100%) among females given in table 4.

Table 5 presents the occurrence of dental anomalies across the dental arches. In the Maxilla, there were 80 cases, accounting for 61.5% of the total occurrences. The Mandible exhibited 11 cases, representing 8.5%. Anomalies affecting both arches simultaneously were observed in 39 cases, comprising 30.0%. The total number of occurrences across all arches was 130, representing 100.0%. Table 6 details the distribution of specific dental anomalies across dental arches. Localized Microdontia was found in 7 cases (8.8%) in the Maxilla, 1 case (9.1%) in the Mandible, and 1 case (2.6%) affecting both arches. Peg Laterals occurred in 7 cases (8.8%) in the Maxilla, 1 case (9.1%) in the Mandible, and 7 cases (17.9%) involving both arches. Fusion was observed in 2 cases (2.5%) in the Maxilla. Talon's Cusp was prevalent, with 37 cases (46.3%) in the Maxilla, 5 cases (45.5%) in the Mandible, and 20 cases (51.3%) affecting both arches. Taurodontism was present in 6 cases (7.5%) in the Maxilla, 2 cases (18.2%) in the Mandible, and 4 cases (10.3%) involving both arches. Dilaceration occurred in 17 cases (21.3%) in the Maxilla, 2 cases (18.2%) in the Mandible, and 6 cases (15.4%) affecting both arches. Supernumerary root was identified in 2 cases (2.5%) in the Maxilla. Localized microdontia was noted in 1 case (1.3%) in the Maxilla and 1 case (2.6%) involving both arches. Supernumerary teeth were found in 1 case (1.3%) in the Maxilla. Overall, a total of 80 cases (100%) were observed in the Maxilla, 11 cases (100%) in the Mandible, and 39 cases (100%) involving both arches.
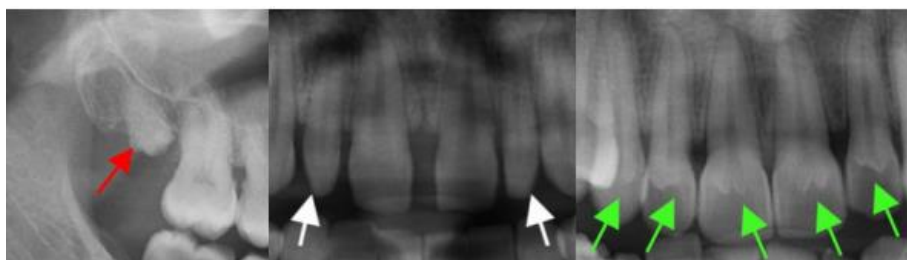
Figure 1: In the OPG, localized microdontia (18, indicated by a red arrow), peg laterals (12,22, indicated by white arrows), and Talon's cusp (11,12,13,21,22, indicated by green arrows) are observed

Table 1: Distribution of demographics of included patients

Variable	Category	Number of Patients (%)
Age	Mean ± SD	33.2 ± 5.11 years
	7-20 years	46 (35.38%)
	21-45 years	38 (29.23%)
	46-60 years	30 (23.07%)
	61 years and above	16 (12.30%)
Gender	Male	75 (55.69%)
	Female	55 (42.30%)

Table 2: Prevalence of Incidental Findings

Variables	Category	Number of Patients (%)
Incidental Finding	Present	78 (60%)
	Absent	52 (40%)

Table 3: Occurrence and distribution of dental anomalies among participants in the study group

Dental Anomalies	Number	Percentages
Localized Microdontia	9	6.92%
Peg Laterals	15	11.53%
Fusion	2	1.53%
Talon's Cusp	62	47.69%
Taurodontism	12	9.38%
Dilaceration	25	19.23%
Supernumerary root	2	1.53%
Localized Microdontia	2	1.53%
Supernumerary teeth	1	0.76%

Table 4: Prevalence of dental anomalies in males & Females

Dental Anomalies	Male	Female
Localized Microdontia	3(4%)	6(10.9%)
Peg Laterals	9(12%)	6(10.9%)
Fusion	1(1.3%)	1(1.8%)
Talon's Cusp	40(53.3%)	22(40%)
Taurodontism	6(8%)	6(10.9%)
Dilaceration	14(18.7%)	11(20%)
Localized Microdontia	1(1.3%)	2(3.6%)
Supernumerary teeth	1(1.3%)	1(1.8%)
Total	75(100%)	55(100%)

Table 5: The occurrence of dental anomalies across the dental arches

Dental anomalies	Frequency	Percent
Maxilla	80	61.5
Mandible	11	8.5
both arches	39	30.0
Total	130	100.0

Table 6: The distribution of specific dental anomalies across the dental arches

Dental Anomalies	Maxilla	Mandible	both arches
Localized Microdontia	7(8.8%)	1(9.1%)	1(2.6%)
Peg Laterals	7(8.8%)	1(9.1%)	7(17.9%)
Fusion	2(2.5%)	0(0.0%)	0(0.0%)
Talon's Cusp	37(46.3%)	5(45.5%)	20(51.3%)
Taurodontism	6(7.5%)	2(18.2%)	4(10.3%)
Dilaceration	17(21.3%)	2(18.2%)	6(15.4%)
Supernumerary root	2(2.5%)	0(0.0%)	0(0.0%)
Localized Microdontia	1(1.3%)	0(0.0%)	1(2.6%)
Supernumerary teeth	1(1.3%)	0(0.0%)	0(0.0%)
Total	80(100%)	11(100%)	39(100%)

DISCUSSION

The issue of incidental findings in dental diagnostic tools, with specific attention to pretreatment OPG is an essential factor that needs to be highlighted. These 'incidentalomas' – findings that are unrelated to the main diagnostic sample – can include various dental and non-dental lesions. They are significant, as understanding the extent of their occurrence is crucial for clinicians to coordinate patient care, making timely referrals, or escalating necessary interventions. This research will contribute insights into the chances of finding IFs and exploring the clinical implications of incidental findings in OPGs through a diverse sample of OPGs [10].

When comparing the results of this study with those of Indra et al., the surveyed patients in the 7-20 years age group accounted for 35. 38% of the sample, whereas the prevalence in the 13-20 years age group was only 28. 39%. Besides, the mean age as indicated in this study was 33 and this is higher than the overall mean age of 28 years. Two years younger than the mean age range witnessed by Indra et al., This in contrast with the current study shown that both male and female patients preferred to seek the healthcare services, more females than male with the ratio of 55% and 45% respectively while the Indra et al., found 57% female participants [11]. Comparing our study's results with Jadu et al. (2015) reveals differences he reported a higher mean age of 36.5 years, with a wider age range (14 to 77 years). Additionally, our study observed a predominance of males (55.69%) over females (42.30%), contrasting with Jadu et al.'s equal gender distribution (50.4% males, 49.6% females) [12].

Our study's observation of a 60% prevalence of incidental findings aligns closely with the findings reported by Alhamid et al. (2023), who documented a prevalence rate of 64.25% among 400 panoramic radiographs [13]. However, Hernández et al. (2018) reported a higher prevalence rate of 88% [14]. This disparity in prevalence rates could potentially be attributed to the smaller number of panoramic radiographs examined in our study compared to the studies by Alhamid et al. and Hernández et al [13,14].

Our study revealed among the study group, various dental anomalies were identified, with Talon's Cusp being the most prevalent (47.69%), followed by Dilaceration (19.23%) and Peg Laterals (11.53%). Less common anomalies included Localized Microdontia (6.92%), Taurodontism (9.38%), and Fusion (1.53%). Additionally, Supernumerary root, localized microdontia, and Supernumerary teeth were each present in 1.53% or less of the cases. On the same note, in Saberi et

al., (2016) study population, respondents most often suffered from Taurodontism in specific 5. 38% of the partaking populace suffered the Taurodontism while 5. 29% were involved in dilacerations, not forgetting 3. 41 % who were involved in impaction cases. However, Fusion and Peg lateral anomalies had the lowest levels of incidence rates; 09% and 0.18%, respectively [15]. In his study conducted by Aikins et al (2022), Taurodontism was the most common anomaly observed in their cases (61.4%), then Supernumerary teeth (7.1%) and finally dilaceration (1.4%) [16]. The current analysis showed the following percentage distribution; Taurodontism- 8.0% in males & females which is consistent with the Ganesan et al. (2023) 9% prevalence rate. Of these, 5 % are more inclined to males [17]. On the other hand, Gonçalves Filho et al., (2014) reported a relatively higher incidence of Taurodontism in their study and it was present in 27% of patients [18].

Goyal et al. (2016) and Preethy et al. (2022) had observable findings to their research with the maxilla presenting the highest percentage of anomalies (61%) while mandible recorded a lower percentage of the anomalies (9%). Continent artery disease contributing to both arches were observed in about 30% therefore, evaluation and management of patient should be holistic [19,20].

The strength of the study performed includes the capability of including more dental anomalies of a large population and understanding their distribution in dental arches, thus making a great contribution in the field of diagnostics. However, there is a potential shortcoming in that only panoramic radiographs are employed for identifying the above-listed anomalies, and they might not be as sensitive as other more sophisticated imaging methods; this would mean that the prevalence of these abnormalities may be under-reported. Furthermore, the study adopted a cross-sectional study design, which makes it possess a somewhat weak internal validity since the results may be affected by events that occurred in the past.

CONCLUSION

Finally, the results of our work shown that 60 % of the patients have experienced incidental findings in their OPGs taken before receiving treatment, while the most common structures detected were the Talon's Cusp with a percentage of 47. 69%. Besides, our results also pointed out that there was a higher frequency of dental anomalies in the maxilla as an overall prevalence (61. 5%) compared to the prevalence of the mandible (8. 5%); therefore, oral assessment and possible diagnosing have confirmed the need for thorough investigations to treat dental anomalies.

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