



Radiographic Identification of Dental Anomalies in Selected Telugu Population of Andhra Pradesh, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The basic objective of any forensic examination involving unidentified human remains is to identify the individual(s). The forensic significance of teeth can be attributed to their strong resilience to explosive and thermal stress, as well as the possibly unique personal information that can be gleaned from their analysis. Furthermore, the morphology of teeth varies between (and within) populations and sexes. Anomalies in the teeth are a common component of macroscopic dental morphological differences. The current study assesses the incidence of certain dental abnormalities in Population of Andhrapradesh. This study was carried out using Pretreatment records of 630 patients of Andhra Pradesh, India. The Radiographs were reviewed for Dental Anomalies. The anomaly, number of teeth affected, and the location of Anomaly were recorded. To find correlations between dental abnormalities and gender, a Chi-square test was carried out using SPSS software.

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Of the 630 patients screened 427 (67.7%) presented with at least one anomaly and 203(32.3%) subjects showed no anomaly. Hypodontia is the most prevalent anomaly(38.25%) followed by Impaction(17.30%) and Rotation (17.14%). Anodontia(0.79%) and Hyperdontia(0.95%) are the least prevalent anomalies. Statistical study revealed that dental abnormalities were independent of sex. The prevalence and impact of dental anomalies in various population groups may provide important information for phylogenic and genetic studies, allowing us to comprehend intra and inter-population variation.

Keywords: *Dental anomalies; hypodontia; impacted teeth; dental evidence; personal identification; radiographic study.*

1. INTRODUCTION

Forensic odontology is the application of dental concepts and expertise to the administration of justice. This discipline plays a significant role in Age estimation, Sex determination, recognition and analysis of Bite marks, occupational habits, and cultural practices [1]. Environmental, medical, vehicular, industrial, or terrorist events can all result in mass fatalities. They can be big, massive, or catastrophic in scale, involving quite a lot of victims. Identification of these victims is critical in these cases, both legally and compassionately [2]. Despite advancements in leading identification techniques such as DNA profiling, fingerprinting, and facial reconstruction, the comparison of dental records plays an important role in identifying the deceased in mass fatality incidents. After a catastrophe or at a crime scene, the key objective of forensic odontologists is to gather dental information from the deceased, compare ante-mortem and post-mortem dental information and look for similarities to establish the identities of deceased victims. In Dental Identification to establish the identity of an individual, postmortem dental remains are compared to antemortem dental documents, which include written notes, study casts, radiographs, and so on. Dental identification is primarily used to confirm the identities of unknown individuals when other methods of identification, such as DNA or fingerprints, are not possible in disaster situations that result in skeletonization, decomposition, severe burning, or charring of the individuals beyond recognition, particularly in disasters with a large number of casualties [3]. The benefits of using teeth in establishing people's identities are that they are durable and resistant to destruction, unlike other structures of the body.

Dental identification mostly relies on comparing records of the missing people with what was discovered in the remains concerning: treatment

done; unusual traits; and Comparison of ante- and post-mortem findings. Individuals with multiple and complicated dental treatments are easier to recognise than those with little or no restorative treatments [3]. Dental anomalies are common congenital malformations that can occur either isolated or as part of a syndrome [4]. Individualising characteristics such as dental fillings, extractions, crowding of specific teeth, diastema, twisted/tilted teeth, teeth rotations, and transpositions, missing teeth, extra teeth, other teeth anomalies, and so on are analysed in forensic dental comparison. The extent of the alterations to the teeth establishes the classification of the abnormalities. These Abnormalities are as follows: shape abnormalities, position changes, and changes in the number of teeth i.e. Supernumerary teeth (hyperdontia), i.e. extra teeth, or hypodontia (teeth missing from the normal complement), whereas oligodontia is a developmental absence of six or more teeth excluding the third molars, and anodontia is all teeth missing. Microdontia and macrodontia are tooth shape anomalies. Both microdontia and macrodontia relate to teeth that are physically smaller or bigger than normal [5]. In forensic investigations and court, the use of distinctive traits and morphological variances of teeth in personal identification should be well acknowledged. Identifying people with various dental abnormalities and/or disorders serve as a crucial factor for Forensic and genetic research. Certain dental developmental features are known to exhibit population diversity and can be used to establish ancestry. Many genetic dental or oral abnormalities are symptoms of more complicated conditions and are connected to inherited features, or they are the consequence of genetic mutations. The prevalence and degree of expression of dental abnormalities in different population groups might give significant information for phylogenic and genetic research, helping us to comprehend intra and inter-population variation [6]. A review of the literature revealed conflicting statistics on the prevalence

of these anomalies. The discrepancy in prevalence between earlier research might be due to differences in races or diagnostic criteria discrepancies. The purpose of this study is to determine the prevalence of dental abnormalities in a selected Telugu Population of Andhra Pradesh.

2. MATERIALS AND METHODS

2.1 Study Sample

This study was carried out as per the method suggested by [7], using Pretreatment OPG of 630 patients of Andhra Pradesh, India: No.of males = 302 (47.9%) No.of Females 328 (52.1%) aged 13 to 82 years old (Mean age 48.21 years). All the OPGs were taken between 2016 to 2022 at Sarada Dental Clinic, Challapalli, Andhra Pradesh. These records were maintained for diagnostic purposes. Inclusion criteria: age >12, No fractures to the skull, clear panoramic radiographs.

2.2 Evaluation Procedure

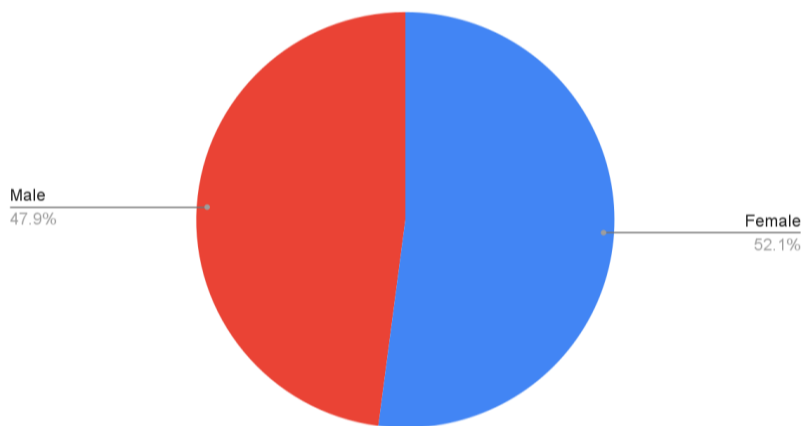
Each patient's maxillary and mandibular dental arches were examined in the radiographs. The records were examined for dental anomalies in both dental arches. The anomaly, number of teeth affected, and their location were recorded. The acquired data was analysed using the SPSS programme (SPSS Inc., Version 29.0, Chicago, USA) version 29. Pearson's Chi-Square test was used to determine the statistical significance of the differences.

2.3 Statistical Analysis

The Collected data were statistically analysed using SPSS software (SPSS Inc., Version 29.0, Chicago, USA). To analyse demographic factors, descriptive statistics were used. The chi-square test was used to compare the values. A p-value of 0.05 or less was considered statistically significant.

Table 1. Distribution of population

Total Subjects (n)	Male (n, n%)	Female (n, n%)
630	302 (47.9)	328 (52.1)



Graph 1. Graphical distribution of the percentage of the population based on sex



Fig. 1. Hyperdontia



Fig. 2. Hypodontia

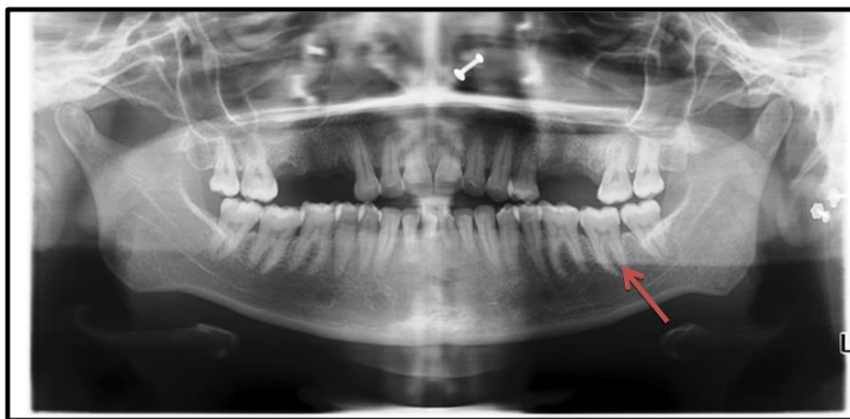


Fig. 3. Dilaceration

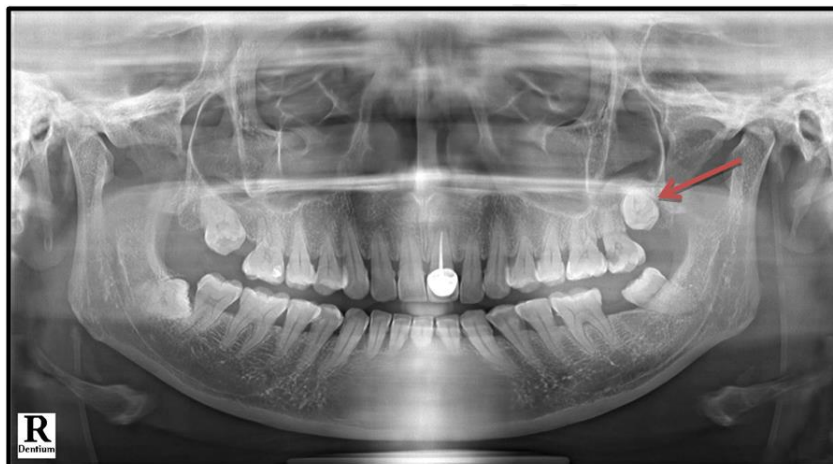


Fig. 4. Vertically impacted teeth



Fig. 5. Horizontally impacted teeth

3. RESULTS

In this study among the 630 subjects, 427 (67.7%) presented with at least one anomaly and 203(32.3%) subjects showed no anomaly. The

most prevalent anomaly was Hypodontia. The less common anomalies were Anodontia and Hyperdontia. Table 2 shows the distribution and prevalence of dental anomalies in the current study.

Table 2. Distribution and prevalence of dental anomalies in the study group of 630 Patients with p values from Chi-square test

Dental Anomaly	Male n=302 n(%)	Female n=328 n(%)	Total n=630 (n%)	Level of significance P value
Hyperdontia	3(0.99)	3(0.91)	6(0.95)	0.919
Hypodontia	114(37.75)	127(38.72)	241(38.25)	0.802
Oligodontia	3(0.99)	14(4.27)	17(2.70)	0.11
Anodontia	2(0.66)	3(0.91)	5(0.79)	0.588
Impaction	43(14.24)	66(20.12)	109(17.30)	0.51
Dilaceration	17(5.63)	23(7.01)	40(6.35)	0.477
Eruption	10(3.31)	9(2.74)	19(3.02)	0.571
Rotation	47(15.56)	61(18.60)	108(17.14)	0.313

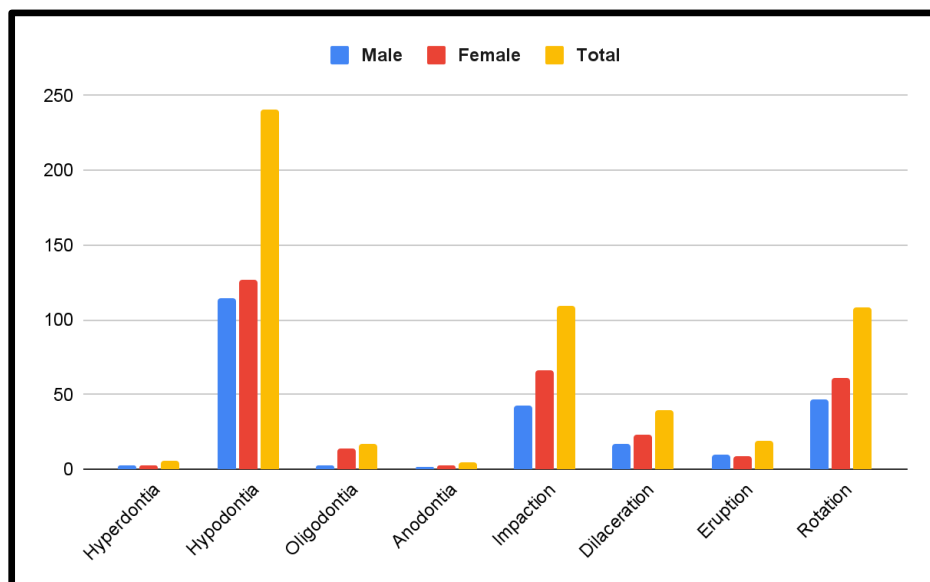


Fig. 6. Distribution of various dental anomalies

4. DISCUSSION

The objective of this study is to establish the prevalence of various developmental dental anomalies in a general population. Hypodontia is a decrease in the normal number of permanent teeth due to dental diseases. They are seen in both permanent and deciduous teeth. Hypodontia affects 0.3% of the population according to Akkaya et al. [8] which is contradictory to current investigation, it was shown that missing teeth accounted for 38.25% of all abnormalities. Congenital tooth loss most commonly affects the maxillary canine, Mandibular 2nd premolars, and mandibular canine. In this study, mandibular premolars dominated the list over mandibular canine, and this was particularly noticeable in Females. The study sample did not include missing third molars.

Impaction is the cessation of tooth eruption caused by a clinically or radiographically evident physical barrier in the eruption path or by an abnormal position of the tooth [9]. Impacted canines have been reported to occur more commonly 2%–3% of the population [7]. In the current study, Impactions are more noticeable in females, they accounted for 17.30% of abnormalities, which is similar to the studies of Patil et al. [6] (15.5%). Around 17.14% had Rotated teeth and were seen in mandibular anteriors. The studies of Vani et al. [10] showed 20.2% Rotation anomalies. Dilacerations are considered to occur as a result of trauma during tooth development, altering the angle between the tooth germ and the portion of the tooth that has already grown [11]. Pressure from

neighbouring cysts, tumours can occasionally cause the bend. The maxillary incisors are frequently damaged, followed by the mandible anteriors. Dilacerations of the roots accounted for 6.35% of the abnormalities in the current investigation, it is much higher than the studies of (Afify and Zawawi [12], Patil et al. [6], Gamze et al. [13]). Females were more affected than Males. Eruption abnormalities are defined as teeth erupting in an abnormal position or orientation [14]. It most commonly affects the maxillary first permanent molars. In the present study, Ectopic eruption accounted for 0.2% of anomalies and Supra eruption accounted for 2.9%, whereas Gupta et al. [15], Vani et al. [10] showed prevalence of 7.93% and 7.6% respectively. Hyperdontia is an increase in the normal number of permanent teeth. Its prevalence ranges from 0.1 to 3.8% [16]. In this study, hyperdontia is seen in 6 cases (0.95%), which is much lower than the studies of Al-Jabaa and Aldrees(5%) [17]. The prevalence is similar in males and females. They are seen in Premaxillary areas. The prevalence of Oligodontia is 2.70% and anodontia is 0.79%.

The prevalence of dental abnormalities observed in the current research differed significantly from that reported in prior epidemiological investigations [18-28]. These contradictory findings can be attributed mostly to ethnic disparities, local environmental effects, and diet. Differences in sample methodology, inclusion criteria, and research design might explain this disparity. Table 3 shows the prevalence rates reported by various writers in various populations.

Table 3. Prevalence of anomalies reported by previous studies in different populations and timeline

Population & year of study	Saudi arabia (2002-2011)	India (2008-2012)	India (2009-2010)	Turkey (2009-2012)	Saudi Arabia (2013-2014)	Saudi Arabia (2013)	Albania (2020-2021)	India (2016-2022)
Sample size	1255	4133	1123	2025	602	1000	1300	630
Dental Anomalies	Afify & Zawawi	Patil et al.	Gupta et al.	Gamze et al.	Vani et al.	Al-Jabaa & Aldrees	Vinjoli et al.	Present study
Hyperdontia	0.3	1.2	2.40	0.79	1.0	5		0.95
Hypodontia	25.7	16.3	4.19	1.77	5.2	19.1	8.9	38.25
Oligodontia			0.36					2.70
Anodontia								0.79
Impaction	21.2	15.5	3.74			52.7	7.6	17.30
Dilaceration	1.1	0.5		0.44	7.2			6.35
Eruption	0.3	0.7	7.93		7.6	5	5.3	3.02
Rotation			10.24		20.2			17.14

5. CONCLUSION

In this study, it was found that, substantial majority of patients had at least one dental abnormality (67.7%). Hypodontia is the most prevalent anomaly (38.25%) followed by Impaction (17.30%) and Rotation (17.14%). Anodontia (0.79%) and Hyperdontia (0.95%) are the least prevalent anomalies. Statistical study revealed that dental abnormalities were not affected by gender.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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