



## Diversity of dental patterns in North Indian population and its significance in human identification: A retrospective panoramic study

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### ABSTRACT-

**Background:** Fingerprints, DNA, and dentition are the principal markers used for forensic identification. Frequently used dental characteristics for identification include evidence of dental procedures as well as about condition of an individual tooth whether it is decayed or missing or virgin tooth. The primary aim of this study was to evaluate utility of orthopantomography for human identification.

**Materials and methods:** 500 total OPG were equally divided between males and females. Dental patterns were divided into 8 codes and their diversity was calculated.

**Results:** The diversity of dental patterns in orthopantomography was 99.2%. The diversity was significant in males and females in the maxilla, upper anterior, lower right and lower anterior region. The individual dental pattern was significant in maxilla and lower right and lower anterior region. These findings have not been reported previously.

**Keywords:** Dental diversity, forensic identification, forensic dentistry, orthopantomography

### Introduction

Forensic identification is the identification of victims of criminal incidents and mass disasters as well as unknown living people. This identification is important to family members and friends, if there is some death in suspicious circumstances and the body cannot be recognized by the legal authorities, and the community.<sup>1,2</sup>

Most productive identifications today are based on fingerprints and dental examinations as these are primary and important procedures in medicolegal death investigations including mass disasters. Teeth serve as a valuable identification tool because they are the most resistant part of the body and are not easily destroyed., particularly in those cases when the body is severely charred, decomposed making fingerprints insignificant<sup>3</sup>

Radiographs reveal details and provide reliable and objective information. Thus, are essential for identification in forensic odontology. In particular, panoramic radiography is a useful for identification.<sup>4</sup>

Gustafson was the first to use orthopantomography in forensic practice for the purpose of identification, according to theory proposed by Paatero.<sup>5</sup>

Previous studies with panoramic radiographs have used various dental characteristics to form a dental pattern.<sup>6-10</sup>

However, it looks as if there is no standardized set of dental patterns on panoramic radiographs.

Though many studies have been performed very few have been done involving Delhi NCR population So this study is conducted with a larger sample size to define dental parameters in OPG and also from dental patterns for forensic identification.

### Material and Method

The present study is retrospective and the investigation protocol is approved by the ethical committee. In total 500 OPG, 250 males and 250 females digital orthopantomograms

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were selected from archives of oral medicine and radiology department. Images with, with supernumerary teeth, or with unusual findings like soft tissue calcifications, history of ortho treatment, fibrous pathologies were excluded.

**RESULTS**

Our result shows that the diversity of full dentition was 99.2% and in case of maxilla it was 26.6 % whereas in mandible it was 32.4%. since our study we are comparing dental patterns among males and females we found that diversity of full dentition in male and females was same at 99.2%

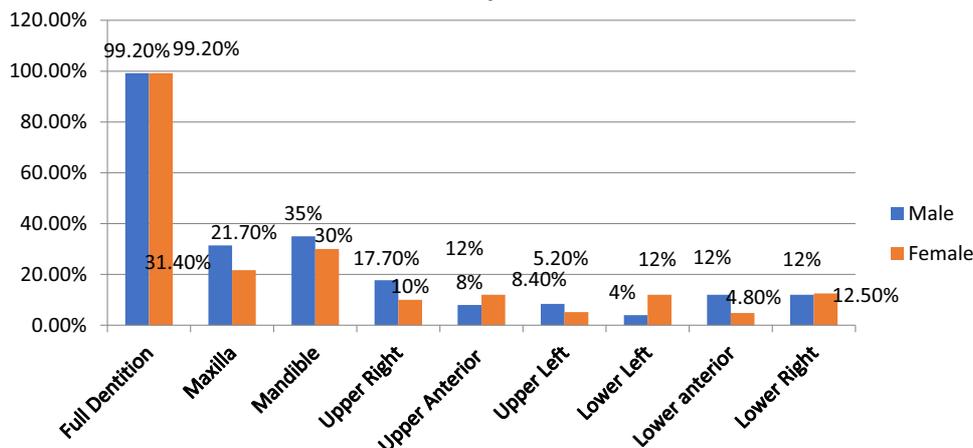
We also observed that in the mandible significant differences in males and females were observed in left side and anterior region values being 4% in males and 12% in females,12% in males and 4.8 % in females respectively. (table1) (Graph 1).

Our results also concluded that the significant differences in the 4 regions excluding the upper right were also observed in the individual dental pattern category (patterns seen only once, which are not repeated). The individual dental pattern for full dentition was 52% in males and 50% in females and in case of maxilla significant variation in individual dental pattern was seen as 29% in males and 19% in females. (table2) (Graph 2)

**Table 1: INTERGROUP COMPARISON BETWEEN MALE AND FEMALES (DIFFERENT DENTAL PATTERNS)**

Region	Male	Female	Chi Sq	P value	Significance
Full Dentition	248 (99.2%)	248 (99.2%)	0.000	1.000	Non-Significant
<b>Maxilla</b>	<b>78 (31.4%)</b>	<b>54 (21.7%)</b>	<b>5.929</b>	<b>0.019</b>	<b>Significant</b>
Mandible	87 (35.0%)	74 (30.0%)	1.548	0.250	Non-Significant
<b>Upper Right</b>	<b>44 (17.7%)</b>	<b>25 (10.0%)</b>	<b>6.069</b>	<b>0.012</b>	<b>Significant</b>
Upper Anterior	20 (8%)	30 (12%)	2.222	0.179	Non-Significant
Upper Left	21 (8.4%)	13 (5.2%)	2.021	0.213	Non-Significant
<b>Lower Left</b>	<b>10 (4%)</b>	<b>30 (12%)</b>	<b>10.87</b>	<b>0.001</b>	<b>Significant</b>
<b>Lower anterior</b>	<b>30 (12%)</b>	<b>12 (4.8%)</b>	<b>8.422</b>	<b>0.006</b>	<b>Significant</b>
Lower Right	30 (12%)	31 (12.5%)	0.019	1.00	Non-Significant

**Graph 1**



**Table 2: INTERGROUP COMPARISON BETWEEN MALES AND FEMALES (INDIVIDUAL DENTAL PATTERNS)**

Region	Male	Female	Chi Sq	P value	Significance
Full Dentition	130 (52.0%)	125 (50.0%)	0.200	1.000	Non-Significant
<b>Maxilla</b>	<b>72 (28.8%)</b>	<b>47 (18.8%)</b>	<b>6.893</b>	<b>0.011</b>	<b>Significant</b>
Mandible	53 (21.2%)	66 (26.4%)	1.864	0.207	Non-Significant
Upper Right	24 (9.6%)	20 (8.0%)	0.399	1.000	Non-Significant
Upper Anterior	15 (6%)	24 (9.6%)	2.253	0.179	Non-Significant
Upper Left	14 (5.6%)	12 (4.8%)	0.162	1.000	Non-Significant
<b>Lower Left</b>	<b>07 (2.8%)</b>	<b>28 (11.2%)</b>	<b>13.548</b>	<b>0.001</b>	<b>Significant</b>
<b>Lower anterior</b>	<b>25 (10%)</b>	<b>10 (4.0%)</b>	<b>6.912</b>	<b>0.019</b>	<b>Significant</b>
Lower Right	27 (10.8%)	27 (10.8%)	0.000	1.000	Non-Significant



Graph 2

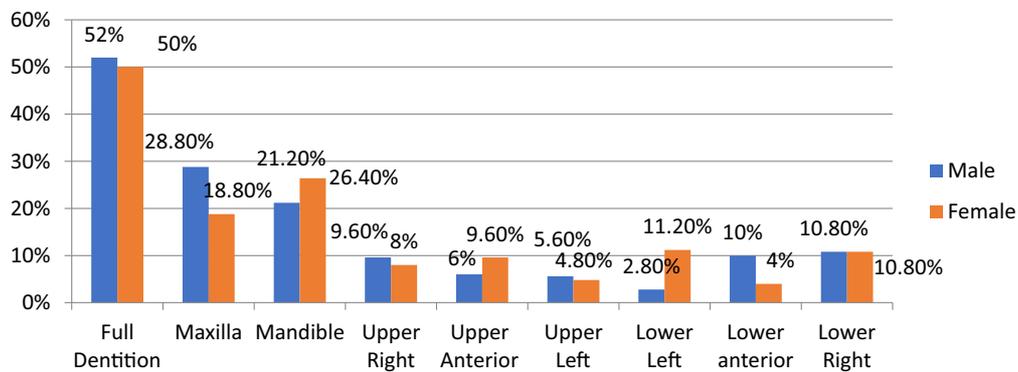


Table 3: MOST COMMONLY OBSERVED DENTAL PATTERNS IN OPG IN FEMALES(N=250)

Area	Dental pattern	Number	Percentage
Full dentition	IVVVVVVVVVVVVVVI IVVVVVVVVVVVVVVI	32	12.8
Maxilla	VVVVVVVVVVVVVVVV	76	30.4
Mandible	VVVVVVVVVVVVVVVV	46	18.4
Upper right	VVVVV	94	37.6
Upper anterior	VVVVVV	233	93.2
Upper left	VVVVV	103	41.2
Lower left	VVVVI	90	36.4
Lower anterior	VVVVVV	242	96.8
Lower right	VVVVV	91	36.4

Table 4: MOST COMMONLY OBSERVED DENTAL DIVERSITY PATTERNS IN OPG IN MALES(N=250)

Area	Dental pattern	Number	Percentage
Full dentition	VVVVVVVVVVVVVVVV IVVVVVVVVVVVVVVI	19	7.6
Maxilla	VVVVVVVVVVVVVVVV	66	26.4
Mandible	IVVVVVVVVVVVVVVI	48	19.2
Upper right	VVVVV	97	38.8
Upper anterior	VVVVVV	222	88.8
Upper left	VVVVVX	51	20.4
Lower left	VVVVV	77	30.8
Lower anterior	VVVVVV	240	96
Lower right	VVVVV	76	30.4

**Discussion**

The diversity of full dentition was 99.2% and in case of maxilla it was 26.6 % and in mandible it was 32.4%. since our study we are comparing dental patterns among males and females we found that diversity of full dentition in male was 99.2 and this remain same for females. This is similar to study done by Lee et al and Bhateja et al.<sup>7,10</sup> However in our study there are significant differences in diversity pattern seen in maxilla in males and females being 31.4% and 21.7 % respectively. Our data also gave us significant differences in upper right region with diversity pattern of 17.7% in males and 10% in females.

We also observed that in mandible significant differences in males and females were observed in left side and anterior region values being 4% in males and 12% in females ,12% in males and 4.8% in females respectively.

In our study different dental pattern shows significant differences in maxilla, maxillary right, left mandibular and anterior region among males and females. Our results also concluded that the significant differences in the 4 regions excluding upper right were also observed in individual dental pattern category (patterns seen only once, which are not repeated). The individual dental pattern for full



dentition was 52% in males and 50% in females and in case of maxilla significant variation in individual dental pattern was seen as 29% in males and 19% in females.

The most common dental pattern observed in males in full dentition was 28 virgin teeth and 4 impacted 3rd molars and its frequency was 7.6% in males and 30 virgin teeth and 2 impacted lower 3rd molar with frequency of 12.6 % in females. This difference could be because of skeletal maturity at any early age in females as compared to males. In upper anterior in both females and males the dental pattern was 6 virgin teeth and its frequency was 88% in females and 93% in males. For the lower anterior in both male and female the pattern was 6 virgin teeth but frequency was same in both.

### Conclusion

The study tells us importance of dental radiology playing an important part in forensic identification. The first choice of radiograph in full mouth dentition being orthopantomography signifies the importance of radiology in forensic identification. In future larger sample in comparison with the population of the region can provide better insight into diversity of individual and common pattern in dentitions and help with forensic identification if needed with ante mortem records.

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