

## PREVALENCE OF DENTAL ANOMALIES AMONG ORTHODONTIC PATIENTS

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## ABSTRACT

*Dental anomalies are clinically evident abnormalities which can cause various dental problems, which may complicate orthodontic treatment planning. Clinical & radiological inspection play crucial role in identification of various anomalies. This study was carried over the period of 2 years to determine the pattern and distribution of various morphological dental anomalies among orthodontic patients. Demographic details along with detailed medical, dental and family histories were obtained from every patient. In addition to the intraoral examination, study casts and dental panoramic radiograph were also evaluated for dental anomalies causing disturbance in number, size, form, and location of teeth. Patients with syndromes were not included in the study. Out of 520 patients, dental anomalies were present in 83 (16%) patients. Hypodontia was the most prevalent dental anomaly occurring in 37 (7.1%) patients & maxillary lateral incisor was found to be the most commonly missing tooth. Microdontia was second most prevalent dental anomaly observed in 21 (4%) patients with the maxillary lateral incisor being the most commonly affected tooth. Double tooth was rare finding present only in 1 (0.19%) patient. All dental anomalies showed higher prevalence in female patients except for double tooth and transposition which were more prevalent in male patients. Dental anomalies can lead to disturbance in occlusion. Orthodontists have the responsibility to observe each patient carefully for various dental anomalies and have full knowledge of them as it can help them in planning treatment for these patients and executing them without any complications.*

**Key Words:** Hypodontia, Supernumerary, Taurodontism, Double Tooth, Dental Anomaly.

## INTRODUCTION

Understanding the effect of dentofacial genetics on diagnosis and treatment planning of orthodontic patients is becoming integral part of health care.<sup>1</sup> Dental anomalies can lead to disturbance in maxillary or mandibular arches and can affect occlusion, which may complicate orthodontic treatment planning.<sup>2</sup> Genetic and environmental factors both play an important role in etiology of dental anomalies.<sup>3</sup> It has been proposed that complex interplay between environmental and genetic factors during the process of tooth formation can lead to range of dental anomalies.<sup>4</sup> Both clinical and radiological examinations play vital role in the

differential diagnosis of dental anomalies. Therefore comprehensive investigation for the presence of any dental anomaly is necessary to prevent various dental problems like caries, periodontitis and malocclusion.<sup>3</sup> Although it has not been fully established that presence of dental anomalies can cause malocclusion but dental professionals have always been concerned about the influence of dental anomalies on malocclusion.<sup>5-8</sup> Studies conducted in the past to determine prevalence of dental anomalies in orthodontic patients showed great variability.<sup>2,9</sup> Possible cause of variance in those studies can be due to racial differences, sample size, period during which study samples were collected & duration of the study.<sup>10</sup>

The objective of this study was to determine the pattern and distribution of various morphological dental anomalies among orthodontic patients & compare results of this study with other studies conducted around the globe.

## METHODOLOGY

This cross-sectional study included all patients, older than 13 years of age, who visited orthodontic department from June 2012 to August 2014. Any subject with extraction of permanent tooth, previous orthodontic treatment, history of congenital malformations like cleft lip or/and palate, any systemic diseases, metabolic

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disorders or syndromes affecting tooth formation or bone metabolism were excluded from the study. Demographic details along with detailed medical, dental and family histories were obtained from every patient. In addition to the intraoral examination, study casts and dental panoramic radiograph were evaluated for the presence of any dental anomaly. The criteria presented by Soames JV and Southam JC<sup>11</sup> were used for the descriptions of anomalies. Following dental anomalies were assessed:

- 1 Disturbance in **Number** of teeth (Hypodontia & Hyperdontia).
- 2 Disturbance in **Size** of teeth (Macrodon-tia & Microdon-tia).
- 3 Disturbance in **Form** of teeth (Taurodontism & Double tooth).
- 4 Disturbance in **Location** of teeth (Transposition).

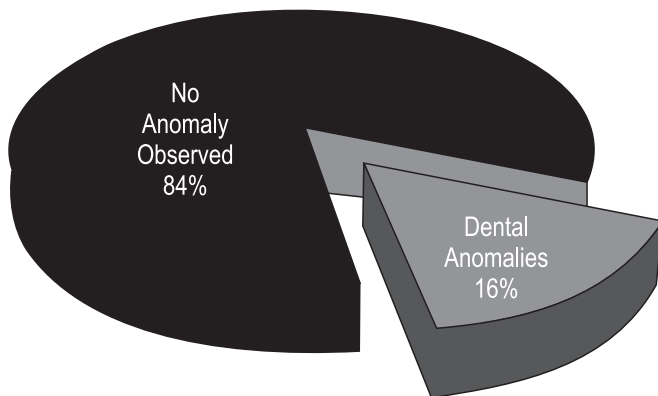


Fig 1: Distribution of anomalies in studied sample

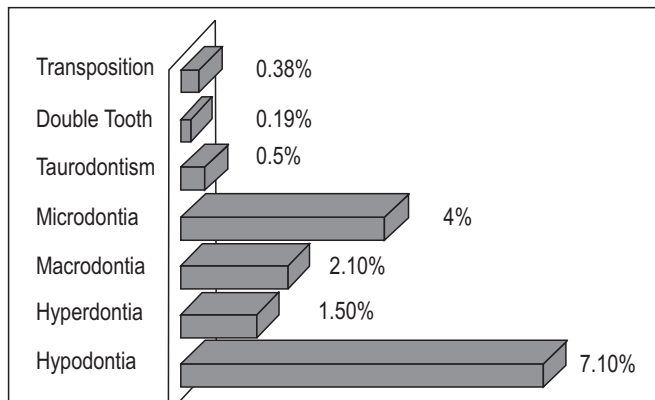


Fig 2: Frequency of distribution of various anomalies in studies sample

All the records were examined by single investigator. Intra-examiner reliability was tested by re-examining pre treatment diagnostic records of random patients a month after initial examination to ensure the diagnostic consistency. Data tabulation and analysis was processed using SPSS software version 20.

## RESULTS

A total of 520 patients were screened for this study and out of these 83 (16%) patients had dental anomalies (Fig 1). Hypodontia was the most prevalent dental anomaly occurring in 37 (7.1%) patients, followed in descending order by microdon-tia (4%), macrodon-tia (2.10%), hyperdontia (1.5%), taurodontism (0.5%), transposition (0.38%) & double tooth (0.19%). Fig 2 shows the frequency of distribution of various anomalies. All dental anomalies showed higher prevalence in female patients except for double tooth and transposition which were more prevalent in male patients (Table 1).

## DISCUSSION

In this study, 16% patients showed some form of dental anomaly. Hypodontia was the most prevalent dental anomaly occurring in 37 (7.1%) patients. These results are in close agreement with study conducted by Rathi<sup>12</sup> where she reported that 12.9% of the studied sample had dental anomalies and hypodontia was the most prevalent anomaly. Congenitally missing tooth is defined as those where tooth germ fails to develop sufficiently to allow differentiation of dental tissues.<sup>13</sup> Etiology of hypodontia is believed to be developmental, but Moyer<sup>13</sup> stated five principal known causes of congenital absence of teeth: 1). Heredity, 2). Ectodermal dyslasia, 3). Rickets, 4). Syphilis & 5). Expression of evolutionary changes in the dentition.<sup>13</sup> The order of most commonly congenitally missing teeth after third molars are mandibular second premolars, maxillary lateral incisors and maxillary second premolars.<sup>14-20</sup> But in this study, maxillary lateral incisor was found to be the most commonly missing permanent tooth followed by mandibular second premolar. These results are in accordance with study conducted by Kennedy.<sup>21</sup> According to Bolk's theory of terminal reduction<sup>22</sup>, when only one to four teeth are missing, the absent tooth will be the most distal tooth of a given type i.e lateral incisor, second premolar and third molars. It is suggested that in the future man will neither have third molars nor maxillary lateral incisors.<sup>22</sup> Treatment of hypodontia generally requires a multidisciplinary

TABLE 1: DISTRIBUTION OF VARI-IOUS ANOMALIES ACCORDING TO GENDER

Gender	Dental Anomalies						
	Hypodon-tia	Hyper-dontia	Macro-dontia	Microdon-tia	Tauro-dontism	Double Tooth	Transpo-sition
Male	17	2	2	9	0	1	2
Female	20	6	9	12	3	0	0
Total	37	8	11	21	3	1	2

approach which may include orthodontic correction or prosthetic replacement.<sup>10</sup> The wide range of prevalence values observed has indicated geographic differences. Hypodontia in Australian orthodontic patients was found to be 8.1%.<sup>2</sup> Study conducted in Japanese orthodontic patients reported prevalence of hypodontia to be 8.5%.<sup>23</sup> Another study reported that in Mexican orthodontic patients hypodontia was prevalent in 2.7% of the sample.<sup>24</sup> The prevalence of hypodontia of permanent teeth differs among population of different origin with frequency varying from 1.6-9.6%.<sup>25-28</sup>

Microdontia was second most prevalent dental anomaly observed in 21 (4%) patients with the maxillary lateral incisor being the most commonly affected tooth. The prevalence of microdontia ranges from 0.8% to 8.4% in various populations and is more commonly observed in female patients.<sup>29</sup> Most distal tooth within each group displays the greatest variability in size and is the most frequently congenitally missing tooth.<sup>30</sup> Third molars vary in size more frequently than any other teeth followed by maxillary lateral incisors.<sup>30</sup> As third molars were not included in this study, maxillary lateral incisors were found to be the most commonly affected teeth which is in agreement with various studies conducted around the globe.<sup>29-30</sup> Few studies have shown association of small size lateral incisors with palatal displacement of canine.<sup>31-32</sup> The mesiodistal width of average maxillary lateral incisor is 6.5mm. When compared with maxillary central incisor, lateral incisor is usually about 2mm narrower mesiodistally and 2mm shorter incisocervically.<sup>29</sup> If there is a reduction in mesiodistal dimension of lateral incisor and convergence towards the incisal edge it is referred as peg shaped lateral. When mesiodistal diameter of lateral is smaller as compared to average width but it is not typically convergent towards incisal edge, then it is called small lateral incisors.<sup>29</sup>

Macrodontia is less prevalent than microdontia.<sup>9</sup> Generalized true macrodontia is observed in patients suffering from pituitary gigantism and pineal hyperplasia.<sup>33</sup> Usually in cases where macrodontia exists, only one or two teeth are larger than normal size. In this study macrodontia was found in only 2.1% of the studied sample. Maxillary central incisor was found to be the most commonly affected tooth, which is in agreement with previous studies conducted.<sup>34</sup>

Hyperdontia is defined as extra teeth that occur in addition to normal series of teeth.<sup>12</sup> It may cause delayed or ectopic eruption of the permanent teeth and can alter overall appearance of patient dentition. Early diagnosis is required for appropriate management which can help in decreasing the possible complications.<sup>35</sup> Studies have reported higher prevalence of supernumerary in males than in female orthodontic patients ranging between 0.1%-3.8%.<sup>36</sup>

Hyperdontia is more prevalent in anterior maxillary region.<sup>37</sup> In this study, it was present in 1.5% of studied sample and mesiodenes were the most commonly found supernumerary teeth followed by paramolars, which is

in accordance with the previous studies conducted.<sup>12,36</sup> Hyperdontia is found to be more common in patients with cleft lip and palate.<sup>36</sup>

A taurodont usually presents with elongated pulp chambers having greater apicoocclusal height and lacking constriction at cemento-enamel junction level.<sup>38</sup> It shows wide variation in the size and shape of the pulp chamber, making root canal therapy a challenge. It is frequently observed in Eskimos, Australian and Natives of Central America. Mandibular molars are found to be affected more often than maxillary molars.<sup>34</sup> Taurodontism affects permanent teeth more than primary teeth and is prevalent in 5.67% to 60% of subjects.<sup>39-40</sup> In the present study, it was only prevalent in 0.5% of the studied sample. Mandibular second molar was found to be the most commonly affected tooth, which is in agreement with other studies conducted.<sup>12,34</sup>

Teeth transposition is a rare eruption anomaly that involves the permanent dentition (incidence 0.3-0.4%).<sup>41,42</sup> Transposition are more frequently seen in the maxillary canines and first premolars.<sup>43,44</sup> In our study, transposition was reported in 2 (0.38%) patients. Results of this study are in agreement with previous studies conducted.<sup>10,43-44</sup> Transposition may occur with other anomalies, such as peg laterals & retention of deciduous teeth.<sup>41</sup>

Double tooth unfavorably affect esthetics, and can lead to crowding and difficulty in eruption of adjacent teeth. Orthodontic intervention is required to complete the treatment plan. Double tooth can be due to fusion or gemination. Fusion may present with total or partial union of dentin and possibly pulps. It may presents with two separate root canals or less often, a single root with one or two pulp chambers.<sup>45</sup> Fused teeth are usually larger than normal size. Mandibular teeth are affected more frequently than maxillary based on racial, genetic or geographic factors.<sup>45</sup> Fusion is observed to occur unilaterally and can be suspected when the number of teeth in the arch is found to be reduced and radiographically two roots are seen in relation to one crown.<sup>38,46</sup> Fusion of central incisors and canines is more frequent than that of lateral incisors and canines.<sup>45</sup> Gemination is defined as incomplete division of one tooth germ, resulting in the formation of two partially or completely separated crowns formed on a single root.<sup>38</sup> It is frequently observed in the anterior teeth, but can also affect molars and bicuspid. Gemination can usually be distinguished from fusion by the presence of a full set of teeth with an incompletely divided tooth. Prevalence of fusion and gemination is extremely limited in orthodontic cases with prevalence of 0.23% and 0.07%, for fusion and gemination respectively.<sup>9</sup> In this study, gemination was found only in one patient (0.19%).

## CONCLUSION

Dental anomalies may be the cause of various dental problems including malocclusion. The present study attempts to evaluate pattern and distribution of various morphological dental anomalies among orthodontic



patients. In this study, 16% patients showed some form of dental anomaly. Hypodontia was the most prevalent dental anomaly (7.1%), maxillary lateral incisor being the most commonly missing tooth. All dental anomalies showed higher prevalence in female patients except for double tooth (gemination) and transposition which were more prevalent in male patients. Careful observation and appropriate investigations are required to diagnose various dental anomalies and initiate correct treatment at correct time to reduce any complication.

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