Prevalence of dental anomalies in Iranian orthodontic patients

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Accepted April 5, 2012

The aim of the study is to investigate the prevalence and gender distribution of selected dental anomalies in an Iranian orthodontic population. This is a retrospective review of panoramic radiographs of 1590 subjects investigated for frequency of selected dental anomalies. Differences in the frequency of each dental anomaly by sex were analyzed using the Pearson chi-square test. 12% of the patients showed at least one dental anomaly. The distribution by sex was 40 males (13.1%) and 150 females (11.5%). Hypodontia is the most common developmental dental anomaly in the Iranian orthodontic patients, followed in decreasing order by ectopic eruption.

Key words: Dental anomalies, prevalence, orthodontics.

INTRODUCTION

Developmental dental anomalies are frequently observed in orthodontic patients. Prevalence of dental anomalies among orthodontic patients may be higher compared to general population since this group of patients have tendency to show more dental problems. Anomalies in tooth number, shape and position can cause discrepancies in maxillary and mandibular arch length and occlusion disturbances, therefore complicate orthodontic treatment. Although the relationship between dental anomalies and orthodontic problems have not been widely studied but some of dental anomalies have been shown to be associated with certain dentofacial characteristics. Ben-Bassat and Brin (2003) reported that multiple congenitally-missing teeth affected the skeletal pattern. Endo et al. (2004) in an investigation on Japanese orthodontic patients have observed an association of hypodontia and craniofacial morphology. Leifert and Jonas (2003) have shown an increased prevalence of occlusal deep bite in subjects with palatally-displaced maxillary canines; however, Uslu et al. (2009) failed to find statistically significant correlation between dental anomalies and type of malocclusion. Further studies are required in this field to determine whether there is a relationship between dental anomalies and orthodontic problems or not.

Vahid-Dastjerdi et al. (2011) examined 1751 Iranian orthodontic patients and found that 0.74% had supernumerary teeth. These investigators (Vahid-Dastjerdi et al., 2010) in a survey of the incidence of non-syndromic hypodontia in Iranian orthodontic patients have observed a total of 197 congenitally missing teeth in 160 patients (9.1%; 74 boys and 86 girls). A study by Gomes et al. (2010) on 1049 orthodontic patients in Brazil reported a prevalence of 6.3% for hypodontia in Brazilian orthodontic patients. Uslu et al. (2009) who determined the prevalence of dental anomalies in different orthodontic malocclusions investigated 900 orthodontic patients and found that agenesis was the most common (21.6%) dental anomaly among Turkish patients, followed by dens evaginatus (6.2%), invaginatus (5.0%), pulp stones (4.2%), and impaction (2.9%), while the investigation carried out by Altug-Atac (2007) on the same population showed that hypodontia was the most common developmental dental anomaly in the Turkish population, followed by microdontia. Several studies

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were carried out to investigate prevalence of dental anomalies in different populations, but only a few of them have been done on orthodontic patients. The present study investigated the prevalence of selected dental anomalies in pretreatment radiographic records of 1590 Iranian orthodontic patients.

MATERIALS AND METHODS

Pretreatment orthodontic panoramic records of 1590 subjects (304 males and 1286 females) were retrieved from the orthodontic archive of a private dental clinic and were examined by two observers retrospectively. Detailed medical, dental and family histories were accessible and retrieved for all subjects and radiographic records of the following cases were excluded from the study:

1. Patients with syndromes such as Down’s syndrome, ectodermal dysplasia, etc.
2. Cleft lip and/or palate patients
3. Patients who had history of trauma or extractions
4. Blurred or inappropriate taken panoramic radiographs.

The following dental anomalies were evaluated: Hypodontia and supernumerary (number abnormalities), tooth size discrepancy such as microdontia and macrodontia (size abnormalities), transposition (location abnormalities) and other findings such as ectopic eruption, impaction, peg shaped lateral incisor and taurodontism. Tooth shape abnormalities such as germination and fusion were assessed but since we did not observed any tooth affected by germination, fusion and macrodontia; these three anomalies were omitted from data in Table 1. We decided to assess crown abnormalities rather than root abnormalities except for taurodontism. Crown abnormalities such as anomalies in tooth number, shape and position may cause arch length and occlusion disturbances and are more associated with orthodontic problems; among root abnormalities only taurodontism were assessed in order to evaluate its association of occurrence with hypodontia since Anziani et al. (2010) observed hypodontia is often associated with other dental anomalies such as disturbances in eruption, peg lateral incisors and taurodontism. On the other hand, it have been shown that assessing the presence of root abnormalities such as dilacerated, pipette-shaped, blunt, pointed, and short roots on panoramic radiographs does not result in a reliable assessment (Van Parys et al., 2011).

The definitions of dental anomalies in the study are as defined in standard texts (Shafer et al., 1983). Data were analyzed for frequency and differences in sex distribution by Pearson chi-square test.

RESULTS

Of 1590 patients, 1400 (88%) exhibited no dental anomalies, while 190 patients (12%) showed at least one dental anomaly. The frequencies of selected anomalies, sex distribution and statistical differences between sexes, as well as the most prevalently involved teeth are shown in Table 1. Differences in prevalence rates of each dental anomaly by sex were analyzed by using chi-square test and the related P values were calculated for each anomaly. No statistically significant correlation were found between dental anomalies and patient’s gender, with the exception of hypodontia and taurodontism (p = 0.027 and p= 0.007, respectively), which were significantly higher in females and males, respectively.

For each dental anomaly, observers determined type of affected teeth by anomaly and the most affected teeth were determined (e.g. with respect to hypodontia maxillary lateral incisors where most teeth are involved, followed by maxillary third molars).

Hypodontia was the most common dental anomaly in the present study followed in descending order by ectopic eruption, impaction, microdontia, peg shaped lateral incisor, supernumerary, transposition and taurodontism. The distribution of various anomalies is outlined in Figure 1.

Hypodontia accounted for 10% of the patients (20 males and 139 females). Maxillary lateral incisors were most frequently missing teeth (37%) followed in decreasing order by maxillary third molars (26%), mandibular third molars (20%) and mandibular second premolars (8%). Ectopic eruption and impaction were found respectively in 5.15% (15 males and 67 females) and 2.6% (11 males and 31 females) of the patients. They were most common for the maxillary canines.

Table 1. Frequencies of dental anomalies and chi-square tests of differences between sexes.

<table>
<thead>
<tr>
<th>Anomalies</th>
<th>Male (n=304)</th>
<th>Female (n=1286)</th>
<th>Total (n=1590)</th>
<th>P value</th>
<th>Teeth most affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypodontia</td>
<td>20 (6%)</td>
<td>139 (10%)</td>
<td>159 (10%)</td>
<td>0.027</td>
<td>12, 22, 18, 28</td>
</tr>
<tr>
<td>Ectopic eruption</td>
<td>15 (4.9%)</td>
<td>67 (5.2%)</td>
<td>82 (5.15%)</td>
<td>0.845</td>
<td>13, 23, 15, 25</td>
</tr>
<tr>
<td>Impaction</td>
<td>11 (3.6%)</td>
<td>31 (2.4%)</td>
<td>42 (2.6%)</td>
<td>0.238</td>
<td>13, 23</td>
</tr>
<tr>
<td>Microdontia</td>
<td>4 (1.3%)</td>
<td>22 (1.7%)</td>
<td>26 (1.6%)</td>
<td>0.625</td>
<td>18, 28, 31, 41, 32, 42</td>
</tr>
<tr>
<td>Peg shaped lateral</td>
<td>3 (0.98%)</td>
<td>13 (1.0)</td>
<td>16 (1.0)</td>
<td>0.633</td>
<td>12, 22</td>
</tr>
<tr>
<td>Supernumerary</td>
<td>2 (0.65%)</td>
<td>9 (0.69%)</td>
<td>11 (0.69%)</td>
<td>0.647</td>
<td>Premolars, mesiodense</td>
</tr>
<tr>
<td>Transposition</td>
<td>2 (0.65%)</td>
<td>6 (0.46%)</td>
<td>8 (0.5)</td>
<td>0.471</td>
<td>12/13, 22/23</td>
</tr>
<tr>
<td>Taurodontism</td>
<td>3 (0.98%)</td>
<td>0 (0)</td>
<td>3 (0.18)</td>
<td>0.007</td>
<td>36, 46</td>
</tr>
</tbody>
</table>
Table 2. Frequencies of number of dental anomalies exhibited in orthodontic patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>No anomaly</td>
<td>264</td>
<td>86.5</td>
<td>1136</td>
</tr>
<tr>
<td>One anomaly</td>
<td>23</td>
<td>7.5</td>
<td>92</td>
</tr>
<tr>
<td>&gt;one anomaly</td>
<td>17</td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

Microdontia was observed in 1.6% of patients (4 males and 22 females). Maxillary third molars and mandibular incisors were the most commonly affected teeth. Peg-shaped lateral incisors were found in 1% of the patients (3 males and 13 females). Taurodontism was observed in the first permanent molars and the prevalence was 0.18% (only in 3 males). The prevalence of supernumerary teeth was determined as 0.69% (2 males and 9 females). Supernumeraries were 8 supernumerary premolars and 3 mesiodens. Transposition was found in eight patients (0.5%). The most common transposition happened between maxillary laterals and canines.

Of 190 patients (12%) who displayed a dental anomaly, 115 exhibited one dental anomaly, while 75 showed two or more dental anomalies (Table 2). No significant association of occurrence between dental anomalies was found.

**DISCUSSION**

Although there have been several studies investigating the prevalence of various dental anomalies, only a few have been conducted on orthodontic patients (Vahid-Dastjerdi et al., 2010, 2011; Gomes et al., 2010; Uslu et al., 2009; Altug-Atac et al., 2007; Udom et al., 1998; Kotsomitis et al., 1996) and Iranian orthodontic patients in particular (Vahid-Dastjerdi et al., 2010, 2011). In the present study, the prevalence of permanent tooth anomalies in patients who underwent orthodontic treatment was analyzed providing an estimation of the prevalence of dental anomalies in Iranian orthodontic patients as a whole.

Hypodontia was the most prevalent dental anomaly in the present study which supports the findings of some of previous study (Uslu et al., 2009; Altug-Atac et al., 2007), while Kruthika et al. (2010) in an investigation on the 20,182 Indian patients reported hyperdontia as most frequent anomaly in their study. In the investigation of Udom et al. (1998), Invagination of maxillary incisors was found to be the most prevalent anomaly in a population of Australian orthodontic patients. Uslu et al. (2009) and Altug-Atac (2007) in their studies on population of Turkish orthodontic patients found that hypodontia was the most prevalent dental anomaly.

In the present study, of the 1590 patients, 190 (12%) showed at least one dental anomaly (40 males and 150 females), from which 115 (7%) exhibited one dental anomaly (23 males and 92 females) and 75 (5%) showed more than one dental anomaly (17 males and 58 females). However studies related to investigating the prevalence of dental anomalies had evaluated different anomalies. Hence, it is inappropriate to compare the prevalence of patients with one and more than one dental anomalies in the present study with those in the previous reports.
The prevalence of patients with hypodontia in this study was 10%, which agrees with the prevalence of 9.1% reported by Vahid-Dastjerdi et al. (2010) who examined 1751 subjects of Iranian orthodontic patients, though others reported frequencies which are to some extent different.

A pilot study by Kotsomitis et al. (1996) on 202 orthodontic patients reported a prevalence of 8.4% for hypodontia, while Udom et al. (1998) in their study on 111 Australian orthodontic patients reported that the prevalence of hypodontia was 8.1% in their study. In the present study, maxillary lateral incisor was the most involved tooth confirming the results of some previous studies (Vahid-Dastjerdi et al., 2010; Gomes et al., 2010). However the mandibular second premolar was the most common affected tooth in reports of many other investigators (Udom et al., 1998; Bergstrom et al., 1977). Hypodontia and missing teeth not only cause malocclusion but also can complicate orthodontic treatment due to poor occlusal support and stability (Kositbowornchai et al., 2010).

The prevalence of patients with ectopic eruption in this study was 5.1%. This is significantly lower than the incidence of 29.7% reported by Kotsomitis et al. (1996) but comparable with the finding of 7.2% by Bergstrom et al. (1977) who examined panoramic radiographs of 2589 school children.

The maxillary canine was the most common ectopic tooth in our study confirming the results of previous investigators (Udom et al., 1998; Bergstrom et al., 1977).

Prevalence of impacted teeth including third molars was 2.6% in the present study, which is significantly lower than the 9.9% prevalence rate reported by Udom et al. (1998) that their report did not include third molars. The observation of the present study that the most frequently impacted teeth are canines agrees with some earlier reports (Udom et al., 1998; Aitasalo et al., 1972).

In the present study, tooth size discrepancy (macrodontia and microdontia) and peg shaped lateral incisor were considered separately, although as we did not observe any macrodontia, we discussed about tooth size discrepancy in form of microdontia. In the present study we also did not observe any tooth affected by germination and fusion. The prevalence of fusion and germination have been reported to be very low in general population (0.19 and 0.22%, respectively) and extremely limited in orthodontic patients (Kositbowornchai et al., 2010). A retrospective study based on the panoramic radiographs of 480 patients done in the same geographic region as the present study (Yazd, Iran) have shown that Macroodontia and fusion were only detected in a few radiographs (0.2%) (Ezoddini et al., 2007) which is in accordance with our study.

The prevalence of microdontia ranges from 0.8 to 8.4% in various populations (Neville et al., 2005) and the finding of 1.6% of microdontia in this study are in the range of the aforementioned report. Maxillary third molars were the most involved teeth.

The reported frequency of peg-shaped lateral incisors varied between 0.3 and 8.4% in different random population studies (Brin et al., 1986; Ooshima et al., 1996). The prevalence of 1% in the present study is in this range but significantly lower than the frequency of 9.9% which was reported by Udom et al. (1998).

Vahid-Dastjerdi et al. (2011) examined radiographs of 1751 Iranian orthodontic patients and reported that 0.74% had supernumerary teeth; this confirmed finding of 0.69% for supernumerary teeth in the present study, whereas Udom et al. (1998) reported prevalence of 1.8% for supernumerary teeth. In the present study, most supernumerary teeth were mandibular premolars followed in decreasing order by mesiodens. Mesiodens may cause delay or ectopic eruption of the permanent incisor and subsequent change in occlusion and appearance (Kositbowornchai et al., 2010).

Transposition, an uncommon dental anomaly involving positional interchange of the two teeth, was observed in 0.5% of the patients in this study. Maxillary lateral-canine transposition was the most common form of transposition in our study followed in descending order by maxillary canine-first premolar transposition. Peck et al. (1993) who examined 43 subjects with canine-first premolar (Mx.C.P1) transposition, reported that tooth agenesis (excluding third molars) and/or peg-shaped maxillary lateral incisors accompanied Mx.C.P1 transposition in 49% (21) of the subjects was four to ten times the normal rate of occurrence, however in the present study no association between these anomalies was found. Transposition may occur in association with other anomalies such as aplasia, peg-shaped lateral incisor and deciduous teeth retention (Budai et al., 2003) and early diagnosis lessen the related risks to orthodontic treatment. The prevalence of taurodontism has been reported to range between 5.67 and 60% of subjects (Ashwin et al., 2006). In the present study, 0.18% of the patients showed taurodontism. In comparison, Shifman and Channeel (1978) reported 5.6% taurodontism in Israeli patients, whereas MacDonald-Jankowski and Li (1993) reported higher rate (46.4%) of taurodontism in an adult Chinese population and Udom et al. (1998) found 9.9% taurodontism in their study on the Australian orthodontic patients. The difference might arise from racial differences (It is commonly observed among the Eskimos and Natives of Australia and Central America (Krutihka et al., 2010)) or differences in diagnostic criteria. The present study attempted to evaluate the frequency of occurrence of selected dental anomalies in a population of Iranian orthodontic patients. It was found that 12% of the patients showed at least one dental anomaly. Hypodontia was the most prevalent dental anomaly. No significant association between the occurrences of dental anomalies was found.
REFERENCES


