

### Original article

## Prevalence of Developmental Dental Anomalies in A Sample of Adult Libyan Patients: Orthopantomographic Study

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### ABSTRACT

**Objectives:** This research was aimed to investigate the prevalence of dental anomalies among a selected adult Libyan sample using panoramic radiographs.

**Materials and Methods:** Retrospective study of digital panoramic radiographs of (412) Libyan adult patients of both sexes (males and females). The data was collected from different Clinics in Benghazi district over six months period of time. The radiographs were studied on a computer screen to find out the developmental dental anomalies. Descriptive statistics and bivariate analysis by age and gender were conducted using SPSS software.

**Results:** A total of 412 panorama radiographs were used in the data analysis. The majority were females (273, 66%), aged between 18 and 70 years old. The most common type of dental anomalies was dilaceration (130, 31.6%), followed by impaction of wisdom teeth (66, 16%) and impaction of other teeth (23, 5.6%). A few cases of other anomalies were reported; these included one case of odontome, ectopic eruption of left upper 8 and one mesiodens.

**Conclusions:** Dilaceration and impaction were the most common types of developmental dental anomalies among study population, with rare cases of supernumerary teeth and odontome. Multiple anomalies are common in the present study, suggestion genetic origin. The study showed that the prevalence of dental anomalies increases with the age of participants.

**Keywords:** Dental anomalies, orthopantomograph, adults, Libya.

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### INTRODUCTION

Developmental dental anomalies are marked deviations from the normal presentation of the primary or permanent dentition. Local, as well as systemic factors, may be responsible for these disturbances. Dental anomalies consist of a wide range of conditions, including changes in the number, morphology, eruption, and size of teeth.<sup>1</sup> The developmental anomalies of teeth are caused during tooth development, whereas the acquired anomalies are caused after tooth development.<sup>2</sup> Anomalies of tooth structure (enamel and dentin defects) can be symptoms of syndromes.<sup>3</sup> Some dental disorders and developmental defects of enamel may lead to a number of problems such as increased sensitivity and

esthetic problems, while severe tooth decay can be prevented by the timely detection of problems and appropriate intervention.<sup>4</sup> Some other dental anomalies, such as impaction, play an effective role in the etiology of different types of malocclusions.<sup>5</sup> Anomalies affect the occlusion and length of the jaw arch and their identification, particularly in the anterior region in young adults, and hence, are extremely important in the esthetic and orthodontic treatment plan.<sup>6</sup>

Several studies have addressed the prevalence of dental anomalies; however, the results of these studies were inconsistent between and within populations. These differences are a reflection of variations in race, sampling methods, and different diagnostic criteria.<sup>7</sup> Therefore, researching the

prevalence of these countries at local and country level is important to provide data for policy makers and dental educators and to help in planning interventions and health care strategies to tackle these problems. Dental anomalies' incidence and distribution in different populations can provide important information for genetic studies, which help to understand variations within and between the different populations, and has an important contribution to the multidisciplinary clinical team approach to treatment.<sup>8</sup> Early diagnosis allows optimal patient management and treatment planning and can reduce complications and the amount and complexity of the planned treatment. So, the aim of this study was to investigate prevalence of dental anomalies among a selected adult Libyan sample using panoramic radiographs.

## MATERIALS AND METHODS

A cross-sectional study design was used to analyze radiographic data that was collected retrospectively as part of routine dental care. This design was adopted to avoid unnecessary exposure to radiations. Although random sample from the population is usually recommended to study the distribution of oral health conditions, this was not possible in our study due to ethical reasons. A convenience sample of panoramic radiographs, taken in the last six months for Libyan adult patients of both sexes (males and females), was collected from different Clinics in the city of Benghazi. Two major clinics were identified and provided consent to use their data. A total of 412 panoramic radiographs were retrieved for analysis which have at least information on patients; age and gender and meet following inclusion and exclusion criteria:

### Inclusion criteria:

- Libyan dental patients
- Aged 18 years of age or older
- Good quality radiograph

### Exclusion criteria

- Unclear panoramic view
- patients known for hereditary syndromes associated with dental anomalies
- Trauma or fracture of the jaw which may affect the normal growth
- History of orthodontic treatment

The radiographs were panoramic views taken as PlaneMeca EC Pro one (Helsinki, Finland) with the maximum KVP of 70, mA=12 and exposure time Sec=18. The radiographs were used in the digital form after being uploaded on computer device DELL 15inch windows10 Pantum5&500 Gp, as JPEG&PNJ pictures with maximum resolution, opened with Windows photo viewer.

Each image was scored subjectively with a 4-point ordinal grading scale covering three major aspects which consisted of anatomical coverage, density and

image contrast and also anatomical structures. The anatomical structures on panoramic image were divided into 6 anatomical zones namely: dentition (zone 1), nasal and sinus (zone 2), mandibular body (zone 3), temporal-mandibular joint (zone 4), ramus-spine (zone 5) and hyoid bone (zone 6). The average score was then calculated from those 6 anatomical zones, anatomical coverage, image density and contrast so as to represent the diagnostic quality of each panoramic image. The lower score (score of 1 or 2) indicating poorer image quality and excluded from the study.<sup>9</sup>

The radiographs were assessed for the presence of developmental dental anomalies which include disorders of shape, number, structure and position. The developmental anomalies are summaries in Table 1. The interpretation of the radiographs was performed by one observer and reviewed by the other observer in a separate setting. The two observers conducted agreement training before starting the interpretation of the radiographs. This included interpreting 10 radiographs with different anomalies and conflicts in the agreement were solved by discussion. Over 90% agreement was reached before commencing radiographs interpretation.

**Table 1: Categories of dental anomalies assess in the present study**

|                |   |
|----------------|---|
| Numbering      | <ul style="list-style-type: none"> <li>• Supernumerary: mesiodens, paramolar and distomolar.</li> <li>• Hypodontia lateral incisors, canines, premolars. excluding third molars</li> </ul>              |
| Shape and size | <ul style="list-style-type: none"> <li>• Microdontia</li> <li>• Macrodontia</li> <li>• Fusion</li> <li>• Gemenation</li> <li>• Dilacerations</li> <li>• dens in dent</li> <li>• Taurodontism</li> </ul> |
| Impaction      | <ul style="list-style-type: none"> <li>• Third molars</li> <li>• Others</li> </ul>  |

The interpretation data and available demographic data for dental patients were uploaded on excel sheet and coded as numbers. The dental anomalies for each type were coded as present or absent. If more than one anomaly of same type were present in one patient, they coded more than one. Each anomaly was coded separately. The data was then imported into SPSS statistical package (version 25). Descriptive statistical analysis was conducted to describe the demographic characteristics of study participants and the proportions of dental anomalies. The mean age of dental patients was compared among

anomalies and anomaly free subgroups using independent samples t test. The distribution of anomalies by gender was conducted using Chi-square test. The level of significance will be set at  $p=0.05$ .

## RESULTS

A total of 412 panoramic radiographs were used in the data analysis. The majority were females (273, 66%), aged between 18 and 70 years with an average age of  $37.45 \pm 11.73$  years.

Figure 1 shows the distribution of dental anomalies. The most common type of dental anomalies was dilaceration (130, 31.6%), followed by impaction of wisdom teeth (66, 16%) and impaction of other teeth (23, 5.6%). A few cases of other anomalies were reported; These included one case of odontome, ectopic eruption, and mesiodens.

The proportion of impacted teeth is presented in figure 1. Overall impaction was observed in 21.6% of

radiographs. Impaction of one tooth was the most common form of impaction, followed by 2 teeth, 3 teeth and four teeth.

Figure 3 shows the distribution of impacted third molars by side. The impaction was more in lower than upper teeth (11.6% and 7.7%, respectively). Single impaction was higher than 2-sided impaction in both maxilla and mandible.

Figure 4 describes the distribution of impacted wisdom teeth according to location. The most commonly seen impaction in wisdom teeth was observed in lower right side (8.5%), followed by lower left side (7.3%). The least impacted tooth was upper right eight (4.6%).

Figure 5 shows the distribution of dilacerated teeth. Dilaceration was seen in nearly one third of radiographs assessed (31.6%). The single tooth dilaceration was less common than multiple teeth dilaceration.

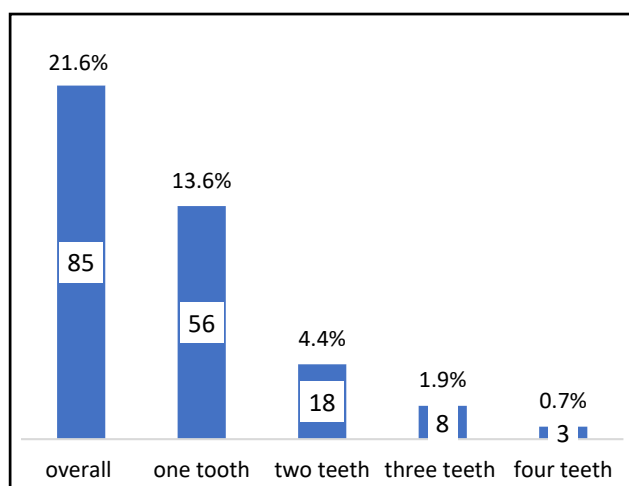


Figure 1: Distribution of dental anomalies according to type.

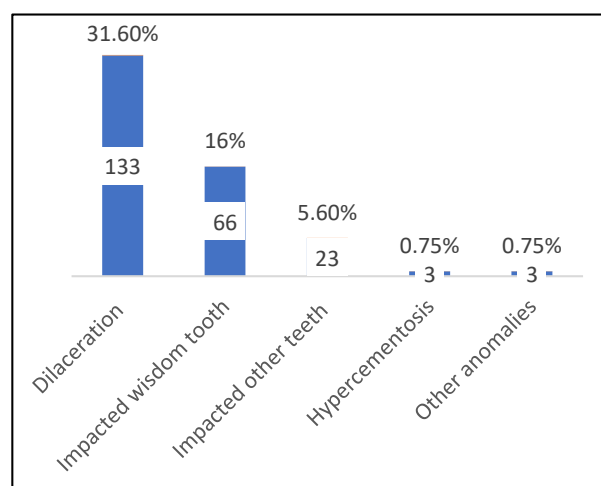


Figure 2: Frequency of impacted teeth according to their number

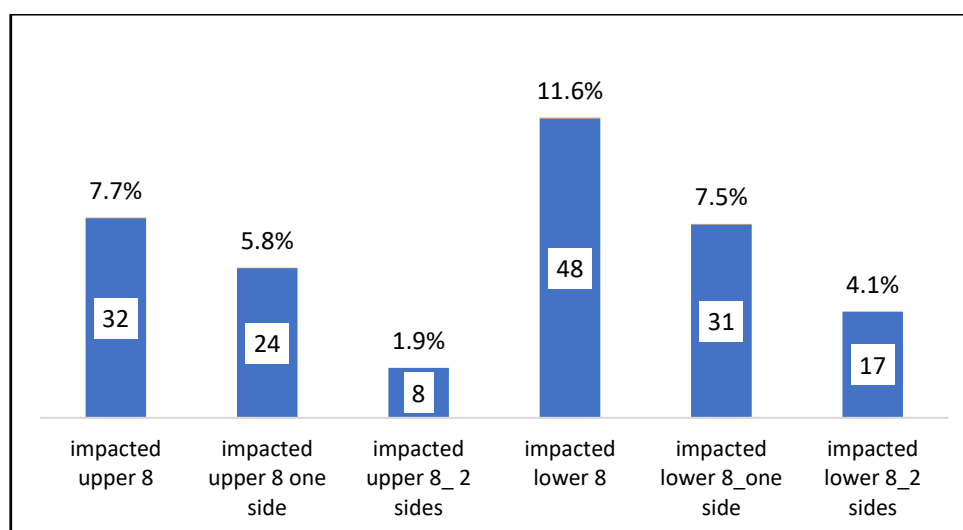
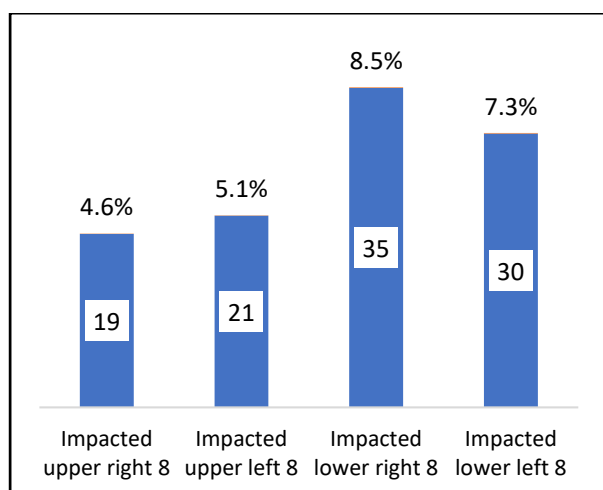
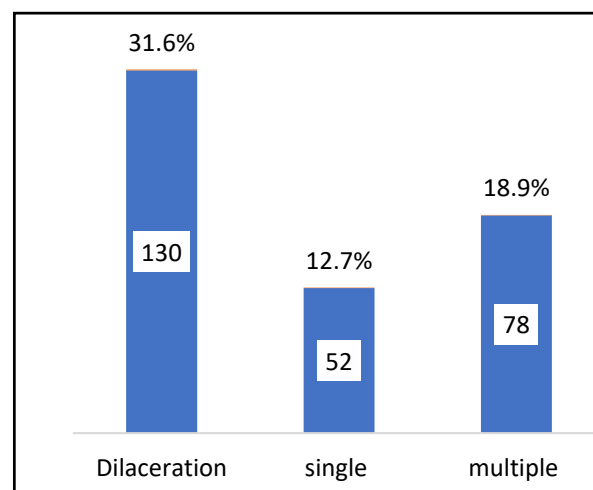


Figure 3: Distribution of impacted third molars by side



**Figure 4: Distribution of impacted third molars according to location**



**Figure 5: Distribution of dilacerated teeth**

Comparisons of anomalies by characteristics of the study sample are summarized in Table 1 and 2. No statistically significant differences were found when the proportion of anomalies were compared by gender. However, statistically significant differences were found when the age was compared among those who have anomalies and those who did not.

**Table 1: comparison of impaction and dilaceration by age**

| Variable                    |         | Mean $\pm$ SD     | P value  |
|-----------------------------|---------|-------------------|----------|
| <b>Dilaceration</b>         | Present | 33.94 $\pm$ 10.84 | 0.000*** |
|                             | Absent  | 39.67 $\pm$ 11.63 |          |
| <b>Impaction of wisdoms</b> | Present | 32.76 $\pm$ 11.22 | 0.003**  |
|                             | Absent  | 38.24 $\pm$ 11.65 |          |

Independent sample t test was used to compare subgroups

**Table 2: comparison of impaction and dilaceration by gender**

| Variable                    |        | N (%)     | P value |
|-----------------------------|--------|-----------|---------|
| <b>Dilaceration</b>         | Male   | 24 (17.3) | 0.124   |
|                             | Female | 42 (15.4) |         |
| <b>Impaction of wisdoms</b> | Male   | 37 (26.6) | 0.624   |
|                             | Female | 93 (34.1) |         |

Chi square test was used to compare subgroup

## DISCUSSION

The present study analyzed panoramic radiographs of adults Libyan dental patients who were outpatients of several dental clinics in the city of Benghazi, in order to describe the prevalence and the pattern of associations of different dental anomalies. Detailed study of these anomalies seems essential as they can lead to malocclusion, cosmetic deformities, and problems during tooth extraction or root canal treatment. In order to diagnose these anomalies, in addition to clinical observations and examinations, paraclinical investigations such as radiography are essential and play an important role in the differential diagnoses of these anomalies (White and Pharoah, 2004).

The analysis 412 panoramic radiographs of dental patients aged between 18 and 70 years, showed that 45 % had dental anomalies and the majority of them had multiple anomalies. This figure is relatively higher than that previously in Turkish population (39%),<sup>10</sup> New Zealand (21%), and Iranian young population (29%)<sup>11</sup> and 40 %, <sup>12</sup> but lower than that previously reported in India (73%).<sup>13</sup> The present study confirms the notion that the prevalence of dental anomalies was inconsistent between and within populations, which is attributed in race, genetic and methodological factors.<sup>12,14</sup> For example, some studies the types of dental anomalies assessed. However, no restrictions were applied on the type of dental anomalies included in the current study.

Dilaceration was the most common type of dental anomalies in the study sample, followed by impaction of wisdom teeth and hypodontia. Similar findings were reported in previous studies in Iran.<sup>12</sup> On contrary, other studies found different results, for example, impaction was the most common type of dental anomalies in an Iranian study.<sup>11</sup> However, comparison of such type of studies should be approached with caution because of variations in age groups and methodology. For instance, in a study that screened 500 digital panoramic radiographs in Rome, displaced canine and hypodontia were the most common type of developmental anomalies.<sup>15</sup> However, the subjects were from young age group (8-12 years of age).

Interestingly, the prevalence of dilaceration in the current study is relatively high (31.65). which is way higher than that reported in other countries such as in Turkey (9.5%) <sup>16</sup> in Nigeria (3%), <sup>17,18</sup> in Jordan (3.8%) in Yazd (15%) <sup>12</sup>. The difference in diagnostic criteria might be the cause of this dissimilarity. In the present study the tooth is considered to have dilaceration if it has angulation above 20 degree. Alternately, a study that included dilaceration at the angle of 90 degree or more, the dilaceration was reported in 7% of patients.<sup>19</sup> Although it is difficult to explain the relatively high rate of dilaceration in the current study, it is possible that recurrent infections in the primary dentition has resulted in injuries of

permanent tooth bud.<sup>20</sup> This explanation is supported by the findings of several studies conducted in Libyan children and adults that indicated high caries rates with no treatment or extraction as common encounters.<sup>21,22</sup>

The second most common developmental anomaly in the present study was the impacted teeth. Third molars which was reported in 16% of patients. This finding is low compared to studies conducted in other countries such as Yemen ,Turkey and Iran were above 40% of adults had at least one impacted third molar tooth.<sup>10,11,23</sup> However, lower prevalence of impaction has been reported in several countries.<sup>12</sup> In fact, extraction of impacted teeth is one of the prominent causes of tooth extraction in Libyan adult population.<sup>21</sup> Therefore, the findings reported in the present study can be an underestimation of the actual impaction prevalence since many patients might remove the impacted teeth surgically, especially older individuals. In addition, the assessment does not include examination to identify impacted teeth and hence many partially impacted teeth may be unrecorded.

Impaction in teeth other than wisdoms was observed in 5.6% of patients. This is comparable to what is reported in studies which suggested that the prevalence of canine impaction ranges between 0.8 and 8.8% among different populations.<sup>7,24,25</sup> This dissimilarity in results in different countries is not surprising given that the prevalence of dental anomalies varied widely globally. However, this finding should be approached with caution given that the analysis is based solely on radiographic assessment with no medical records were available. Nevertheless, the present study enrolled older dental patients which minimizes the bias of miss-diagnosis usually occur in younger patients.<sup>26</sup> Above all, missing teeth to congenital or other reasons can effect quality of life and social well-being of individuals by compromising the aesthetic, function, and places additional financial burden.<sup>27</sup>

In the present study the majority of patients with dental anomalies had two or more co-existing anomalies. This finding is highly suggestive of genetic origin and hereditary aspects of these anomalies. In addition, while no gender differences were observed, the prevalence of impaction and dilaceration increased with age. It is unclear why, however, it could be the case that these the panoramic radiograph is usually taken to older patients to diagnose periodontitis and hence these asymptomatic anomalies are common among older patients who comprised the majority of participants. The data used in this study is for adult patients who received dental care at some point and whose treatment necessitates the radiographic investigation. Therefore, the findings of the present study cannot be extrapolated to general population.



In the present study a few cases of supernumerary teeth and odontome were observed. This is suggesting that supernumerary teeth are relatively rare among Libyan adult. A review of literature indicates that incidence rate of supernumerary teeth ranged between 1.5% and 3.5%.<sup>28</sup>

The study findings were tempered by some limitations which should be discussed here. First, the study used retrospectively collected radiographs with limited additional information such as medical history, dental history, and chief complain. Second, no clinical examination was undertaken at the time of the study which affected the diagnosis of anomalies. Therefore, future prospective studies that included both radiographic and clinical examination should be considered. Another area to investigate the role of dental education in preparing dental work force to meet the diagnostic and treatments needs of patients bearing dental anomalies. Previous studies suggested that dental curricula in Libyan dental schools do not adequately prepare dentists to provide preventive dental services.<sup>29,30</sup>

The present study used a retrospective analysis of panoramic radiographs of adults Libyan dental patients. It demonstrated that developmental anomalies among Libya adults participated in the study are relatively common affecting 45% of cases and the majority of them had multiple anomalies. The most common types of anomalies were dilaceration and impaction, mainly third molars. Rare cases of supernumerary teeth were reported. The study showed that the prevalence of dental anomalies increases with the age of participants.

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