Prevalence of supernumerary teeth in a nonsyndromic Syrian sample

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Background
Supernumerary teeth (ST), also known as hyperdontia, is a condition in which more than the normal number of teeth are present in the series. The prevalence of ST varies between and within different populations. These teeth may cause various complications. The aim of the current study was to investigate the prevalence and characteristics of ST in Damascus inhabitants, Syria.

Materials and methods
A cross-sectional study was carried out using retrospectively collected digital panoramic radiographs of 2753 patients (1047 males and 1706 females) ranging in age from 12.2 to 20.5 years between January 2012 and December 2014. These radiographs were obtained from private dental offices spread across Damascus, Syria. For each patient with ST, the demographic variables, number, location, type, position, morphology of ST, and complications were recorded.

Results
ST were detected in 39 patients (1.4%), of whom 25 (64.1%) were males and 14 (35.9%) were females, with a male to female ratio of 1.8 : 1 ($P<0.001$). Mesiodens was the most prevalent ST (39.1%), followed by supernumerary premolars (28.3%), supernumerary laterals (26.1%), distomolars (4.3%), and paramolars (2.2%). This series includes cases with one and two ST. Of the 46 ST detected, 56.5% had a conical morphology, 89.1% were in a vertical position, and 19.6% were erupted. ST caused displacement of the adjacent teeth in 17 cases (37.0%) and the impaction of the permanent teeth in five cases (10.9%).

Conclusion and recommendations
The prevalence of ST in Damascus inhabitants was found to be 1.4%; the most frequent type was mesiodens. A conical morphology was found to be the most common form of ST. Displacement of permanent teeth is the most frequent complication. Further studies should be carried out on more representative samples of both the public and the private sector patients.

Keywords:
mesiodens, prevalence, supernumerary teeth, Syria
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Introduction

Supernumerary teeth (ST) are defined as teeth that exceed the normal dental formula [1]. They are classified according to their type and form. Type variations include mesiodens, parapremolars, paramolars, and distomolars [2]. Shapira and Kuftinec [3] reported the order of decreasing frequency as follows: upper central incisors, molars, and premolars, followed by lateral incisors and canines. The form of ST varies from a simple odontome, through a conical or tuberculate tooth to a supplemental tooth that closely resembles a normal tooth. Also, the number and site of supernumeraries can vary considerably [2]. ST may occur single or multiple, unilaterally or bilaterally, and in one or both jaws. Cases involving one or two ST most commonly involve the anterior maxilla, followed by the mandibular premolar region [4].

The prevalence of ST varies between 0.1 and 3.6% [5–8]. ST are more frequent in males than in females [1,9–11]. Males are affected approximately twice as much as females [1,10]. ST are often associated with Gardner syndrome, Crouzon syndrome, Fabry–Anderson syndrome, Ehler–Danlos syndrome, Hallermann–Streiff syndrome, facial fissures, or cleidocranial dysplasia [1,12], also seen in a nonsyndromic population [1,13]. The exact etiology of formation of ST is not very well understood. Many theories have been put forward to explain the anomaly on the basis of developmental interference and heredity [12].

ST may cause different local disorders, such as ectopic eruptions, tooth displacements [14], overcrowding, delayed eruption, dental impaction, spacing anomalies [6], follicular cysts, and other alterations, requiring a surgical or an orthodontic intervention [14]. Mesiodens can prevent or cause ectopic eruption of a central incisor. Less frequently, a mesiodens can cause dilaceration or resorption of the permanent incisor's root. Dentigerous cyst formation involved the mesiodens. Moreover, eruption into the nasal

cavity has been reported. Removal of a mesiodens or another permanent supernumerary incisor results in eruption of the permanent adjacent normal incisor in 75% of the cases. Later removal of the mesiodens reduces the likelihood that the adjacent normal permanent incisor will erupt on its own, especially if the apex is completed [15]. Inverted conical supernumeraries can be harder to remove if removal is delayed as they can migrate deeper into the jaw [16]. Thus, an early diagnosis and appropriate treatment are essential for a successful solution [17]. Knowledge of the prevalence of ST and associated complications will help to develop targeted interventions for the prevention of potential complications. The aim of this study was to investigate the prevalence and characteristics of ST in a sample of nonsyndromic Syrians in the region of Damascus and to detect their complications.

Materials and methods

A cross-sectional study was carried out using retrospectively collected digital panoramic radiographs of 2753 patients (1047 males and 1706 females) ranging in age from 12.2 to 20.5 years (median age = 16.13 3.27) between January 2012 and December 2014. These radiographs were obtained from private dental offices spread across Damascus, Syria. Patients with a history of previous extractions, any syndrome, or congenital anomalies were excluded from the current study. The supernumeraries were diagnosed and the cases were included on the basis of the descriptions presented by White and Pharoah [18].

The radiographs were saved as Joint Photographic Experts Group files, and no adjustment of contrast, brightness, and magnification was performed. A separate assessment of all radiographs was performed by two researchers (the first two authors) on the monitor screen. To reduce radiographic misinterpretation, each examiner carefully studied the findings and verified them independently. Interexaminer discrepancies were resolved by consensus and agreement.

For each patient with ST, the number, location (maxilla or mandible), type, position, morphology of ST, and complications (displacement, impossibility of eruption, resorptions of adjacent tooth, and presence of follicular cysts) were detected. The following information was obtained from the patients' records: sex, age, and medical history. The preliminary data were recorded manually using paper sheets and the final data were entered into SPSS (Statistical Package for Social Sciences) software, version 20 (IBM Corp., Armonk, New York, USA) for analysis.

Ethics considerations

The present study was approved by the Research Ethics Committee at the Faculty of Dentistry, Syrian Private University.

Statistical analysis

The data were analyzed using SPSS software version 20 (IBM SPSS Statistics, Armonk, NY: IBM Corp, USA). Statistical analysis of the data in terms of sex was carried out using the χ^2-test. A P value of 0.05 or less was considered statistically significant.

Results

We studied the radiographs of 2753 patients of both sexes; we found that 39 patients (1.4%) had 46 ST. Of the 39 patients, 25 were males (64.1%) and 14 were females (35.9%), with a male to female ratio of 1.8 : 1 (Table 1).

Table 2 shows the characteristics of ST. A total of 46 ST were detected, of which 82.6% ($n = 38$) were single and 17.4% ($n = 4$) were double. However, cases with three or more ST were not detected. In addition, 65.2% ($n = 30$) were located in the maxillary arch, whereas 34.8% ($n = 16$) were found in the mandible. Mesiodens was the most common ST (39.1%) (Fig. 1), followed by supernumerary premolars (28.3%), supernumerary laterals (26.1%), distomolars (4.3%), and paramolars (2.2%). Of the total ST, 56.5% ($n = 26$) had a conical morphology, 19.6% ($n = 9$) were erupted, and 89.1% ($n = 41$) were in a vertical position. All erupted ST were in vertical positions. In terms of morphology, 22.2% ($n = 2$) of the ST erupted were conical in shape and 77.8% ($n = 7$) of the ST erupted had a eumorphic morphology. ST caused displacement of the adjacent teeth in 17 cases (37.0%) and the impaction of the permanent teeth in five cases (10.9%). Among the five impacted teeth, the most frequently affected teeth were the premolars (80%, $n = 4$) (Fig. 2), followed by the central incisor (20%, $n = 1$) (Fig. 3). No cysts, enlargement in the follicular epithelium, or root resorption were found.

Discussion

There are numerous published data on ST among different populations worldwide [6–8,10,11,14,17]. However, this information is lacking in Syria. Therefore, the aim of this paper was to investigate the prevalence and characteristics of ST in a nonsyndromic Syrian sample.

According to the literature, the prevalence of ST in permanent dentition is 0.1–3.6% [5–8]. The results of this study showed that the prevalence of ST in permanent dentition was 1.4% and was more frequent in males than in females, with a male to female ratio of 1.8 : 1 ($P < 0.001$). This finding was in agreement with the data reported that males are affected approximately twice as much as females in the permanent dentition [1,4,10]. However, Singh *et al.* [7] found a lower male to female distribution of 1.3 : 1 in a patient sample of Nepalese children, whereas others found a greater sex distribution in Asian school children of 5.5 : 1 for Japanese children and 6.5 : 1 for children in Hong Kong [19]. The differences in findings may be attributed to differences in ethnic groups.

Studies have reported that ST are more frequent as a single tooth, whereas multiple ST appear frequently as two teeth [20,21]. In agreement with these studies, 82.6% ($n = 38$) of the ST in the current sample were single and 17.4% ($n = 4$) were double. However, cases with three or

Table 1. Distribution of the supernumerary teeth according to sex

Sex	*n*	Supernumerary teeth [*n* (%)]	*P* value
Male	1047	25 (64.1)	<0.001
Female	1706	14 (35.9)	

Table 2. Characteristics of the supernumerary teeth

Characteristics	*n* (%)
Number	
Single	38 (82.6)
Double	4 (17.4)
Location	
Maxilla	30 (65.2)
Mandible	16 (34.8)
Type	
Mesiodens	18 (39.1)
Lateral	12 (26.1)
Premolar	13 (28.3)
Paramolar	1 (2.2)
Distomolar	2 (4.3)
Morphology	
Eumorphic	14 (30.5)
Conical	26 (56.5)
Tubercular	6 (13.0)
Status	
Impacted	37 (80.4)
Erupted	9 (19.6)
Position	
Vertical	41 (89.1)
Horizontal	2 (4.4)
Inverted	1 (2.2)
Distoangular	2 (4.3)
Complications	
Impaction	5 (10.9)
Displacement	17 (37.0)
No complications	24 (52.1)
Total number	46 (100)

Figure 1.

Panoramic photograph showing conical mesiodens.

more ST were not observed in the present study. It has been reported that it is uncommon to find multiple supernumeraries in individuals with no other associated disease or syndrome [22]. This finding is not in agreement with that of Açikgöz *et al.* [23], who carried out their study on a Turkish sample and found that multiple ST are very common, but the prevalence of five or more ST was reported to be less than 1%. They suggested that hereditary factors might be involved in the etiologies of ST.

In agreement with the data reported by Salcido-García *et al.* [11] (66%), our study showed that 65.2% ($n = 30$) of

Figure 2.

Panoramic radiographic appearance of an unerupted premolar 34 along with an unerupted supernumerary tooth in the mandibular premolar region.

Figure 3.

An unerupted conical supernumerary tooth causing failure of eruption of central incisor 21.

the observed ST were found to be in the maxillary arch. In addition, other studies reported that around 90–98% of the cases were located in maxilla [14,24].

The results of this study showed that mesiodens was the most common ST (39.1%), followed by premolars (28.3%), supernumerary laterals (26.1%), distomolars (4.3%), and paramolars (2.2%). This result is in agreement with many studies that reported that mesiodens is the most frequently occurring ST [7,8,10,11,21]. In contrast to our finding, some studies found that mesiodens was followed by distomolars [21,25], but others found that mesiodens was followed by supernumerary laterals and premolars [1,11]. Interestingly, in 1990, Yusof [5] mentioned in his brief review of the literature that premolars were the most frequent ST, followed by paramolars and mesiodens. Differences in the findings could be attributed to the fact that these studies were carried out in different populations.

In terms of the shape of observed ST in this study, ST with a conical shape were the most commonly observed morphology 56.5% ($n = 26$). This finding was in agreement with the previous research [7,14,20]. The results of the current study showed that 19.6% ($n = 9$) of the ST were erupted. Similar frequencies of erupted ST have been found by other studies [14,20]. We also observed that 22.2% ($n = 2$) of the ST erupted were conical in

shape and 77.8% ($n = 7$) of the ST erupted had a eumorphic morphology. This result is in agreement with some studies that reported that eumorphic teeth had a higher frequency of eruption [7,14]. The results of the current study showed that the most frequently reported position for ST (89.1%) was the vertical position. These findings are in agreement with other reports [14,20].

Complications including displacement and impedance of eruption of permanent teeth were found in 47.8% ($n = 22$) of the participants of the present study. The displacement was the most frequently observed complication. This result is in agreement with some studies that reported that displacement was a commonly observed complication [20,26]. In the present research, we found that impacted permanent premolars were the most prevalent (80%, $n = 4$), followed by impacted central incisor (20%, $n = 1$). In contrast to our findings, Jamilian *et al.* [27] found that the most frequently impacted teeth were the maxillary canines. Differences in these findings could be attributed to the fact that their study was carried out in a specific group of patients with cleft lip and palate.

Other complications were observed in the literature such as cysts, enlargement in the follicular epithelium, and root resorption of the adjacent teeth [10,16,28]. No cysts or enlargement in the follicular epithelium were observed in the current study. These findings are not in agreement with those of Primosch [16], who reported that enlarged follicular space was present in 30% of the cases, but histologic evidence of cyst formation was found in only 4–9% of the cases. In line with Hogstrom and Anderson [29], the present study did not find any root resorption. However, this finding is not in agreement with that of Ferrés-Padró *et al.* [10] and Díaz *et al.* [28].

Limitations

The results were obtained from the population sample of Damascus inhabitants only. We selected a convenience sample from private clinics. Clinic-based samples represent dental patients who seek treatment including factors of awareness and access to service; therefore, they do not reflect the actual situation of the general population of Damascus.

Conclusion and recommendations

The prevalence of ST (1.4%) in the studied sample of Damascus inhabitants was within the range reported by the literature and the most frequent type was mesiodens. A conical morphology was the most common form of ST. Displacement of permanent teeth was the most frequent complication. Using panoramic radiographs as a supplement to the clinical examination of patients enabled the detection and diagnosis of undiscovered complications. The findings from this study will form part of the baseline data for oral health of Damascus inhabitants. Therefore, it is recommended that further studies be carried out on more representative samples of both the public and the private sector patients.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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