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Original Article

A Retrospective Cross-Sectional Study on Supernumerary Teeth in Non-Syndromic Children and Adolescents: Evidence from Lesvos, Greece

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ABSTRACT

The occurrence of extra teeth beyond the normal dental complement—known as supernumerary teeth or hyperdontia—represents an uncommon developmental variation that can interfere with normal occlusion and tooth eruption. Such anomalies may lead to aesthetic and functional complications, including crowding and delayed eruption. Although prevalence rates have been reported across diverse populations, little is known about their occurrence in smaller or geographically distinct communities. This study examined the frequency and distribution patterns of supernumerary teeth among school-aged children and adolescents from Lesvos Island, Greece. Dental panoramic radiographs from 621 Caucasian patients aged 9–16 years were retrospectively reviewed. All radiographs were obtained from orthodontic and general or pediatric dental clinics in Mytilini, Lesvos. Each image was screened to document the presence, number, morphology, and arch position of supernumerary teeth, and the findings were analyzed by sex and dental arch.

Fifteen participants presented with at least one supernumerary tooth, yielding a prevalence rate of 2.4%. Males exhibited a marginally higher frequency (1.4%) compared with females (1.0%). Most cases involved the maxillary arch (1.9%). The mesiodens type was the most prevalent, followed by supernumerary lateral incisors, paramolars, and a single maxillary central incisor. The prevalence of hyperdontia in this cohort aligns with previously documented values for comparable populations. Mesiodens was the dominant type and occurred mainly in the upper jaw. Routine radiographic evaluation remains vital for early recognition and effective treatment planning of such anomalies.

Keywords: Supernumerary teeth, Hyperdontia, Prevalence, Lesvos Island, Greece

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Introduction

Hyperdontia, or the presence of supernumerary teeth, is a developmental dental anomaly that originates during the formation of the dental lamina, specifically throughout the induction and proliferation stages of odontogenesis [1]. The condition most frequently affects the anterior maxillary region, particularly the central incisors, followed by the occurrence of additional teeth in the maxillary and mandibular molar and premolar areas. Less commonly, the canines and

lateral incisors are involved. In rare cases, supernumerary teeth have been documented in ectopic sites beyond the alveolar ridges, such as the maxillary sinus, nasal cavity, soft palate, and even in regions as remote as the orbit, brain, or sphenomaxillary fissure [2].

Supernumerary teeth are classified according to their morphology and position. Morphologically, they are categorized as either *supplemental*—resembling normal teeth in shape and size—or *rudimentary*, which are smaller and morphologically atypical. The

rudimentary group can be further divided into subtypes: conical (peg-shaped), tuberculate (barrelshaped with one or more cusps, typically found in the anterior region), and molariform or premolar-like types [3]. Among these, mesiodens are the most frequent and typically appear in the maxillary incisor region. Conical mesiodens tend to erupt spontaneously, while tuberculate ones are usually impacted. A distomolar (or distodens) refers to a fourth molar, whereas a paramolar denotes a supernumerary tooth situated near the molar region, either on the buccal or lingual side [2]. Clinically, such anomalies may hinder the eruption of adjacent permanent teeth, cause diastemas, or lead malalignment, emphasizing their significance [3].

The etiology of supernumerary teeth can be sporadic or hereditary. A well-documented example of genetic association is *cleidocranial dysplasia*, an autosomal dominant disorder characterized by multiple supernumerary teeth and mutations in specific developmental genes [1].

Epidemiologically, the frequency of supernumerary teeth varies across ethnic groups. In Caucasian populations, reported prevalence ranges from 0.1% to 3.8%, while slightly higher rates have been observed among Asian populations. In contrast, Black Americans exhibit up to a ninefold higher prevalence compared with White Americans. A distinct male predominance of approximately 2:1 is consistently reported [3]. Single supernumerary teeth account for 76–86% of cases, most frequently occurring in the permanent dentition, with a strong preference for the anterior maxilla. Two supernumerary teeth are found in 12–23% of cases, whereas three or more are exceedingly rare, comprising less than 1% [3].

Previous Greek studies have provided valuable insights into the national distribution of this anomaly. Fardi *et al.* [4] reported a 1.8% prevalence in northern Greece, consistent with international findings, identifying *mesiodens* as the most frequent type. In a more recent investigation, Lykousis *et al.* [5] found a notably higher prevalence of 11.6% in a Greek pediatric cohort, again with a male predominance. However, most available studies have focused on mainland populations, with limited evidence concerning individuals from isolated island regions.

Radiographic imaging remains essential for diagnosis. Although panoramic radiographs are commonly used, their image quality for anterior teeth can be suboptimal. Periapical radiographs, particularly when combined with the parallax technique, improve localization of anterior supernumerary teeth, while vertex occlusal radiographs offer superior accuracy in determining

anteroposterior positioning. Cone-beam computed tomography (CBCT) further enhances diagnostic precision by providing three-dimensional visualization with relatively low radiation exposure compared to conventional CT [1].

Supernumerary teeth located in the premaxillary region often cause complications, most notably the impaction of central incisors [6]. Early identification and timely extraction during the mixed dentition stage are crucial to prevent adverse effects on adjacent teeth, including eruption delays, root resorption, crowding, ectopic eruption, displacement, dilaceration, malocclusion, and diastema formation. In most cases, spontaneous eruption of the affected permanent tooth follows removal of the supernumerary tooth. However, when root development is complete and eruption does not occur naturally, surgical exposure in combination with orthodontic guidance may be required [2]. Among all types, tuberculate mesiodentes are particularly associated with eruption failure, crowding, and rotation of adjacent teeth, often necessitating orthodontic intervention [7, 8].

Given the scarcity of epidemiological data from geographically isolated regions, the present study sought to assess the prevalence of supernumerary teeth among Caucasian children and adolescents residing on the Greek island of Lesvos. Lesvos, located in the northeastern Aegean Sea, is Greece's third-largest island and the eighth-largest in the Mediterranean. Owing to its relative geographic isolation and unique demographic profile, this population offers an interesting context for studying dental anomalies, including hyperdontia.

Materials and Methods

This investigation employed a retrospective cross-sectional design spanning a 10-year period and was conducted in full compliance with ethical and research standards. The study adhered to the principles outlined in the *Declaration of Helsinki* and received ethical approval from the Committee of Dr. M. Katanakis' Clinic in Mytilini, Lesvos (approval date: 12 October 2022).

Data were obtained from anonymized diagnostic archives and included panoramic radiographs supplemented, when available, by periapical images. Only radiographs acquired prior to any dental intervention were considered for analysis.

Inclusion criteria

Participants were selected according to the following criteria:

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- Children and adolescents between 9 and 16 years of age;
- Both parents of native Greek origin from Lesvos;
- Availability of clear, high-resolution panoramic radiographs (Figures 1 and 2).

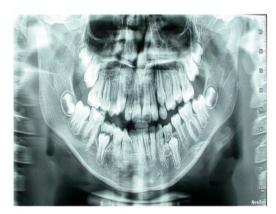


Figure 1. Panoramic radiograph of a patient with supernumerary mandibular left right premolar.



Figure 2. Panoramic radiograph of a patient with supernumerary maxillary left premolar.

To verify that no additional supernumerary teeth had developed over time, post-orthodontic radiographs were also reviewed. As no new occurrences were detected, only the initial diagnostic records were retained for analysis. Participants were recruited through convenience sampling; however, the demographic characteristics of the selected group were consistent with those of the broader pediatric population of Lesvos, allowing the findings to reflect a reasonably representative prevalence estimate.

Exclusion criteria

- Children whose parents were not of Greek descent or originated from other regions of Greece;
- Individuals presenting with syndromic conditions known to be associated with hyperdontia, such as ectodermal dysplasia or cleft lip and palate.

Based on these criteria, 88 records were excluded from the study.

Following the application of inclusion and exclusion parameters, a total of 621 radiographic records (258 males and 363 females) were included in the final sample. These participants were selected from an initial pool of 709 children attending orthodontic and general/pediatric dental clinics. Eligibility was determined by the availability of radiographs that met the quality and demographic requirements.

The chosen age range of 9–16 years was intentional, as it encompasses a developmental window during which both early- and late-forming supernumerary teeth can be identified, thereby providing a comprehensive assessment of their impact on occlusion and facial development.

All panoramic radiographs were independently examined using a dental X-ray viewer by two trained examiners (N.K. and M.A.M.), both of whom possessed formal academic qualifications in dental radiographic interpretation. A tooth was categorized as supernumerary when the number of teeth exceeded the normal dental count for its type and position.

Descriptive statistical analysis was performed using Microsoft Excel (version 16.95.1; Microsoft Corporation, Redmond, WA, USA). Due to the limited number of identified cases (n = 15), only descriptive statistics were applied.

Results and Discussion

The study sample consisted of 621 children, with a mean age of 12.5 years. Supernumerary teeth were detected in 15 participants, corresponding to an overall prevalence of 2.4%. Among these cases, 9 occurred in males and 6 in females (**Table 1**).

Here is the paraphrased version of the tables with the requested format:

Table 1. Distribution of Individuals with Supernumerary Teeth by Gender

Gender	Number	Percentage
Female	6	1.0%
Male	9	1.4%
Total	15	2.4%

The maxilla was the most common location for supernumerary teeth. The majority of these teeth were located in the maxillary arch (**Table 2**). Among the types of supernumerary teeth, mesiodentes were the most frequent (n = 8), followed by supernumerary lateral incisors (n = 3), paramolars (n = 2), and supernumerary central incisors (n = 1) (**Table 3**).

Table 2. Distribution of Supernumerary Teeth by Jaw

Arch	Males	Females	Total	
Maxilla	7	5	12	
Mandible	2	1	3	

Table 3. Distribution of Supernumerary Teeth by Tooth Type and Gender

Tooth Type	Males	Females	Total	Percentage	Tooth Type		
Mesiodentes	5	3	8	1.3%	Mesiodentes		
Supernumerary Lateral Incisors	2	1	3	0.5%	Supernumerary Lateral Incisors		
Paramolars	1	1	2	0.3%	Paramolars		
Supernumerary Central Incisors	1	1	2	0.3%	Supernumerary Central Incisors		

This study identified supernumerary teeth in 2.4% of the examined population, with a distribution of 1.9% in the maxilla and 0.5% in the mandible. Among the different types, mesiodens were most frequently observed, followed by supernumerary lateral incisors, paramolars, and central incisors. These findings emphasize that even in otherwise healthy children and adolescents, clinicians—particularly orthodontists—must remain alert for hyperdontia during routine examinations.

Supernumerary teeth are often sporadic but may also be associated with various genetic syndromes, such as cleidocranial dysplasia, Nance–Horan syndrome, Down syndrome, Noonan syndrome, and Hallermann–Streiff syndrome, among others [9–11]. The presence of multiple supernumerary teeth is uncommon in the general population and typically suggests an underlying syndromic condition [12, 13].

The clinical significance of supernumerary teeth extends beyond their presence. They can contribute to crowding, midline diastema, ectopic eruption, root resorption of adjacent teeth, cyst formation, and delayed or failed eruption, all of which may compromise both function and aesthetics [9–16]. Nevertheless, some supernumerary teeth remain asymptomatic and may not interfere with occlusion [16]. Early identification is therefore critical, as it allows for timely intervention and minimizes potential complications.

Diagnosis begins with thorough clinical assessment, including inspection and palpation, and is often supplemented by radiographic imaging for accurate localization [17–19]. Precise determination of a supernumerary tooth's position is essential for planning surgical extraction or other interventions [20].

Management strategies vary: erupted teeth that do not impede normal occlusion may be monitored, while those causing space issues, crowding, or eruption disturbances generally require early removal [12, 21]. Impacted supernumerary teeth are often extracted prior to orthodontic treatment to facilitate alignment and prevent complications [13, 22]. In some cases, however, clinicians may delay extraction until the roots of the supernumerary or adjacent permanent teeth are fully developed to reduce surgical risks [12, 13, 23]. The prevalence reported here aligns with prior studies.

Research by Syriac *et al.* [24], Demiriz *et al.* [25], Dobles and Meza [26], and the review by Mallineni *et al.* [27] report comparable rates. A modest male predominance observed in our sample is consistent with other reports, including Singh *et al.* [28], Arikan *et al.* [29], and Jain *et al.* [30], as well as findings from Anegundi *et al.* [31], McBeain and Miloro [32], and others [33, 34]. Collectively, these data reinforce the trend of slightly higher hyperdontia prevalence in males.

Ethnic differences in prevalence are also evident. For instance, Sella Tunis *et al.* [35] reported that among Caucasian populations, supernumerary teeth predominantly affect the maxilla, especially the incisor region, with mesiodens comprising 37.5% of cases—patterns that mirror our findings. Similarly, Eshgian *et al.* [36] noted higher rates among Hispanic patients, whereas Bello *et al.* [37] observed lower prevalence in African populations. Shen *et al.* [38] reported a 4.03% prevalence in Asian cohorts, again with maxillary predominance. These variations highlight the influence of genetic and ethnic factors on the occurrence and distribution of supernumerary teeth.

Overall, our results confirm that supernumerary teeth most commonly occur in the maxilla, particularly as mesiodens, and support the importance of early detection, accurate localization, and appropriate management to prevent functional and aesthetic complications.

The present study found supernumerary teeth in 2.4% of the examined cohort, with a higher occurrence in the maxilla (1.9%) compared to the mandible (0.5%). Among the different types, mesiodens were the most frequent, followed by lateral incisors, paramolars, and central incisors. This distribution highlights the importance for clinicians, particularly orthodontists, to maintain vigilance during routine assessments, even in otherwise healthy pediatric populations.

While supernumerary teeth may occur sporadically, multiple occurrences are often associated with syndromic conditions, including cleidocranial dysplasia, Down syndrome, Noonan syndrome, and

various craniofacial and genetic disorders. However, in non-syndromic individuals, these anomalies can still produce significant clinical challenges. Potential complications include crowding, delayed eruption, diastemas, ectopic eruptions, root resorption, cyst formation, and aesthetic concerns. In some cases, supernumerary teeth may remain asymptomatic and not disrupt occlusion, yet early recognition remains critical to allow for timely intervention.

Diagnosis relies on careful clinical evaluation combined with imaging. Visual inspection and palpation are essential initial steps, but radiographs provide critical information on location morphology. Accurate localization is particularly important when planning surgical or orthodontic management to prevent unintended damage to adjacent teeth or supporting structures. Treatment strategies range from monitoring non-problematic erupted teeth to surgical extraction of those causing space limitations, eruption disturbances, or planned orthodontic procedures. Timing of extraction must balance the risks of surgery with the potential benefits of early removal to optimize occlusion and alignment. The prevalence observed in this study aligns with previous reports internationally and regionally. A slight male predominance was also noted, consistent with prior research from multiple populations. Ethnic variations in prevalence have been documented, with Caucasians generally showing lower rates than Hispanics and Asians, while African populations often present with relatively low prevalence. These patterns suggest that both genetic background environmental factors influence the development of supernumerary teeth.

Additionally, the literature describes non-syndromic late-developing supernumerary teeth, which emerge later than expected for the associated dentition. These can occur as single or multiple teeth, unilaterally or bilaterally, and in any region of the dental arches, including the canine, premolar, and molar areas. By focusing on children aged 9–16 years, this study captured the developmental window in which both early- and late-forming supernumerary teeth typically emerge, allowing for accurate prevalence assessment and timely intervention. Final radiographs confirmed that no new supernumerary teeth appeared after treatment, supporting the reliability of the findings.

This study contributes to the limited data on island populations in Greece, offering insights into region-specific patterns that may reflect genetic homogeneity or local environmental factors. Previous Greek studies have reported varying prevalence rates, with Fardi *et al.* documenting 1.8% and Lykousis *et al.* reporting

11.6%, while data from neighboring Balkan countries indicate similarly low frequencies. By providing prevalence estimates for Lesvos Island, this research helps map dental anomalies geographically and provides a foundation for future studies exploring genetic and environmental influences on tooth development.

A limitation of this study is the reliance on a convenience sample, which may not fully represent the entire pediatric population of Lesvos. Nevertheless, the sample's demographic characteristics closely match those of the island's population, lending credibility to the prevalence estimates. Standardized protocols and examiner calibration ensured consistency and accuracy in identifying supernumerary teeth, strengthening the validity of the findings.

Conclusion

Supernumerary teeth were observed in 2.4% of children and adolescents on Lesvos Island, with the maxilla being the most affected arch. Mesiodens were the most common type, followed by lateral incisors, paramolars, and central incisors. These findings emphasize the importance of early detection and monitoring of supernumerary teeth to enable timely orthodontic or surgical intervention and prevent potential functional and aesthetic complications. Furthermore, this study highlights the value of examining geographically isolated populations to identify potential region-specific patterns in dental development.

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