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Original article

Prevalence and Characteristics of Talon Cusp in Deciduous Teeth Among Libyan Children

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Abstract
The talon cusp is a relatively rare dental developmental anomaly characterized by cusp-like projections, usually observed on the lingual surface of the affected tooth. To determine the prevalence of talon cusps in Libyan children with respect to sex, jaws, and dental localization to determine the relation between sex and this anomaly. It was performed by clinical examination of the patients for the presence of talon cusps. Examination of 2000 Libyan children aged four to six years. Talon cusps were observed in 42 patients. Thus, the prevalence of talon cusp was 2.1 %. In addition, the results highlight a significant predilection for anomalies in the maxillary arch. In this study, the maxillary canines were the most commonly affected teeth in the mouth, with no gender variation. The prevalence figure for primary maxillary canine talon cusp was so high that it may be appropriate to consider this anomaly as being characteristic of the Libyan children's primary dentition. Clinicians should be aware of potential complications that may occur with talon cusps. It is important to recognize that the management of talon cusps may require a multidisciplinary approach and should be considered during treatment planning.
Keywords. Talon Cusp, Dental Anomalies, Deciduous Teeth.

Introduction

Talon cusp is an uncommon developmental dental anomaly characterized by an accessory cusp like structure mostly projecting from the cingulum area or cementoenamel junction of the maxillary or mandibular anterior teeth in both primary and permanent dentitions, varying in size from a prominent cingulum to a marked projection, it has rarely been described either on the labial surface or on both surfaces of a single tooth [1-4]. Although the talon cusp is the most commonly used term, various names have been given by different authors for the same phenomenon, like accessory cusp, horn, supernumerary cusp, cusped cingulum, dens evaginatus of anterior teeth, evaginated odontome, hyperplastic cingulum, and supernumerary lingual tubercle. Other less-used terminologies include interstitial cusp, tuberculum dentale, and rugae adamantineae [5-8].

Talon cusp varies widely in shape, size, structure, location, and site of origin; it fluctuates in size from a prominent, enlarged cingulum to a marked, fully formed cusp extending toward the incisal edge. [9,10]. Clinically, some talon cusps possess sharp tips, whereas others have smooth, rounded tips. The tip of the cusp may stand away from the rest of the crown, or it may be fused with the tooth surface. Morphologically, talon cusps can be presented as horn-like, pyramidal, or conical shapes [8,11]. Histologically, the talon cusp is composed of normal enamel underlined by dentine. It may or may not contain pulpal extension; however, large talon cusps, particularly those which stand away from the crown surface, more probably have pulpal tissue [3,12].

The talon cusp was classified according to the degree of formation and extension [13]. The exact etiology of the talon cusp is still unclear; it is believed to begin during the morphodifferentiation stage of tooth development [14,15,16]. Various theories regarding its etiology were proposed; some of these are: it is supposed to be a result of an outgrowth of the enamel organ or hyperproductivity of the dental lamina. Developmentally, it may arise as a result of out-folding of inner enamel epithelial cells (precursors of ameloblasts) and transient focal hyperplasia of the mesenchymal dental papilla (precursors of odontoblasts), it is the most accepted theory [12,17]. Talon cusp has also been regarded as one end of a range of hyperactivities of the dental lamina, while a supernumerary tooth is at the other end. Some authors even suggested that a talon cusp was due to the fusion of a normal and a supernumerary tooth [7,8]. The recent studies have shown in murine models that disturbances in enamel knots, non-proliferating epithelial structures during development, can lead to additional cusp differentiation. Some hypotheses are currently being proposed as a basis for experimental research. One of these hypotheses is in line with the theory that postulates common developmental mechanisms for talon cusps and supernumerary teeth [6]. Some other authors suggested that an altered endocrine function during tooth development stages can also disturb the tooth size and shape without impairing the function of ameloblasts and odontoblasts [4,11,18]. It is generally believed that the cause could be due to a combination of genetic and environmental factors; some hypotheses suggest genetics to be a causative factor of talon cusp based on its occurrence in a family, trauma, and other localized forces on the tooth germ have also been held responsible for talon cusp [5,9,10].

Talon cusp may cause a variety of clinical problems which their severity of which depends on its size, location, and extent [12]. It has a clinical significance, in particular large talon cusps that can act as an

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occlusal interference which further result in multiple complications include traumatic occlusion, displacement of the affected tooth, attrition of the opposing tooth, periodontal and alveolar bone pathological changes due to excessive occlusal forces, hypersenstivity, pulpal necrosis, accidental cusp fracture, irritation of tongue and other surrounding soft tissues during speech and mastication, speech disturbances, breast-feeding problems and tempermandibular joint pain [19,20,21]. Also, plaque retention and caries susceptibility in the developmental grooves that delineate the cusp, leading to periapical and periodontal pathosis. Other clinical problems, including compromised esthetics and diagnostic problems, especially when the affected tooth is unerupted or partially erupted, may be confused with a compound odontome or supernumerary tooth, which may result in unnecessary surgical operation [11].

The talon cusp may present unilateral or bilateral, but most of the cases are unilateral; only one-fifth of the reported cases show bilateral occurrence [12]. This anomaly has a greater predilection in the maxilla, with more than 90% of the cases reported, than in the mandible, with only 10% of the cases, which means that it occurs more frequently in the maxillary dentition, while mandibular talon cusps have been reported in the literature with only a few cases [1,5]. It was reported that talon cusps are most frequently present on maxillary lateral incisors [9]. Moreover, the affected teeth have been reported to occur in males more than females in both primary and permanent teeth [7]. While a talon cusp may affect both the primary and permanent dentitions, it has been found to be three times more common in the permanent than the primary dentition. Therefore, there have been very few reports mentioning the prevalence of a talon cusp in the primary dentition [8,17].

In the deciduous teeth, the talon cusps mostly affect the maxillary central incisors; however, in the permanent teeth, most of the reported cases involved maxillary lateral incisors, followed by central incisors and canines [14,19,21]. There have been limited studies revealing the frequency of occurrence of this anomaly; most of the studies documented in the literature are case reports. The review of literature showed that over the last two decades, increasing case reports have been made of the occurrence of this condition [1,5]. Studies on the prevalence of talon cusp were mainly on the permanent dentition and rarely on the primary dentition [7,11]. Extensive prevalence studies have not been performed, but it is estimated that the frequency of talon cusp might range from less than 1% up to 8% of the population world around in both dentitions, where the prevalence of talon cusp in the primary teeth varied between 0.4% and 2.1% and it may reach up to 15.6% in permanent teeth [8,22].

A retrospective cross-sectional study of panoramic radiographs using a total of 1311 records of children with mixed and permanent dentitions in Saudi Arabia stated that 1% of the subjects had taloned teeth [23]. Another study investigated the talon cusps in 568 school children and concluded that there were no taloned teeth in primary dentition among this sample [22]. It was reported that the frequency of talon cusps in primary teeth of Saudi Arabian children was approximately 2.1%. Moreover, a systematic review and meta-analysis of a large sample showed that talon cusp can be found in 1.67% of the population [6,18]. A cross-sectional study conducted on 4180 subjects, it was reported that the talon cusp prevalence in deciduous dentition was 0.04% while another survey revealed that the talon cusp frequency in primary dentition was 0.07% [24] . In a previous study, it was illustrated that the occurrence of talon cusps is rare in deciduous teeth. Moreover, three-fourths of all reported cases are located in the permanent dentition [25]. A study done on the South Indian population was screened for the presence of talon cusps. The age ranged between 4 to 60 years, and talon cusps were detected (0.58%). Thirty-one teeth were found to have a talon cusp. Out of these 31 affected teeth, 96.77 % (30 teeth) were permanent, and only one tooth (3.22%) was found to be deciduous. Maxillary teeth (87.09%) were found to be more involved than the mandibular teeth (12.90%), with Maxillary lateral incisors being the most commonly affected teeth (54.8%). The prevalence of the talon cusp was seen more in males (75%) than in females (25%). in addition, the talon cusp was found to involve the lingual side more (94%) than the buccal and occlusal surfaces. Bilateral involvement of the talon cusp was seen in 77.41% [26].

A study was done on a sample of 670 records from the orthodontic clinic archives at the Autonomous University of Yucatan. Patient ages ranged from 9 to 20 years of age. All patients were of Mexican origin, 65.38% were female, and 34.62% were male. Upper lateral incisors with talon cusp were found in 7 cases (1.04%); the right side was most affected (n=5), and no bilateral affectations were identified [27]. Studies that have addressed the prevalence of talon cusps in Libyan children were scarce; there is little information about the true prevalence of this malformation.

Methods

Study design and settings

A cross-sectional prospective study was carried out to illustrate the prevalence of talon cusp that occurs in primary teeth in a population of 2000 children aged between 4 to 6 years in both genders. A convenient sample was selected from children who attended various kindergartens and primary schools (both government and private-run schools) in Benghazi city.

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Eligibility criteria

According to the following criteria, the sample selection was carried out: The inclusion Criteria were Libyan nationality, having fully erupted primary teeth, and no history of teeth loss due to trauma or extraction. The exclusion criteria were children of non-Libyan groups, any children with systemic diseases, teeth extraction due to caries, trauma, and for orthodontic reasons, large restorations, and preventing observation of crown morphology.

Patient consent

Consent was taken from each patient included in the study. A special proforma was designed to collect the data. The patients were examined in the ordinary chair for the presence of a talon cusp. Patients were examined clinically using a mouth mirror and a probe, and a special table was designed to note the required data.

Statistical analysis

Descriptive summary statistics were obtained for all independent variables. The Chi-square test was applied to see the frequency of different developmental anomalies across genders. All significant differences were detected at a 95% confidence level. Statistical analyses were carried out using SPSS (Statistical Package for the Social Sciences) Version 17.

Results

The table presents a descriptive summary of the study population, which includes a total of 42 cases. The variables examined are gender and age, providing insights into the characteristics of the participants(Table 1). In this study, there was an equal distribution between the male and female populations: The males represent 50% of the total cases, and the females have the same percentage (Table 1). There was a perfect gender balance in the current study. The majority of the participants are focused on the 5 and 6-year-old age groups, with each of these groups contributing significantly to the overall study population. The 4-year-old group represents the smallest percentage.

Table 1. The demographic distribution of the talon cusp

Variable	Subgroup	No.(%) Total= 42 cases
Gender	Male	21 (50%)
	Female	21 (50%)
Age	4 years	8 (19%)
	5 years	17 (40.5%)
	6 years	17 (40.5%)

Distribution of talon cusp in deciduous teeth

This study investigates the prevalence and distribution of talon cusp within a sample of 2000 children. There are only 42 (2.1%) of those children who had primary teeth with a talon cusp. The results highlight a significant tendency for these anomalies in the maxillary arch, accounting for 66 cases (95.7%) of the total. In contrast, the mandibular arch shows a much lower incidence, with only 3 cases (4.3%) (Table 2). Within the maxillary arch, the maxillary canine is the most commonly affected tooth, presenting with 64 anomalies. Of these, 40 were observed unilaterally, and 24 bilaterally. The maxillary lateral incisors were affected in 2 cases, both appearing unilaterally. There were no observed anomalies in the maxillary central incisors within this dataset. In the mandibular arch, all 3 observed anomalies occurred in the mandibular canine. These 3 cases were all unilateral, with no bilateral presentations. Similar to the maxillary arch, no anomalies were recorded for either the mandibular central or lateral incisors in this study. In this study, the bilateral presentation is noted particularly with maxillary canines. Unilateral anomalies appear to be more common overall. The analysis of data suggested valuable insights into the specific teeth and arches most susceptible to developmental anomalies in primary dentition.

Table 2. The distribution of the talon cusp in deciduous teeth

Dental Arch	Anomalous teeth No=69	Anomalous primary teeth	Anomalous teeth Total No. = 69	Unilateral No.	Bilateral No.
Maxillary Arch	66 (95.7%)	Maxillary central incisor	-	-	-
		Maxillary lateral incisors	2	-	1
		Maxillary canine	64	40	24
Mandibular Arch	3 (4.3%)	Mandibular central incisor	-	-	-
		Mandibular lateral incisor	-	-	-
		Mandibular canine	3	3	-

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Disscusion

Prevalence of the talon cusp is variable in different regions and races of the world. In this study, an attempt was made to determine the prevalence of talon cusp in the group of Libyan population. The reported prevalence of talon cusp in the literature is most commonly seen in maxillary lateral incisors, followed by maxillary central incisors and maxillary canines, 8.3% [28]. However, the maxillary canines were the most commonly involved tooth in our study. Most of the studies concluded that there is no significant difference between genders in the prevalence of dental anomalies, which goes in accordance with our results [29,30, 31,32,33]. In contrast, it was reported that boys had a higher prevalence of dental anomalies as compared to that in girls [25, 34,35,36]. Whereas fewer studies revealed a higher prevalence of dental anomalies among girls [37,38]. This dissimilarity might arise from a greater percentage of a specific gender (females) included in their samples. Moreover, racial differences, local environment effects, and nutrition may play a role.

The present study also observed that anomalous primary teeth were located predominantly in the maxilla, which is in agreement with the previous reports [23, 38.39]. The majority of the anomalous primary teeth in the current sample occurred more frequently on the left side, which disagrees with most studies that reported no difference between arch sides [25]. Most of the dental anomalies in this investigation were restricted to the anterior region of the maxilla, which is consistent with the most reported surveys [29,30,31]. All these findings could be due to genetic factors and racial differences.

The most affected teeth were the primary maxillary canines, unlike all previous studies concerning primary teeth talon cusps, in which most of them were case reports of mainly primary central incisors and limited cases of primary lateral incisors [4, 17, 19, 40]. The boys and girls were similarly distributed in our study. While most of the previous studies revealed a higher prevalence of talon cusp among boys [16,17,41]. The present study found that the talon cusps were located predominantly in the maxillary arch, in agreement with previous reports [14,17,19].

This anomaly is reported to occur more frequently unilaterally than bilaterally. This finding is inconsistent with our results, where most of the cases in this sample were bilateral (59.5%). This different finding of the high prevalence of talon cusps in the primary maxillary canines among the current sample of Libyan children, in contrast to other reported studies, could be explained by many possibilities, such as racial factors, ethnic variations, and methodological differences. In addition, there may be environmental influences, nutritional deficiencies, and psychological stresses of the war on pregnant women with affected children could be an effective causative factor. Developmentally, it may be due to the compression of the tooth germ of the maxillary canine by the adjacent lateral incisor and primary first molar, which developed months earlier than the primary canines. This increased pressure on a tooth germ may lead to out of the dental lamina during the morphodifferentiation stage. The genetic influences in the formation of talon cusp were also suggested as a major possible cause, by the evidence of its occurrence in a specific tooth type (primary maxillary canines). Some investigators suggested that there is a link between tooth size and talon cusp, so it could be more frequent in larger teeth, for example, in permanent teeth rather than primary dentition, in maxillary teeth than mandibular, and in our study in primary canines rather than primary incisors [6,42,43].

Conclusion

The current study is the first to report the prevalence of talon cusp in the Libyan population in Benghazi city. It is important to be aware of potential complications that may occur with talon cusps. As this is a rare phenomenon, the aid of radiographs is essential to assess whether the accessory cusp contains or is devoid of a pulp horn. Appropriate care has to be taken if intervention is necessary so as to be sure of a favorable prognosis. The study concluded that a rigorous clinical and radiographic examination leading to an early and accurate diagnosis that of extreme importance for the adoption of an adequate treatment.

Conflict of interest. Nil

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