

Original Article

Prevalence and characteristics of talon cusps in Turkish population

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ABSTRACT

Background: Talon cusp is a rare dental anomaly characterized by a cusp-like projection, often including the palatal surface of the affected tooth. The aim of the present study was to investigate the prevalence and characteristics of talon cusps in a group of Turkish children.

Materials and Methods: The study population consisted of 14,400 subjects who attended the clinics of the Department of Pediatric Dentistry at the Istanbul University, Istanbul, Turkey. Subjects ranged in age from 1 to 14 years with a mean age of 10.5 ± 2.55 years. Talon cusps were mainly categorized by visual examination according to the classification of Hattab *et al.* The distribution and frequency of talon cusps were calculated with respect to dentition type, tooth type, talon type, the affected surface, associated dental anomalies, and clinical complications. Statistical analysis included descriptive statistics, frequencies, and crosstabs with Chi-square analysis.

Results: Talon cusps were detected in 49 subjects (26 males and 23 females) of 14,400 (0.34%). A total of 108 teeth showed talon cusps. Distribution of talon cusps according to gender showed no statistically significant differences. The incidence of talon cusps was found to be greater in maxillary lateral incisors (53.7%) than central incisors (29.62%). Regarding the type of talon cusp, 47.22% of teeth showed a Type III talon cusp, whereas 30.55% of teeth demonstrated a Type II talon and 22.22% of teeth demonstrated a Type I talon cusp. Nine patients (18.36%) with talon cusps also exhibited other developmental dental anomalies. Clinical complications associated with talon cusps were detected as caries formation and occlusal interference.

Conclusion: This is the most comprehensive study of the prevalence of talon cusps in Turkish population using the largest sample size to date. Also, taurodontism associated with a talon cusp has been reported here for the 1st time. Clinical complications associated with talon cusps need more investigations.

Key Words: Accessory, developmental anomaly, talon, tooth

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INTRODUCTION

Talon cusp is an uncommon developmental dental anomaly characterized by an accessory cusp-like structure mostly projecting from the cingulum area or cemento-enamel junction of anterior teeth.^[1] It has rarely been described either on the labial surface or on both surfaces of a single tooth.^[2] This anomalous

cusp-like structure varies in size from an enlarged cingulum to a full-formed talon cusp extending toward the incisal edges of the teeth. Hattab *et al.* classified these anomalous cusps into three types: True talon (Type I), semi talon (Type II), and trace talon (Type III) according to the degree of cusp

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formation and extension.^[1] A recent classification based on the affected surface was proposed by Mallineni *et al.* and divided into three types such as facial, lingual, and facial and lingual.^[3]

Talon cusps are more prevalent in permanent dentition than in primary dentition. Maxillary lateral incisors are the most frequently affected teeth followed by the maxillary central incisors and the canines. The incidence of talon cusp on mandibular teeth has been found to be very rare.^[4]

Histologically, a talon cusp is composed of normal enamel and dentin structure and usually contains a pulpal extension.^[5,6] The appearance of a talon cusp in radiographs looks like a V-shaped radiopaque structure due to the superimposition of the cusp over the affected tooth crown.^[7,8] The radiographic demonstration of pulpal extension inside the talon cusp is difficult due to this superimposed appearance.^[9] Mader and Kellogg proposed that large talon cusps (Type I), especially when projected from the lingual surface of the tooth, are more likely to contain pulpal extension.^[10]

There have been limited studies revealing the frequency of occurrence of this anomaly. Most of the studies documented in the literature are single case reports.^[3] Although studied in other groups, the frequency of talon cusps in Turkish people is not well documented in the literature. Therefore, the aim of the present study was to investigate the frequency, distribution, and characteristics of talon cusps in a large group of Turkish children attending to the clinics of the Pediatric Dentistry Department at Istanbul University.

MATERIALS AND METHODS

The present study evaluated a total of 14,400 subjects (7704 females, 6696 males) ranging in age between 1 and 14 years who were referred to Istanbul University, Faculty of Dentistry, Department of Pediatric Dentistry between September 2009 and April 2014. Patients diagnosed with any syndrome or illness that involved odontogenesis or dental eruption were excluded. Only subjects of Turkish origin were selected. Following a clinical diagnosis of talon cusp, panoramic or periapical radiographic images and intraoral photographs were obtained for each case. The age and gender of the subject, the tooth involved, the type of talon cusp, other associated dental anomalies, and treatment procedures were also recorded.

Talon cusps were mainly categorized independently by visual examination by two calibrated examiners (YG and YK) twice according to the classification of Hattab *et al.* The teeth were classified as Type I, Type II, and Type III according to Hattab's scale [Figure 1] as shown in Table 1. An interexaminer reliability analysis using the kappa statistic was performed to determine consistency among examiners. The kappa coefficient was found to be 0.96, indicating almost perfect inter-examiner reliability.

The distribution and frequency of talon cusps were calculated with respect to dentition type (primary/permanent and maxilla/mandible), tooth type, talon type, the affected surface (palatal/facial/both), associated dental anomalies, and clinical complications.

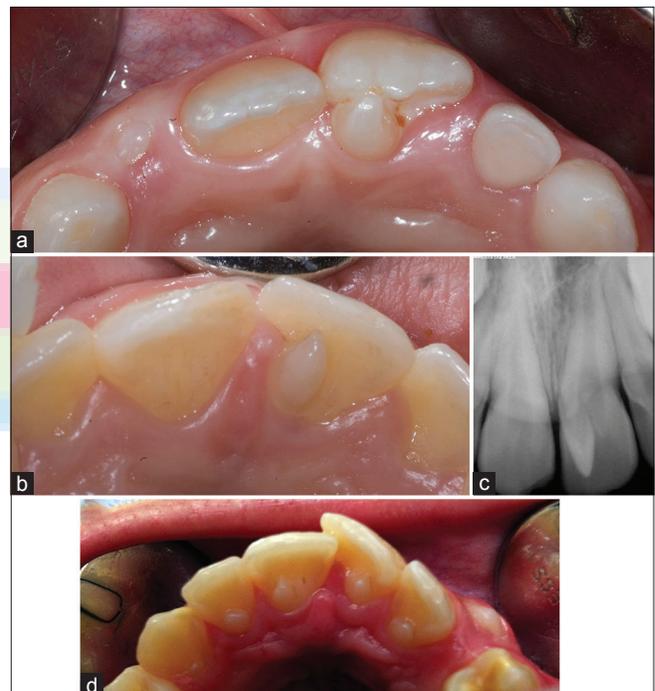


Figure 1: Clinical examples of Type I (a), Type II (b and c), and Type III (d) talon cusps based on the classification of Hattab *et al.*^[11]

Table 1: Classification for talon cusps into three types based on their size and morphology

Type I - Talon: A morphologically well-delineated additional cusp that prominently projects from the palatal surface of a primary or permanent anterior tooth and extends at least half the distance from the cemento-enamel junction to the incisal edge
Type II - Semi talon: An additional cusp of 1 mm or more, but extending less than half the distance from the cemento-enamel junction to the incisal edge. It may blend with the palatal surface or stand away from the rest of the crown
Type III - Trace talon: An enlarged or prominent cingula in any of its variants originating from the cervical third of the root

RESULTS

Talon cusps were detected in 49 subjects (26 males and 23 females) of 14,400 (0.34%). Ages ranged between 1 and 14 years with a mean age of 10.5 ± 2.55 years. A total of 108 teeth showed talon cusps. None of the subjects had significant systemic diseases. Distribution of talon cusps according to gender shows that there was a slightly higher prevalence in males (0.39%) than in females (0.3%) with no statistically significant differences ($\chi^2 = 0.8508, P > 0.05$).

Of the subjects with talon cusps, 47 had 106 talon cusps in permanent dentition while two subjects had talon cusps in primary dentition. Talon cusps in mandibular teeth were detected in only one subject. Talon cusps were found solely in permanent maxillary lateral incisors in 25 of 49 children (51.02%), in maxillary central incisors in 9 children (18.36%), in maxillary central and lateral incisors in 9 children (18.36%), in maxillary lateral incisors and canines in one child (2.04%), and in central and lateral incisors and canines in two children (4.08%). Talon cusps were found in a supernumerary (SN) tooth and maxillary lateral incisors in one child and detected solely in their SN teeth in three children. Distribution of the number of teeth with talon cusp according to the tooth type and talon type is presented in Table 2.

Only one tooth showed a talon cusp on both its palatal and facial surfaces and showed a T-shaped view from the occlusal side. One SN tooth had a talon cusp on its facial surface [Figure 2]. The remaining 106 talon

Table 2: Frequency of talon according to tooth type, location, and type of talon

Tooth type	Type I n (%)	Type II n (%)	Type III n (%)	Total (%)
Central incisor				
Upper	7 (21.87)	9 (28.12)	16 (50)	32 (29.62)
Lower	-	-	2 (100)	2 (1.85)
Lateral incisor				
Upper	12 (20.68)	21 (36.20)	25 (43.10)	58 (53.70)
Lower	-	-	2 (100)	2 (1.85)
Canine				
Upper	-	2 (33.33)	4 (66.66)	6 (5.55)
Lower	-	-	2 (100)	2 (1.85)
Supernumerary tooth				
Upper	4 (100)	-	-	4 (3.70)
Lower	-	-	-	-
Primary teeth				
Upper	1 (50)	1 (50)	-	2 (1.85)
Lower	-	-	-	-
Total	24 (22.22)	33 (30.55)	51 (47.22)	108 (100)

cusps were located on the palatal surfaces of the affected teeth.

Nine patients (18.36%) with talon cups exhibited other developmental dental anomalies. Three patients had tooth agenesis, and four patients had SN teeth. One patient showed a talon cusp on the lingual surface of a macrodont incisor [Figure 3]; one had a taurodontic permanent lower first molar and an impacted upper incisor; and one showed fusion of the maxillary central incisor associated with agenesis of maxillary lateral incisors.

Clinical complications associated with talon cusps were detected as caries formation in 20 teeth (18.51%) and occlusal interference in 31 teeth (28.7%). Management of patients included selective grinding, restorative treatment, fluoride, and fissure sealant applications or variable combinations of these treatments when required. All SN teeth were extracted. Table 3 shows the distribution of taloned teeth according to the treatment types.

DISCUSSION

The etiology of the talon cusp is not clear, but a combination of genetic and environmental factors

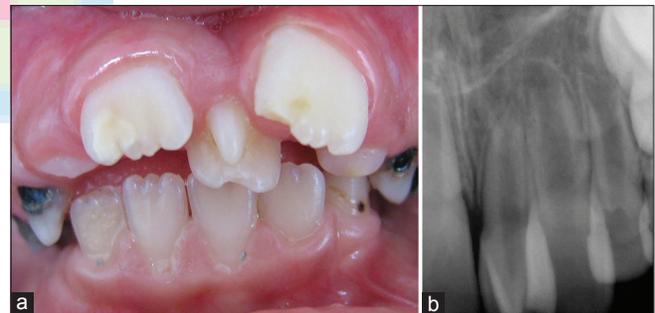


Figure 2: Clinical (a) and periapical view (b) of a facial talon cusp separated from the crown of the vestibular surface of maxillary supernumerary incisor.



Figure 3: An intraoral photograph of a talon cusp on a macrodont central incisor.

Table 3: Distribution of treatment modalities to talon cusps

Treatment modalities	Number of teeth	Percentage
Grinding	31	28.70
Filling	20	18.51
Fluoride	11	10.18
Fissure sealant	22	20.37
Extraction	4	3.70
None	20	18.51

is thought to play a role in the development of this anomalous structure.^[1,11] The most accepted hypothesis for the etiology is that talon cusps are related to disturbances such as impaired endocrine function during the morphodifferentiation phase of tooth development. It may occur as a result of outfolding of the inner enamel epithelial cells and focal hyperplasia of the peripheral cells of mesenchymal dental papilla.^[12] Genetic influences on the formation of talon cusp were also suggested by some authors based on the evidence of its occurrence in siblings.^[11,13]

Studies that have addressed the frequency of talon cusps in the population report frequencies from <1% to 8%. The reported prevalence is 2.4% in Jordanians,^[8] 2.5% in Hungarians,^[14] 0.06% in Mexicans,^[15] 5.2% in Malaysians,^[16] 0.6% in Iranians,^[17] and 0.02%,^[13] 0.97%,^[18] and 0.58%^[19] in Indians. Arfat *et al.* examined talon cusps in 2597 Turkish subjects and found their prevalence to be 1.2%.^[20] In the present study, talon cusps were found in 0.34% of 14,400 subjects. This prevalence is lower than many previous studies reported. The different results may arise from ethnical variations or the differences in study design such as sample size or examination method used for interpretation of talon cusp. The present study reported 49 Turkish children with 108 talon cusps. To the best of our knowledge, this is the largest talon cusp series reported so far and the total sample size is much larger than most previous prevalence studies.

The incidence of talon cusps was found to be greater in maxillary lateral incisors (51.02%) than in central incisors (18.36%). This result conforms with the findings of Gündüz and Celenk,^[6] Mavrodisz *et al.*,^[14] Prabhu *et al.*,^[19] and Guttal *et al.*^[21] However, this contrasts with a study conducted by Sharma *et al.*,^[13] who reported the maxillary central incisor to be the most commonly involved tooth.^[12] Simões *et al.* reported that talon cusps were more frequent in the upper lateral incisor, followed by the maxillary canine.^[22] Hamasha and Safadi examined a Jordanian

population and found that the permanent maxillary canine (46%) was the most commonly affected tooth.^[8] This result is at odds with the findings of previous reports and the present study. This difference might be due to the inadequate design of the study, which was solely based on the radiographic examination.

The Type III talon (47.22%) was the most frequent form of talon, followed by Type II (30.55%) and Type I talon (22.22%). These findings were consistent with a study by Simões *et al.*^[22] In contrast to the present study, Type I talons were detected more frequently in most previous studies.^[6,14,20]

Although the talon cusp is usually reported as an isolated entity, it may be associated with other dental abnormalities such as peg-shaped lateral incisors,^[8] agenesis,^[23] mesiodens,^[24] odontomas,^[25] gemination,^[26] dens evaginatus of posterior teeth,^[27] and dens invaginatus.^[23] Talon cusps have also been seen in patients with Ellis-van Creveld syndrome,^[28] incontinentia pigmenti,^[29] and Rubinstein–Taybi syndrome.^[30] Although the evidence of this association between the presence of talon cusps and these syndromes is not adequate, Rubinstein–Taybi syndrome is strongly correlated as demonstrated by a study of 45 patients, in which 73% of cases demonstrated talon cusps.^[30] In the present study, patients with talon cusps were also found to have tooth agenesis, taurodontism, SN tooth, fusion, and macrodontia. To the best of our knowledge, taurodontism has been reported here for the 1st time.

Talon cusps in mesiodens or other forms of SN tooth have been reported in the literature.^[9] The only labial talon cusp in this study was seen in an SN incisor. The labial talon cusp is an extremely rare finding, and only a few cases have been reported in the literature. Some of these labial talon cusps were detected in mandibular central incisors,^[19] whereas others were reported in maxillary central^[2,25] and lateral incisors.^[31] Also, a combination of labial and lingual talon cusps was detected in this study only in a maxillary SN tooth. Ekambaram *et al.* have also reported a case of fusion of the mandibular permanent incisors with labial and lingual talon cusps.^[32] Dunn reported a 10-year-old girl with bilateral talon cusps and one tooth with both lingual and labial talons.^[33]

Small talon cusps are usually asymptomatic and require no therapy. On the other hand, large talon cusps frequently cause clinical problems necessitating individualized treatment modalities.^[1] Occlusal

interference, which is the most common complication observed in large talon cusps, may further result in displacement of the affected tooth, attrition of the opposing tooth, temporomandibular joint pain, and periodontal problems. Other clinical problems include stagnation of food predisposing to caries and subsequent periapical pathology, irritation of tongue during speech and mastication, and compromised esthetics.^[5,34] Diagnostic problems may also occur on unerupted teeth with talon cusps. It is important to note that radiographic appearance of talon cusp in an unerupted tooth may be confused with a compound odontome or an SN tooth, which may result in unnecessary surgical operation.^[1]

Management of talon cusps varies depending upon the clinical problems of each individual case. If occlusal interference presents, the cusp should be diminished gradually and periodically to allow for tertiary dentin deposition and pulpal recession. After each grinding session, topical fluorides such as fluoride varnish should be applied to the exposed dentin to reduce the sensitivity. Reduction of the cusp may sometimes result in pulpal exposure requiring partial pulpotomy for immature teeth, and root canal therapy may be indicated in more severe cases.^[11,35] In the case of deep developmental grooves, simple prophylactic measures such as fissure sealing can be performed if there are no caries. If caries occurs in these grooves, composite or glass ionomer restorations should be conducted.^[36] In 18 of 20 Type I taloned teeth, the extra cusps extended beyond the incisal edge and created occlusal problems. In these cases, occlusal adjustment was performed by gradually grinding the cusp to eliminate the premature contacts. Twenty teeth had caries and were restored with composite fillings. Fissure sealant was applied to 22 taloned teeth with deep grooves. No other clinical symptoms associated with talon cusps were detected in the present study, which may be related to the young age of the subjects. Early diagnosis and therapy prevented more serious problems.

CONCLUSION

The present study, which described the prevalence of talon cusps in 14,400 Turkish subjects, is the most comprehensive study to date of the prevalence of talon cusps in the Turkish population. Talon cusps were detected in 49 subjects with a prevalence of 0.34%. No statistically significant differences were

observed by gender. The incidence of talon cusps was found to be greater in maxillary lateral incisors, and Type III talon (47.22%) was the most frequent form of talon. Patients with talon cusps were also found to have tooth agenesis, taurodontism, SN tooth, fusion, and macrodontia.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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