

# The frequency and characteristics of talon cusps in a Turkish population

Berna Arfat, Hakan Çolak, Ahmet Arif Çelebi<sup>1</sup>, Recep Uzgur<sup>2</sup>, Mustafa Turkal<sup>2</sup>, Mehmet Mustafa Hamidi

Department of Restorative Dentistry, <sup>1</sup>Orthodontics Dentistry, <sup>2</sup>Department of Prosthodontics, Kırıkkale University, Kırıkkale, Turkey

Address for correspondence:

Dr. Berna Arfat,  
Department of Restorative Dentistry,  
Kırıkkale University, Kırıkkale, Turkey  
E-mail: berna.arfat@gmail.com

## ABSTRACT

**Background:** The aim of this study was to determine the prevalence of talon cusps in a Turkish dental patient population with respect to sexes, jaws, and dental localization to determine the relation between sex and this anomaly. **Materials and Methods:** A cross-sectional study was carried out. Patients attending outpatient department of Restorative Dentistry Dental School, Kırıkkale between October 2009 to January 2012 were screened specifically for the presence of talon cusp during routine outpatient screening. Each patient was examined clinically and radiographically for the presence of talon cusps. **Results:** A total 2597 sample was evaluated. Talon cusps were observed in 31 patients. Thus, the person prevalence of talon cusp was 1.2% in this study. Gender-wise prevalence was 1.25% and 1.13% in females and males, respectively. Talon cusps were detected in 44 teeth out of a total of 35424 teeth to give a tooth prevalence of 0.12%. Maxillary lateral incisors were most commonly affected teeth in the mouth, and most commonly seen type of talon cusp was type I (23 teeth, 52.3%). **Conclusion:** The prevalence of talon cusps was found to be 1.2% for the Turkish dental patient population. Clinicians should be aware of potential complications that may occur with talon cusps.

## Key words

Prevalence, talon cusps, Turkish

## INTRODUCTION

Developmental variations in the dentition are frequently observed during a routine dental examination. These may include anomalies of number, size, and form of the teeth. Such anomalies are of interest in anthropology, genetics, pathology, and forensic odontology.<sup>[1]</sup> Their incidence and degree of expression can provide important information for phylogenetic and genetic studies and help in the understanding of differences within and between populations.<sup>[2]</sup>

Talon cusp is an uncommon developmental dental abnormality, showing a cusp-like accessory structure, varying in size from a prominent cingulum to a marked projection affecting the lingual surface of the maxillary and mandibular teeth.<sup>[3]</sup> [Figures 1 and 2] This unusual dental anomaly showing an accessory

cusp-like structure projecting from the cingulum to the cutting edge was first described by Mitchell in 1892. It was thereafter named a talon cusp by Mellor and Ripa due to its resemblance to an eagle's talon.<sup>[4]</sup> Other terminologies include dens evaginatus, interstitial cusp, tuberculated premolar, odontoma of the axial core type, evaginated odontoma, occlusal enamel pearl, occlusal anomalous tubercle, and supernumerary cusp.<sup>[5]</sup>

Radiographically, it may appear typically as a v-shaped radiopaque structure, as in true talon or semi-talon, or be tubercle-like, as in trace talon, originating from the cervical third of the root. The radiopaque v-shaped structure is superimposed over the normal image of the crown of the tooth. The point of the 'V' is inverted in mandibular cases. This appearance varies with the shape and size of the cusp and the angle at which the radiograph is taken<sup>[6,7]</sup> [Figure 3].

The exact mechanism of the formation of dens evaginatus is unknown. It has been postulated that the anomaly is caused by an evagination of the internal enamel epithelium and dental papilla into the stellate reticulum during the morphodifferentiation stage of tooth development.<sup>[8]</sup>

Talon cusp occurs more frequently in the permanent

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Figure 1: Talon cusps on right maxillary first molar (buccal)



Figure 2: Talon cusp in maxillary left lateral incisor



Figure 3: Panoramic radiograph showing the inverted V-shaped talon cusp in maxillary left lateral incisor

than in the primary dentition. A review of the literature shows that the talon cusp was exhibited in the permanent dentition in 75% of cases and in the primary dentition in 25% of cases.<sup>[9-11]</sup> Talon cusp shows a predilection for the maxilla over the mandible.<sup>[5,6,12]</sup> The maxillary lateral incisors are the teeth most frequently involved (67%); they are followed by the central incisors (24%) and the canines (9%).<sup>[5,6,13,14]</sup>

There is a wide variation in the size and shape of this anomaly. Due to this variation, and in order to have a diagnostic criteria, it has been classified into 3 types by Hattab *et al.*<sup>[13]</sup> A type 1 talon refers to a morphologically well-delineated additional cusp that prominently projects from the palatal (or facial) 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 2 (semi-talon) is an additional cusp of 1 mm or more extending to less than half the distance from the cemento-enamel junction and the incisal edge. It may blend with the palatal surface or may stand away from the rest of the crown. Type 3 (trace talon) is present as an enlarged or prominent cingulum and its variations (i.e., tubercle, bifid, or conical).<sup>[15,16]</sup>

Talon cusp has been associated with other dental anomalies such as dens invaginatus, impacted teeth, supernumerary teeth, root abnormalities, and odontomas.<sup>[17-23]</sup> In a few cases, a tooth with both a labial and palatal talon cusp has been described.<sup>[21-23]</sup> Association with some genetic syndromes has been also recorded. It may accompany syndromes such as Mohr's, Rubinstein-Taybi, Sturge-Weber, and incontinentia pigmenti.<sup>[21-26]</sup> In a sample of 45 patients with Rubinstein-Taybi syndrome, Hennekam and Van Dorne established that talon cusp affects permanent dentition in 92% of cases.<sup>[26]</sup>

Studies that have addressed the prevalence of talon cusps in populations were scarce. A review of the literature showed that over the last two decades, increasing case reports have been made of the occurrence of the condition. The reported prevalence is between 0.06% in Mexicans<sup>[27]</sup>, 2.4% in a Jordanians, 2.5% in a Hungarian<sup>[28]</sup>, 5.2% in a Malaysian<sup>[29]</sup>, and 7.7% in a northern Indian population.<sup>[30]</sup> It has also been found to be relatively common in the Chinese<sup>[14]</sup> and Arab<sup>[30]</sup>, and predominantly in the male population.<sup>[31]</sup>

When we reviewed the literature using the PubMed Database (National Library of Medicine), most publications concerning talon cusps were case reports. We found only few articles regarding of prevalence of talon cusp.<sup>[6,27-29,32]</sup> Because of the insufficient epidemiologic data, there is little information about the true prevalence of this malformation. Additionally, there was not any prevalence result with respect to talon cusps in Turkish dental patients. The aim of this study was to determine the prevalence of talon cusps in a Turkish dental patient population with respect to sexes, jaws, and dental localization, to determine the relation between sex and this anomaly.

## MATERIALS AND METHODS

A cross-sectional study was carried out. Patients attending outpatient department of Restorative Dentistry Dental School, Kırıkkale between October 2009 to

January 2012 were screened specifically for the presence of talon cusp during routine outpatient screening. The study sample presented represents the central Anatolian Turkish population.

A total of 2,597 subjects, aged 15 - 55 years, comprising 1239 (47.7%) males and 1358 (52.3%) females were included. Exclusion criteria of the subjects included any significant medical history, history of orthodontic treatment, patients belonging to the pediatric age group (under the age of 14 years), and patients having cleft lip and palate.

A dental mirror, probe, standard dental light, and chair were utilized during the comprehensive clinical examination. Each patient was examined clinically and radiographically for the presence of talon cusps. The patients with talon cusp were then subjected to intra oral periapical (IOPA) radiograph to rule out the associated anomalies or periapical changes. The patients' records and radiographs were evaluated and the following variables were studied: Age, sex distribution, and distribution of talon cusps in different teeth, radiographic evidence of pulp extension, and associated dental anomalies and complications. These clinical details were undertaken by a two experienced clinician.

Diagnosing criteria of talon cusp: Talon cusp is defined as an accessory cusp-like structure projecting from the lingual surface of a primary or permanent anterior tooth and extending at least half the distance from the cemento-enamel junction to the incisal edge.<sup>[7]</sup>

The examiners were calibrated by reading 100 intra-oral photographs of different patients separately, containing 10 different cases of talon cups before the investigation starts. The diagnosis given by both examiners were compared to their original diagnosis, which resulted in 100% agreement.

Data collected were entered into a spreadsheet (Excel 2007; Microsoft Office, Microsoft Corporation, USA) and analyzed subsequently using the Statistical Package for Social Sciences (Windows version 16.0; SPSS Inc., Chicago, IL, USA). The frequencies of anomalies which are detected are calculated with respect to sexes, jaws, and dental localization. The Pearson chi-squared test was used to determine potential differences in the distribution of dental anomalies when stratified by sex. A *P* value of <0.05 was considered statistically significant.

## RESULTS

A total 2597 sample was evaluated. Talon cusps were observed in 31 patients. Thus, the person prevalence of talon cusp was 1.2% in this study. Genderwise prevalence was 1.25% and 1.13% in females and males, respectively.

Talon cusps were observed bilaterally in 13 patients (6 were males (46%), and 7 were females (54%) [Table 1].

Almost equal numbers of maxillary (17903) and mandibular teeth (17521) were examined. Talon cusps were detected in 44 teeth out of a total of 35424 teeth to give a tooth prevalence of 0.12%. The prevalence of talon cusps among different tooth types was presented in Table 2. All 44 teeth exhibiting talon cusps were in the maxillary arch, so the maxillary teeth prevalence was 0.25%. Maxillary lateral incisor were most commonly affected teeth in the mouth (66% of cases), followed by maxillary central incisor teeth (11.4% of cases) and maxillary canines [Table 3].

The most commonly seen type of talon cusp was type I (23 teeth, 52.3%) followed by type II (15 teeth, 34.1%) while 13.6% of patients had type III (6 teeth) dens invaginatus. Any additional associated anomaly or pathologic conditions with talon cusp were not observed.

## DISCUSSION

The data of the present study were collected from Turkish who attended restorative dentistry Department of Kırıkkale University Dental School (KUDS). Caution was taken in extrapolating the results of the present survey to larger population. This study investigated talon cusp in adults; no attempt was made to include examination for permanent teeth in children. The results reflect the

**Table 1: Prevalence of talon cusp according to unilateral and bilateral distribution**

	Unilateral N (%)	Bilateral N (%)	Total N (%)
Male (1239)	8 (0.65)	6 (0.48)	14 (1.13)
Female (1358)	10 (0.74)	7 (0.51)	17 (1.25)
Total (2597)	18 (0.69)	13 (0.50)	31 (1.20)

**Table 2: Frequency of the prevalence of talon amongst different tooth types**

Tooth	No. of teeth examined	No. of teeth with talon cusps	Percentage of talon cusps
Maxillary	17903	44	0.25
Central	2483	5	0.20
Lateral	2469	29	1.17
Canine	2503	4	0.16
First premolar	2316	0	0.0
Second premolar	2357	0	0.0
First molar	2211	3	0.14
Second molar	2256	3	0.13
Third molar	1308	0	0.0
All mandibular teeth	17521	0	0.0
Total	35424	44	0.12

**Table 3: Distribution of the number of talon cusp according to tooth type, gender, and location**

	Maxillary central incisors		Maxillary lateral incisors		Maxillary canines		Maxillary first molar		Maxillary second molar	
	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
Male	0	1	6	10	0	1	0	1	0	1
Female	1	3	7	6	3	0	1	1	2	0

prevalence of talon cusps only in patients who attended dental clinics at KUDS. However, there is no reason to believe that this group of patients is different from other Turkish adults. No data were found indicate genetic, social, and geographical differences in the prevalence of talon cusps among other nations.<sup>[6]</sup>

Review of the literature reveals a wide discrepancy in the prevalence of dens invaginatus in different populations. The results of the present study on a group of Turkish dental patients have shown an overall prevalence of 1.2% for individuals. This figure is lower than the result of the study by Mavrodisz<sup>[28]</sup> (2.5%) among Hungarian, the result of the study by Hamasha and Safadi (2.4%) among Jordanian population, and the study by Chawla<sup>[33,34]</sup> among Malaysian (5.5%) and higher than study by Prabhu (0.58%) among Indians. These variations in prevalence between different populations may be due to ethnic variations, but may also be influenced by differences in criteria used for interpretation of talon cusp and also due to the specific teeth examined.

Hattab *et al.* suggested a classification system for the accessory cusp-like structures including true talon, semi-talon, and trace talon.<sup>[9]</sup> In present study, the most commonly seen type of talon cusp was type I (23 teeth, 52.3%) followed by type II (15 teeth, 34.1%) while 13.6% of patients had type III dens invaginatus. Classification of talon cusp according to type had not been mentioned in previously published prevalence studies.<sup>[6,28,32,35]</sup>

In the present study, the maxillary lateral incisors were the most commonly affected teeth with the condition, followed by the maxillary lateral incisors. Additionally, no talon cusps were observed in the mandibular teeth, and maxillary premolars examined. This finding is almost consistent with studies of Hamasha and Safadi. However, they found maxillary canines were most commonly affected teeth in the mouth followed by maxillary lateral incisor teeth, and no talon cusps were observed in the mandibular teeth. In a recent study, Prabhu *et al.*<sup>[35]</sup> found that 87.09% of the cases were found to involve the maxillary teeth and only 12.90% were found in the mandibular teeth. They also observed maxillary lateral incisors that were the most commonly affected teeth followed by maxillary central incisors and canines, which are consistent with close to our study. According to Segura and Jiménez-Rubio,<sup>[12]</sup> the reason for this condition may be the compression of the tooth germ of the lateral incisor by the central incisor

and the canine, which develop 7 months earlier than the lateral incisor. Increased pressure on a tooth germ may cause outfolding of the dental lamina during the morphodifferentiation stage.<sup>[12]</sup>

According to our findings, females presented a slightly higher prevalence of talon cusp than males; however, these differences were statistically not significant ( $P>0.05$ ). This finding is consistent with other studies previously reported for patients of Jordan origin.<sup>[6]</sup> Additionally, according to a recent study performed in Indian population, talon cusps were occurred more frequently in males than in females.<sup>[35]</sup>

The appearance of the symmetric talon cusp was considered to be a common finding by some authors. In the present study, the bilateral occurrence of talon cusps were 42% (13 of 31), which was lower than the recent study among the Indian population (77.4%) and slightly higher than the studies on the Jordanian population (30%). This also agrees with the data reported in the literature.<sup>[3,4,11,36-40]</sup>

Talon cusps on permanent incisors can occur as an isolated finding or in association with other dental anomalies, such as peg-shaped lateral incisor, dens invaginatus, dens evaginatus, odontomas, impacted teeth, transposition, and supernumerary or missing teeth.<sup>[10,19,41]</sup> Any additional associated anomalies with talon cusp were not observed in present study.

The clinical problems associated with the presence of talon cusps include stagnation of food, caries, periapical lesions, irritation of tongue during speech and mastication, other soft tissue irritation, breast feeding problems, compromised aesthetics, occlusal interference which may lead to accidental cusp fracture, displacement of the affected tooth, temporomandibular joint pain, and periodontal problems because of excessive occlusal force.<sup>[3,7,8,11,17,42]</sup>

The treatment of talon cusp requires careful clinical judgment and is dependent on its size and shape. Management includes no treatment, sequential grinding, pit and fissure sealing, pulp therapy, restorative treatment, full crown coverage, and extraction of the affected tooth.<sup>[10,13]</sup>

The prognosis of teeth with talon cusp depends on the timing of diagnosis. If it is diagnosed early, the accessory cusp may be progressively removed with polishing

diamond bur every two months. The abraded area should be treated with fluoride varnish. At the last appointment, to avoid postoperative sensitivity, this area should be covered with resin composite.<sup>[42]</sup>

## CONCLUSION

The present study is the first to report the prevalence of talon cusp in Central Anatolian Turkish population. 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.

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