



FREQUENCY AND ASSOCIATED COMPLICATIONS OF TALON CUSP IN PATIENTS VISITING PESHAWAR DENTAL COLLEGE AND KHYBER COLLEGE OF DENTISTRY

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ABSTRACT

Objective: To document the frequency of talon cusp in patients visiting the outpatient department of Peshawar Dental College and Khyber College of Dentistry, Peshawar and their associated complications like Dental caries, Occlusal interference, Soft tissue irritation, Speech disturbance.

Material and Methods: This cross-sectional study was conducted on patients visiting Peshawar Dental Hospital and Khyber College of Dentistry to assess the prevalence of talon cusp and its associated complications. A total of 753 patients meeting inclusion criteria participated. Age group selected for the study was from 13 to 50 years. Study duration was six months i-e September 2024 to February 2025. The patients were examined 4 days a week until the required sample size was accomplished. Permanent maxillary incisors (central, lateral) were studied for the presence of Talon cusp. Written consent was obtained following ethical guidelines. Data analysis was performed using SPSS version 20, calculating means, standard deviations, male-to-female ratios, and associated complications using Pearson's chi-square test (significant at $P \leq 0.05$). Ethical approval was obtained, and participant confidentiality was maintained.

Results: Total 10 patients were detected with talon cusps out of 753 patients. Person prevalence is 1.33%. Gender wise prevalence of talon cusp is 1.78% for female gender (7 out of 393) and 0.833% for male gender (3 out of 360). There was no significant sexual dimorphism present. The chi-square statistic is 2.7438. This result is *not* significant at $p < 0.05$. Result for gender wise distribution of complications associated with Talon cusp is not significant.

Conclusion: Talon cusp is more frequently present in females as compared to male patients in Pakistani population. The associated complications were also more prevalent in female patients. Amongst the associated complications with Talon cusp, the most commonly occurring complication was dental caries.

Key words: Talon cusp, Human permanent teeth, occlusal contact, dental caries

INTRODUCTION

Talon cusp is a supernumerary dental anomaly characterized by an accessory cusp projecting from the cingulum area of anterior teeth. It was first described in the late nineteenth century and later named because of its resemblance to an eagle's talon [1]. This anomaly shows considerable variation in size, shape, and structure, ranging from a slight ridge on the lingual surface to a well-formed cusp extending toward the incisal edge. Based on morphological features, talon cusp has been classified into three types, depending on the degree of cusp formation and extension. It is also known by several alternative terms, including cusped cingulum, hyperplastic cingulum, dens evaginatus, and supernumerary cusp, and is considered a variant of dens evaginatus affecting anterior teeth [2, 3].

The reported prevalence of talon cusp varies widely across different populations and geographic regions. Studies from various parts of the world have documented frequencies ranging from very low rates in some populations to relatively high rates in others, with notable differences between ethnic groups and regions [4]. In some populations, a male predominance has been observed, while in others, females appear more frequently affected. These variations suggest that genetic, environmental, and methodological factors may influence the observed prevalence of this anomaly. Despite the growing number of reports, the true prevalence of talon cusp remains uncertain due to differences in study design, diagnostic criteria, and population characteristics [5, 6].

The exact etiology of talon cusp formation remains unclear. It is believed to arise from disturbances during early tooth development, particularly from excessive folding of the internal enamel epithelium and dental papilla during the morphodifferentiation stage [7]. Abnormal signaling during the bud and bell stages of tooth development may result in variations in cusp size and number. Talon cusps may occur as isolated findings or in association with other dental anomalies such as mesiodens and odontomes. They have also been reported in association with certain genetic syndromes, although they are not considered defining features of these conditions. Both hereditary and environmental factors, as well as localized developmental disturbances, are thought to contribute to their formation [8]. Clinically, talon cusp is significant because it is frequently associated with various complications. These include food impaction, dental caries, periapical pathology, soft tissue irritation, occlusal interference, tooth displacement, temporomandibular joint discomfort, and periodontal problems related to abnormal occlusal forces. Beyond clinical dentistry, the study of dental morphological variations has important applications in anthropology, forensic odontology, and population studies. However, limited epidemiological data are available regarding the frequency and complications of talon cusp in the local population of Khyber Pakhtunkhwa. Therefore, the present study aims to document the frequency of talon cusp among patients attending the outpatient departments of Peshawar Dental College and Khyber College of Dentistry and to evaluate the associated complications, including dental caries, occlusal interference, soft tissue irritation, and speech disturbances.

METHODOLOGY

This cross-sectional study was conducted on patients visiting Peshawar Dental Hospital and Khyber College of Dentistry to assess the prevalence of specific dental trait (Talon cusp) and its associated complications. Before the examination, patients were informed about the study purpose, and written consent was obtained following ethical guidelines. A total of 753 patients meeting inclusion criteria participated. Duration of the study was six months i-e September 2024 to February 2025. Age group selected for the study was from 13 to 50 years. The patients were examined 4 days a week until the required sample size was accomplished. Permanent maxillary incisors (central, lateral) were studied for the presence of Talon cusp.

The study focused on the presence of talon cusp. The clinical examination was standardized, using tools like mouth mirrors and dental explorers under proper lighting. The palatal and lingual surfaces of permanent maxillary incisors were evaluated for talon cusps, with type 1 cases requiring periapical X-rays. Occlusal contact was assessed using articulating paper, while complications such as caries, soft tissue irritation, and speech issues were recorded through clinical observation and patient history.

Data analysis was performed using SPSS version 20, calculating means, standard deviations, male-to-female ratios, and associated complications using Pearson's chi-square test (significant at $P \leq 0.05$). Ethical approval was obtained, and participant confidentiality was maintained.

RESULTS

Out of 753 examined patients, talon cusp was identified in 10 individuals, giving a person prevalence of 1.33%. Most participants (98.67%) did not show the anomaly. This distribution indicates talon cusp is an uncommon finding in this OPD-based sample.

Table 1: Frequency of distribution of Talon cusp in the study subjects (N=753)

Supernumerary cusp	Present (%)	Absent (%)	Total (%)	Chi-Sq ² Value	Significance
Talon cusp (TC)	10 (1.33%)	743 (98.67%)	753 (100%)	713.63	<.001

Gender-wise, talon cusp was observed more in females (7 cases) than males (3 cases). However, the association between gender and talon cusp presence was not statistically significant ($p = 0.256$). This suggests no confirmed gender-based difference in frequency in this dataset.

Table 2: Talon cusp frequency

Gender	Present	Absent	Total	Chi-Sq ² value	Significance
Male	3 (0.4%)	357 (47.4%)	360 (47%)	1.288	.256
Female	7 (0.9%)	386 (51.3%)	393 (52.32%)		
Total	10 (1.3%)	743	753		

Among males, talon cusp appeared more often as bilateral (66.6%), whereas females showed predominantly unilateral (86%) presentation. Despite this pattern difference, symmetry distribution by gender was not significant ($p = 0.098$). Therefore, symmetry trends are observable but not statistically confirmed.

Table 3: Gender/Symmetry wise distribution of talon cusp

Gender	Symmetry	Frequency	Percent	Chi-Sq ² Value	Significance
Male	Unilateral	1	33.3	2.74	$p = 0.098$ (NS)
	Bilateral	2	66.6		
	Total	3	100		
Female	Unilateral	6	86.0		
	Bilateral	1	14.0		
	Total	7	100		

Out of 3012 maxillary incisors examined, talon cusp was present in 13 teeth (0.43%), confirming a low tooth-based prevalence. The permanent maxillary lateral incisor accounted for most affected teeth, with females contributing a slightly higher number of affected teeth than males. Central incisor involvement was rare in both genders.

Table 4: Gender-wise distribution of Talon cusp in PMC.I & L.I teeth

Gender	Talon absent in PMaxCI&LI teeth (N)	Talon present in PMC.I&L.I (N)					Total (%)	Total (n)
	Right	Left	Total	PMRightC.I n(%)	PMLeftC.I n(%)	PMRightL.I n(%)	PMLeftL.I n(%)	
Males	718	717	1435	1	-	1	3	5 (0.35%)
Females	781	783	1564	1	-	4	3	8 (0.51%)
Total	1499	1500	2999	2	-	5	6	13 (0.43%)

Dental caries with soft tissue irritation was the most frequent complication pattern, especially among females (50%). A more severe cluster of complications (DC+STI+DS+OCI) appeared only in one male case, while DC+STI+OCI appeared only in females. Overall, complication distribution by gender was not significant ($p = 0.665$).

Table 5: Gender wise distribution of complications associated with Talon cusp

Gender	Complications	n (%)	Chi-Sq ² value	Significance
Male	DC + STI	2 (20%)	.816	.665
	DC + STI + OCI	-		
	DC + STI + DS + OCI	1 (10%)		
Female	DC + STI	5 (50%)		
	DC + STI + OCI	2 (20%)		
	DC + STI + DS + OCI	-		

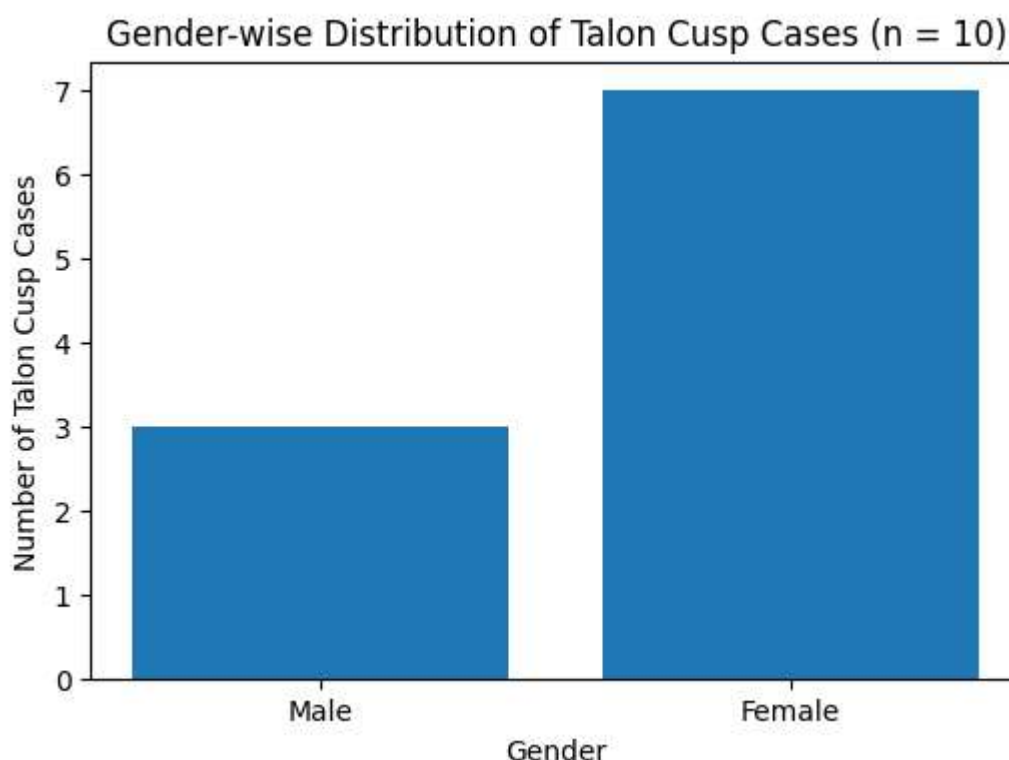


Figure 1: Bar graph showing the gender-wise distribution of talon cusp cases among the affected patients, with a higher number of cases observed in females (7 cases) compared to males (3 cases).

DISCUSSION

In this cross-sectional study, the frequency and complications associated with talon cusps were evaluated. Talon cusp accounted for 1.33% (10 out of 753 patients) of the total supernumerary cusps

recorded (Table: 5.1). Previous studies have reported higher frequencies. Notably, this study assessed talon cusps only on permanent anterior incisors, leaving their occurrence in deciduous teeth unexplored.

The frequency of talon cusp varies widely among different populations. It has been reported as 0.3% in Nigerians [9], 0.58% in Indians[10], and 0.34% in Turks [3], which are lower than the 1.33% frequency observed in the present study. However, our finding is comparable to reports from Pakistan [11] and other regional studies where prevalence has been documented between 1.2% and 2.5%. In contrast, markedly higher frequencies have been reported in Portuguese populations (6.3%) [12] and in some Indian and Turkish studies, where rates range from 6.3% up to 14.34% [13], suggesting that ethnic background, geographic variation, sampling methods, and diagnostic criteria may influence the reported prevalence. In the current study, talon cusp was more frequently observed in females (1.78%) than in males (0.83%), although this difference was not statistically significant ($p > 0.05$). This female predominance has been noted in some previous studies, while others have reported a male predominance, indicating that gender-based patterns may differ across populations and study settings. Bilateral talon cusp occurrence was reported in 3 out of 10 patients (30%), with 66% of these cases in males (Table 5.2). The remaining 7 patients had unilateral cusps, predominantly in females (Table 5.3). Bilateral presentations has been reported in varying populations across studies, such as 20% by Sharma & Nagpal (2014) [14] and 7.4% by Gunduz and Celenk (2008) [15].

The prevalence of Talon cusp in the study sample was 0.43%, based on 13 affected permanent maxillary incisors out of 3012 examined (Table 5.5). This is in comparison with the reports of 0.12% by Arafat et al. (2012) [16] and 0.03% by Temkola et al. (2014) [17]. Variations in prevalence could be attributed to differences in population samples, study design and tooth selection criteria.

The most common complication observed were dental caries, occlusal interference, soft tissue irritation and speech disturbances (Table 5.6). One patient with a type I talon cusp experienced all four complications. Other patients exhibit combinations of these issues, with caries in talon cusp groove being the most frequent complication.

Literature confirms these findings, with Elmubarak (2019)[18] reporting caries and occlusal interferences in 6% and 2% cases respectively. Various case studies highlight the clinical challenges posted by talon cusp van der Vyver et al. (2024), [19] such as premature contact causing occlusal interference or damage to opposing teeth Alqahtani A et al. (2024) [20]

Most existing research on talon cusps consists of case reports or studies on broader dental anomalies. Variations in definition criteria and classification further complicate the accurate assessment of prevalence. While the classification system by Hattab et al. (1996) is widely accepted, there remains a need for standardized criteria to improve reliability.

Due to limited epidemiological data, the precise prevalence and associated complications of talon cusps in Pakistani populations remain unclear. Future studies with larger sample sizes and diverse designs are needed to provide a comprehensive understanding of this anomaly.

Among 753 dental patients examined in the present study, talon cusp was identified in 10 individuals, giving a frequency of 1.33%. The investigation focused exclusively on permanent anterior incisors, which highlights the need for future studies to include deciduous dentition for a more comprehensive assessment. The frequency observed was higher than that reported in Nigerians (0.3%) and Indians (0.58%) but lower than that documented in Portuguese and Turkish populations. Similar population-based variation in prevalence has been emphasized by Simões et al. (2014), who reported a frequency of 6.3% in a Portuguese cohort, underscoring the influence of ethnicity and geographic factors on reported rates [12].

In the present study, talon cusps were more prevalent in females (1.78%) than in males (0.833%), although this difference was not statistically significant ($P > 0.05$). This pattern of female predominance is consistent with the findings of **Hamasha and Safadi (2010)**, who also reported a higher frequency in females in a Jordanian population [21]. However, variations in gender distribution across different studies suggest that sex predilection may not be uniform and may be influenced by population characteristics and sampling methods.

Bilateral talon cusps were observed in 30% of the affected patients, while unilateral involvement was more common overall. The permanent maxillary lateral incisor was the most frequently involved tooth, accounting for 84.6% of all affected teeth in this study. These findings are in agreement with the observations of **Decaup et al. (2021)**, who reported that permanent maxillary lateral incisors are the most commonly affected teeth in cases of talon cusp, reflecting a consistent anatomical predilection [22].

Complications associated with talon cusp in the present study included dental caries, occlusal interference, soft tissue irritation, and speech disturbances, with dental caries being the most frequent finding. Only one patient with a Type I talon cusp exhibited all four complications, indicating that severe clinical presentations are relatively uncommon. A similar association between talon cusp and dental caries has been reported by **Elmubarak (2019)**, who highlighted the high caries risk associated with deep developmental grooves in talon cusps, emphasizing the importance of early diagnosis and preventive management [18].

CONCLUSION

In conclusion, the present study demonstrates that talon cusp is an uncommon dental anomaly among patients attending the outpatient departments of Peshawar Dental College and Khyber College of Dentistry, with a person prevalence of 1.33%. The anomaly was observed more frequently in females than in males; however, this gender difference was not statistically significant. The findings indicate that talon cusp occurs predominantly in permanent anterior teeth, particularly the permanent maxillary lateral incisors, while involvement of permanent maxillary central incisors was relatively rare.

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