MORPHOLOGICAL CHARACTERISTICS OF CUSPS AND OCCLUSAL FEATURES OF MAXILLARY SECOND MOLARS; CROSS-SECTIONAL STUDY IN KHYBER COLLEGE OF DENTISTRY, PESHAWAR

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ABSTRACT

Objective: *To determine the morphological numbers of cusps and occlusal features of maxillary second molar among patients visited to Khyber College of Dentistry, Peshawar.*

Materials & Methods: *This was a cross-sectional study based on clinical observation among patients visited for oral health services other than for the treatment of maxillary second molar. A total of 200 patients were examined from July to December 2017. A thorough examination of the maxillary second molar was done using examination instruments. The data was entered into SPSS version 20 and analyzed for descriptive statistics. Chi-square test was used for comparing the occlusal features among gender where p ≤0.05 was considered as significant.*

Results: *Two hundred patients were included in the study, out of whom 112(56.0%) were male and 88(44.0%) female with a mean age of 23.0±5.0 (ranged from 15 to 37 years). Individuals with four cusps in the right maxillary second molar were 139(69.5%), while three cusps were 61(30.5%). The difference between gender was not significant (p>0.05). In right maxillary second molar distolingual cusp was observed in 59(29.5%) while in left maxillary molar distolingual cusp was found in 63(31.5%). There was no significant difference in gender. Oblique ridge and distal triangular fossa were present, while Cusp of Cerabelli was absent in all cases.*

Conclusion: *The maxillary second molar in the sample population is characterized by four and three cusps along with apparent oblique ridge and distal triangular fossa with no Cusp of Cerabelli. There are no significant difference among gender.*

Keywords: *Morphological, occlusal, maxillary second molars, Cerabelli*

INTRODUCTION

The Maxillary second molar teeth assist the 1st molars in the normal function of grinding while the different cusps or other developmental anomalies including accessory cusp, talon cusp, projecting from cingulum or may interfere the functions.[1] Usually, Molar teeth have four cusps probably with a square occlusal surface; however there is variation in the number, size, and pattern of maxillary second molar's cusp. Variations in the cusp's shape and patterns are either inherited or developed due to influences of gene, lifestyle, and culture, and adaptation process. The incidence of deviation from normal morphology in first molar is 5-6%,[2] however, little is known about the maxillary second molar.

The occlusal features of the second molar characterized by rhomboidal in shape along with protrusion of acute angle with obtuse angles having a smaller mesiodistal diameter and larger buccolingual dimension. However, morphological variation

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is reported in dentitions across the globe as well as within the countries.[3] Cusp of carabelli, talon cusp, and others are reported.[1,3] Similarly, supernumerary cusps also reported, which develops over the surface of second molars. A complex biological process involved in the development of teeth depending upon different factors, including interaction of tissues like epithelial and mesenchymal tissues, which in turn interrupts the morphodifferentiation.[4] Any alteration in the healthy development leads deviations in occlusal morphology, including the second molar.[5] Throughout human growth/development, morphological changes occur in the occlusal surface of molar teeth, which may lead to different patterns, including "y" to "+"pattern.[5] Such variations are inherited and dependent on many genes, cultures, conditions of life, diet, and adaptation processes.[6] However, it is observed that there are different degrees of expression and frequency in variation of teeth in dentitions of different populations. It is believed that the possible etiology of cuspal variation could be either nutritional or genetic. PAX, MSX1, MSX2, BMP, FGF 4, and SHH (Sonic Hedgehog) genes are responsible for the abnormal shape of the teeth.[7] Teeth are a part of dental anthropological system so its morphological variation should be determined in different populations.[7] The investigation into population-based or racial differences has provided bases for the hypothesis that common origins of people have some extent of variation in Phenotypic pattern of the teeth. It is vital to evaluate different patterns and frequency in variation of teeth in different populations. The present study aimed to determine the frequency of different patterns of cusps and occlusal features of maxillary second molars among patients presented to Khyber College of Dentistry, Peshawar Pakistan

MATERIALS AND METHODS

This was a cross-sectional study based on a sample of 200 patients visited to Khyber College of Dentistry (KCD) from July to December 2017. Using a convenient sampling technique, patients who visited with teeth complain other then second maxillary molars were examined for further morphological features. The patients who were free from occlusal and proximal caries, completely erupted showing clear occlusal features line of maxillary second molars were included in the study. Patients who have any pathological condition traumatic injuries, undergone through prosthesis or restoration of teeth were excluded from study. After taking informed consent from patients, patient's oral examination was assessed with naked eye. After thorough oral health assessment, the 2nd maxillary molar of all participant were assessed for numbers of Cusps and features of occlusal surface along with the status of oblique ridges, Distal Triangular fossae and cusp of carabellli. Data were recorded in Microsoft Excel and then transformed into SPSS version 20 for statistical analysis.

RESULTS

A total of 200 subjects (mean age) out of whom 112(56.0%) male and 88(44.0%) female. The number of cusps in the right maxillary second molar showed that 139(69.5%) of participants had four cusps while 61(30.5%) had three cusps. Similarly, in case of Left maxillary second molar, 137(68.5%) had four cusps, 36(31.5%) had three cusps, respectively.

Characteristics of cusps on occlusal surface among 200 indicate 59(29.5%) distolingual cusp, while 141 (70.5%) had normal in right molar while in case of left maxillary molar, 63(31.5%) Distolingual cusp missing. In both left and right molar teeth all had oblique ridge. Similarly all of these also had distal triangular fossa DTF).The gender-wise difference in the number of maxillary second molar cusp indicates that four cusps were more common in males as compared to females, but this difference was not statistically significant (p>0.05). Similarly in case of Distolingual cusp configuration of both right (p=0.216) and left (p=0.541) maxillary second molars also had no significant differences (p>0.05).

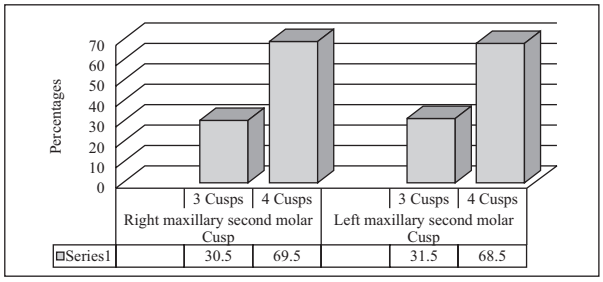

Figure 1: Description of the number of Cups in the right and left of second maxillary molars

DISCUSSIONS

The maxillary 2nd Molar is more or less similar to the first molar however, distolingual cusp is less developed and has no protrusion (tubercle) of

Table: Characteristics of Cusps and Occlusal of maxillary second molars

	Frequency	**Percent**
Missing of Right maxillary second molar		
Distolingual	59	29.5
None	141	70.5
Missing of Left maxillary second molar		
Mesiolingual	200	100.0
Distolingual	63	31.5
None	137	68.5
Oblique Ridge in Right Molar		
Present	200	100.0
Absent	--	--
Oblique Ridge in Left Molar		
Present	200	100.0
Absent	--	--
Distal Triangular Fossa Right Molar		
Present	200	100.0
Absent	--	--
Distal Triangular Fossa Left Molar		
Present	200	100.0
Absent	--	--
Cusp of Crabelli		
Present	--	--
Absent	200	100

Table 2: Description of cups features of maxillary second molars

		Gender		**P-Value**
		male f(%)	**Female f(%)**	
Right maxillary second molar Cusp	3 Cusps	30 (49.2%)	31 (50.8%)	0.218
	4 Cusps	82 (59.0%)	57 (41.0%)	
Left maxillary second molar Cusp	3 Cusps	33 (52.4%)	30 (47.6%)	0.541
	4 Cusps	79 (57.7%)	58 (42.3%)	
Right maxillary second molars feature	Distolingual	29(49.2%)	30(50.8%	0.216
	None	83(58.9%)	58(41.1%)	
Left maxillary second molars	Distolingual	33(52.4%)	33(47.6%)	0.541
	None	79(57.7%)	58(42.3%)	

carabelli.[8] The crown is comparatively shorter but similar in terms of buccolingual dimension. The occlusal features of the maxillary second molar are more rhomboidal in shape with poorly developed distolingual cusp.[9] The rhomboidal shape is more frequent having less acute and its obtuse angles.[10] The supplemental grooves are more common and distinct features of second molar as compare to first and third molars.[11] Results from the present study indicate that the majority of 139 (69.5%) of the study population have four cusps, and 61(30.5%) had three cusps. In a cross-reference Ling YK reported that the frequency of 4 cusps is 100 % for the first molars, 69 % for the first molars, and 31 % for the 3rd molars.[12] The research on Hong Kong population indicates that second molars, 5-cusp molars were the most prevalent in both sexes (43%-53%). Unlike the lower second permanent molars, which have 34% and 41%

four cusps for males and females respectively.[12] It is reported that lower second molars usually have four essential cusps which also been observed in the present study. However euthenics and geographical variation are also reported.

The present study indicates that 59(29.5%) of subjects had distolingual cusp missing, while 141(70.5%) were having distolingual cusp in right molar. Similarly among left maxillary molar, 63(31.5%) were Distolingual cusp was missing. This has been reported that molar teeth often develop from five lobes, and the premolars develop from four lobes except for mandibular second premolar.[13] Research further explained that the two depression at buccal and lingual surface is due to the pressure of roots of molar teeth. The buccal inclination is most common in Maxillary first molar teeth.[14] In present study, vast differences were noted in mesiobuccal cusp of both right and left molar teeth having an oblique ridge. A dental CT based study indicates that among a total of 100 patients mesiobuccal canal was present in 77 and dentilingual was observed in 18 patients.[15] it is further reported that 6.5% of patients had five cusps in second molar, and 935% has four cusps pattern.[16] sometimes there is rare Para style Cusp present in second molars, which have great importance forensic investigation.[17]

Cusp of carebelli was absent in the 2nd maxillary molar. This was a normal finding in first maxillary molar was found to be 29.7% in a group of Khyber Pakhtunkhwa.[16] The Cusp of carabelli is considered being a primitive structure that is disappearing with the evolutionary changes in humans.[17] Another study on Chinese population established the view that as the size of molar decreases, the occurrence of the cusp of Carabelli's trait decreases. This supports the fact that Carabelli's trait is a disappearing feature.[18]

CONCLUSION

According to the study maxillary second molar observed in the population is smaller than first molar.It is characterized by four and three cusps. Oblique ridge is present in it, like other maxillary molars. There are no additional features observed in the study. Cusp of carebelli is absent in the second maxillary molar. There are no significant differences present between gender.

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