

FREQUENCY OF TYPE TRAITS OF MANDIBULAR SECOND PREMOLARS — A STUDY

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ABSTRACT

Mandibular second premolar has two different type traits depending upon the number of cusps. In addition to this they are also identified on the basis of groove pattern unique to each type trait. The aim of this study was to determine the frequency of two variants of mandibular second premolars, unilaterally or bilaterally. This descriptive investigation was undertaken in different schools of Lahore, Pakistan. A total of 1500 children were examined for unilateral and bilateral cuspal variations, groove patterns and gender predilection. The subjects were examined in ordinary classroom chair using torch light and mouth mirror. To collect the data, the findings were recorded on a specially designed proforma.

The frequency of 2 cusp type and 3 cusp type premolars was 37.5% and 62.4% respectively. U shaped and H shaped groove pattern was found to be 54% and 46% respectively.

A gross difference in the frequency of 3 cusp variety was noticed. The most frequent occlusal morphological pattern was U/crescent shaped for 2 cusp variety of mandibular second premolar with predominantly bilateral existence. Frequency of 3 cusp type premolars was more in females as compared to males.

Key Words: Mandibular second premolars, groove pattern, cusp variety.

INTRODUCTION

Premolars are divided into two types namely bicuspid and tricuspid premolars. Mandibular second premolar is the fifth tooth from the midline, is the only class which bears these two type traits namely bicuspid and tricuspid respectively. Literature shows that 45% of individuals have two cusps type premolars and 55% have three cusps type form. Not only the cusp type varies, their occlusal groove patterns also differ. There are three different occlusal groove patterns. Y shape pattern is associated with three cusps type variety and U shape and H shape patterns are associated with two cusps type variety. Secondly the existence of these type traits unilaterally or bilaterally in the individuals

is also of clinical importance as the arch perimeters change when mixed dentition analysis is done to predict the space required for permanent canine, 1st and 2nd premolars respectively.^{1,2}

Mandibular second premolar of three cusps type is relatively larger mesio-distally than the two cusps type premolar.⁸ So this rare discrepancy in the prediction of leeway space can lead to slight crowding in the permanent dentition. This problem may worsen where there is only unilateral existence of these type traits, leading to shifting of midline and canine guidance discrepancy.³

Two cusps type premolar has one large and functional buccal cusp where as lingual cusp is very small and usually blunt. In this variety the central groove on the occlusal surface determines the subtypes of two cusps type.⁹ Where the central groove is horizontally placed between the mesial and distal pits, it is called H shaped second premolar and if the central groove is crescent shaped between these two pits, it is known as U shaped respectively. H shaped groove pattern is relatively more common than the U shaped type. However in three cusps type premolar the only groove pattern on the occlusal aspect is that of Y shaped.⁹ Since there are three cusps, one large

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est and functional buccal cusp where as two lingual cusps in which mesio-lingual is relatively larger than the disto-lingual which is pretty small usually non functional cusp.^{3,4}

The present study was carried out to check the frequency and distribution of different type traits of mandibular second premolars seen in children of different schools of Lahore and also to determine the existence of bilateral or unilateral variance, so that we could have some base line statistics of this trait in these groups. This knowledge of tooth morphology can be employed in the fields of forensic odontology, anthropology and odontometry as it can provide information on the phylogenetic relationship between species as well as variations and diversities within a population.^{2,3}

METHODOLOGY

This descriptive cross sectional study was carried out in different schools of urban and rural areas of district Lahore after taking permission from the concerned authorities and parents. A total of 1500 students of age 12-15 years were included in the study, which fulfilled the selection criteria. Fully erupted, healthy premolars of normal morphology were included in the study. Mandibular second premolars with decay, restoration, fractured or any trauma showing attrition, abrasion or erosion were excluded.

All the subjects were examined in the classroom chair using torch light and simple mouth mirror for both right and left sides of the lower jaw. The readings were recorded in the prescribed proforma to collect the data. Gender predilection was determined among the students. SPSS 20 version was used for data analysis.

RESULTS

Fifteen hundred subjects were examined in this study. The frequent cusp pattern was found to be three cusp variety (62.4%), compared to two cusp form (37.5%) (Table 1). Among the studied subjects, 698 were males and 802 were females, (Table 2). The predominant groove patterns were U/crescent shaped (54%) in two cusps variety and Y shaped in three cusps variety (Table 3).

TABLE 1: DISTRIBUTION OF VARIETIES OF MANDIBULAR SECOND PREMOLARS

	Premolar examined	No
1	Two cusps type unilateral only	02
	Two cusps type bilateral	561
2	Three cusps type unilateral only	02
	Three cusps type bilateral	935
	Total subjects	1500

TABLE 2: GENDER DISTRIBUTION OF VARIETIES OF MANDIBULAR SECOND PREMOLARS

Gender	Bicuspid	Tricuspid	Total
Male	277(40%)	421(60%)	698
Female	286(36%)	516(64%)	802
Total	563(37.5%)	937(62.4%)	1500

TABLE 3: DISTRIBUTION OF DIFFERENT GROOVE PATTERNS.

Groove pattern	No
Y shaped	937 (100%)
H shaped	258 (46%)
U shaped	305 (54%)

DISCUSSION

Mandibular second premolar is one of those permanent teeth with diverse morphological features existing in different populations.^{7,10} That is why the knowledge of its type trait is very important from the clinical point of view so that not only its other variants are identified from one another but also differentiate it from the second deciduous molar.

Mandibular second premolar has two type traits, a bicuspid variety and a tricuspid variety. This premolar is overall larger than the mandibular first premolar but the tricuspid variety is relatively more larger than the usual size of premolars and for the same reason it is also called as a mini molar and a transitional tooth being some morphological features like that of canine (having single rooted) and more than two cusps on the occlusal surface like that of molars.⁵ Further when we discuss the occlusal anatomy it is again of three types having based on the configuration of primary developmental grooves.^{1,4}

In this study the frequency of bicuspid and tricuspid types have been found 37.5% and 62.4% respectively. Thus the results of the current study differs from the work done by Bath-Balogh M and James Fuller JL¹, who reported the frequency of bicuspid and tricuspid varieties as 45% and 55% respectively. These results also differ from the similar studies conducted in India and China^{9,8} which also show almost same results like that of James Fuller JL. The Heavy physique and complexity of crown forms associated with the Western population could be the reason of this difference in the results.^{5,6} Although the complexity of crown forms are more associated with the males but in the current study the frequency of tricuspid variety is found much higher in females (64%) than the males (36%). This high frequency of tricuspid form in females could be one of the

reasons that frequency of crowding and malocclusion in females in Lahore region.

As far as configuration of occlusal groove pattern is concerned, more frequency of U/crescent shaped pattern (54%) has been observed associated with bicuspid variety in the present study. This is again in contrary to the work done by James Fuller¹ but consistent with the study of Sunil S, who also reported similar frequency of groove pattern in bicuspid variety.⁹

However it is interesting to mention that gender predilection is quite different as far as groove patterns are concerned, more frequency of H shaped pattern (55%) has been observed in females as compared to males (45%). But overall frequency of U/crescent shaped pattern is considered to be more pronounced in this study if bicuspid variety is considered irrespective of gender.

Although the parameters studied were found to be bilaterally present in each subject but very few students showed deviation from this norm (0.13%) as they had bicuspid variety on one side of the lower jaw but tricuspid variety on the other side of the jaw. Though this finding is not significant being very rare but is unique in the sense that this feature has not been studied before in the previous works.

CONCLUSION

The frequency of tricuspid variety in the study subjects of some Lahore schools was more as compared to bicuspid type just like those of Europeans. However frequency of U/crescent shaped groove pattern was predominantly associated with the bicuspid variety as compare to H shaped pattern which was more frequent

form of groove pattern in Europeans and Chinese. Tricuspid variety had only Y shaped pattern and that is the same was Asians as well as in Europeans.

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| 2 Muhammad Zeeshan Baig | Acquisition of data |
| 3 Muhammad Zeeshan Baig | Analysis and interpretation of data |
| 4 Tabeer Ayub | Drafting of manuscript |
| 5 Asrar Ahmed | Critical revision |