

Comparison and Analysis of Morphological Variations between Different types of Grooves Pattern in Mandibular 2nd premolar

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ABSTRACT

Background: To compare and analyze the different types of grooves pattern which is seen in Mandibular 2nd premolar.

Material and Methods: A total of 467 patients, out of which 178 are male and 289 are females, was examined for the present study. The different groove patterns were recorded.

Results: Most common groove pattern seen on the right Mandibular 2nd premolar is U shaped followed by H shaped and Y shaped. Most common groove pattern seen on the left Mandibular 2nd premolar is H shaped followed by U shaped and Y shaped

Conclusion: Very few or limited research or study had been conducted to observe the occlusion groove pattern of mandibular 2nd premolar. The present study has inference in forensic odontology as well as in clinical dentistry.

Keywords: Mandibular 2nd premolar, U shaped, H shaped, Y shaped.

INTRODUCTION

It had been a well known fact that human teeth possess morphological diversification in the crown as well as root structures. Various coronal morphological diversification includes different groove patterns, missing cusp, extra cusp etc¹. These structural differences displayed significant help in recognizing the gender, age and race of the deceased person and various anomalies or habits popular in a population². The mandibular 2nd premolar teeth show various morphological diversification. These teeth possess either two

cusps of three cusps. Moreover, three different types of occlusal groove patterns are also seen. These are Y, U and H shaped groove patterns. It had been observed that Y shaped groove pattern (Figure-1) is most commonly seen in three cusp type, while U shaped groove pattern (Figure-2) and H shaped groove pattern (Figure-3) are seen in two cusp type. H shaped pattern is observed when the central groove is placed horizontally in between the mesial pits and distal pits. Similarly, if central groove is seen as crescent shaped between the

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mesial pits and distal pits, then u shaped pattern is seen^{3,4}.

So, keeping this fact in mind that mandibular 2nd premolar shows various morphological differences in cusp type and groove pattern, we have conducted this study to observed the morphological variations in different grooves pattern seen in mandibular 2nd premolar. Also, to check the most common groove pattern in male and female, respectively.

MATERIALS AND METHODS

This study was conducted in the Department of Oral and Maxillofacial Pathology. A total number of 467 patient had been participated and examined in this study. Out of this,178 are male, and 289 are female. There are two mandibular 2nd premolar i.e. right and left. so total number of tooth examined in this study is 934 mandibular 2nd premolar teeth. All the participants are well aware of the study and written informed consent had been taken from them.

Inclusion criteria

- 1.Bilaterally completely erupted
- 2.Unaltered morphology
- 3.Devoid of proximal or occlusal caries

Exclusion criteria

- 1.Grossly decayed
- 2.Extracted
- 3.Restored
- 4.Fractured
- 5.Any regressive change i.e attrition,abrasion,erosion
- 6.Unilateral erupted

All the subjects are carefully examined. The armamentarium includes a mouth mirror, torchlight. The two well-trained operators had recorded the morphology of mandibular 2nd premolar. The groove pattern of right and left mandibular second premolar were recorded in the record book

RESULTS

After collecting the data, it was sent for statistical analysis. The sample consisted of 467 patients. Out of which, 178 are male, and 289 are female. A total number of teeth are 934 out of which 443 are male

teeth and 491 are female teeth. In males, the most common groove pattern of mandibular 2nd premolar

Table 1: Distribution of different groove pattern in male and female.

Gender	U shaped groove pattern	H shaped groove pattern	Y shaped groove pattern
Male	157	115	84
Female	192	198	188

Table number 2 : Distribution of different groove pattern in Right and Left side tooth

Shape of groove	Total number of tooth	Right side	Left side
U shaped	349	189	160
H shaped	313	144	169
Y shaped	272	129	143

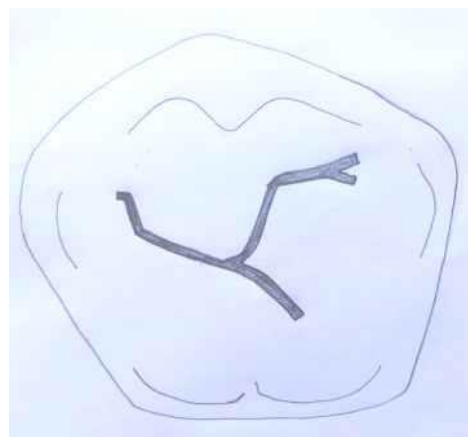


Fig 1: Y Shaped Groove Pattern.

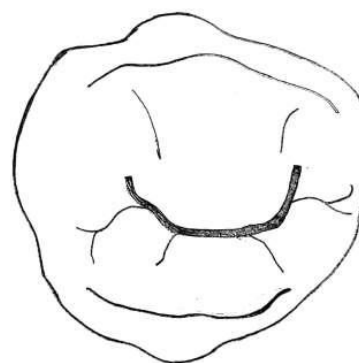


Fig 2: U Shaped Groove Pattern.

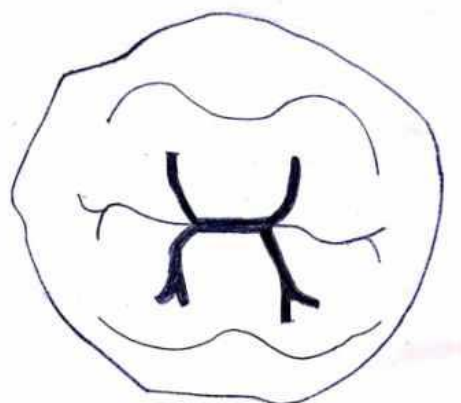


Fig 3: H Shaped Groove Pattern.

is U shaped, which is followed by H shaped and Y shaped (Table-1)? In females, the most common groove pattern of mandibular 2nd premolar is H shaped, which is followed by U shaped and Y shaped (Table-1). Out of 934 teeth, U shaped groove pattern is most commonly seen, which is followed by H shaped and Y shaped (Table-2).

Most common groove pattern seen on the right mandibular 2nd premolar is U shaped followed by H shaped and Y shaped. Most common groove pattern seen on the left mandibular 2nd premolar is H shaped followed by U shaped and Y shaped (Table-2).

DISCUSSION

From midline, 2nd premolar is the fifth tooth in both quadrants in mandible. It erupts as a predecessor tooth of deciduous second molar at the age of 11-12 years. In March, mandibular 2nd premolar is in mesial contact with mandibular first premolar and in distal contact with permanent mandibular first molar. There function is to help molars during the mastication. It had been observed that mandibular 2nd premolar, on comparison with mandibular first premolar, has a larger crown with longer root^{4,5}. It is observed that in two cusp pattern, one large buccal cusp and one small lingual cusp is seen. The buccal cusp is functional cusp while lingual cusp in non-functional in three cusp variety, one large buccal cusp along with two lingual cusps i.e. mesiolingual and distolingual are seen. Out of three cusps, the distolingual cusp is the smallest cusp and is nonfunctional. Also, after maxillary lateral incisor,

the most common missing tooth is mandibular 2nd premolar^{6,7}.

Various different dental morphology like missing teeth, crowding, occlusal groove pattern, dental restorations gives an individual person a separate identity. These dental records help in recognition of deceased individual and help in forensic dentistry as well as dental anthropology. It has been observed that there is variation in mesiodistal width of three cusps and two cusp type of mandibular 2nd premolar. This difference leads to variance in leeway space and results in modest crowding as well spacing which is helpful in the treatment planning of orthodontic patients^{1,6}

In our study, we observed that the most common groove pattern is U shaped, which is followed by H shaped and Y shaped. Our results were similar to the study conducted by Ali MAH et al., in which they observed the most common groove is U shaped, followed by H shaped and Y shaped⁸. In our study, we find that the most common groove pattern in males in mandibular 2nd premolar is U shaped which is followed by H shaped and Y shaped.

Also, we find the most common groove pattern in females in mandibular 2nd premolar is H shaped, which is followed by U shaped and Y shaped. A study conducted by Ali MAH shows similar results seen in our study⁸.

In another study conducted by Priyadharshini M observed that the most common groove pattern is Y shaped⁹. But in our research, we found that the most common groove pattern is U shaped. Also, they observed that in males and females, most common groove pattern was Y shaped. But in our study, the most common groove pattern in males is U shaped and in females, it is H formed.

CONCLUSION

Very few or limited research or study had been conducted to observe the occlusion groove pattern of mandibular 2nd premolar. The present study has inference in forensic odontology as well as in clinical dentistry. Further additional studies with a large number of sample size with different geographical locations is required for achieving the more accurate results regarding the gender preference as well as prevalence rate.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Krishan K, Kanchan T, Garg AK. Dental evidence in forensic identification– an overview, methodology and present status. *Open Dent J.* 2015; 9: 250-6.
2. Coro JC, Velasquez RL, Coro IM, Wheeler TT, Mcgorray SP. Relationship of maxillary 3-dimensional posterior occlusal plane to mandibular spatial position and morphology. *Am J Orthod Dentofacial Orthop.* 2016; 150(1):140-52.
3. Kolude B, Adeyemi BF, Taiwo JO, Sigbeku OF, Eze Ann UO. The role of forensic dentist following mass disaster. *IB Postgrad Med.* 2010;8(2):111-7.
4. Fuller JL, Denehy GE, Schulein TM. Concise dental anatomy and morphology. 4th ed. Iowa, University of Iowa College of Dentistry. 2013:86-98.
5. Gunduz K, Avsever H, Orhan K, Canitezer G, Acikgoz A, Oz U. A multi-center evaluation of multiple supernumerary premolar prevalence. *Aust Orthod J.* 2015;31(2):149-56.
6. Allen TR, Trojan TM, Harris EF. Evidence favoring a secular reduction in mandibular leeway space. *The Angle Orthodontist.* 2017;87(4):576-82.
7. Amin F. Prevalence of hypodontia in orthodontic patients in a pakistani sample. *Pak Oral Dent J.* 2010; 30: 142-5.
8. Ali MAH, Niazi M, Saqib S, Younas A, Khan N. Frequency of different groove patterns on the occlusal surface of mandibular second premolars. *J Islamabad Med Dental Coll.* 2019; 8(2):84-7.
9. Priyadarshini M, Don K.R. Prevalence of two variants of permanent mandibular second premolars. *International Journal of Current Advanced Research.* 2017;6(4):3541-4.