



## PREVALENCE OF TWO VARIANTS OF PERMANENT MANDIBULAR SECOND PREMOLARS

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### ABSTRACT

**Background:** Dental identification is an important identification tool in Forensic odontology. Permanent Mandibular second premolars, though generally are included under bicuspid, are of two types, the 2 cusp and 3 cusp variants. There is a difference of opinion regarding whether ethnicity influences dental morphology or not.

**Aim:** To determine the prevalence of two different occlusal morphological patterns of Permanent mandibular second premolars in Indian population.

**Methods:** This study was undertaken from the students of Saveetha Dental College, Chennai. A total of 100 students were randomly examined for cuspal variations and groove patterns of Permanent mandibular second premolars.

**Results:** The study revealed that the predominant cusp pattern was two cusp pattern (55.5%) and the predominant groove pattern was Y shaped (43.5%). The predominance in the combination of cusp and groove pattern was 2U (27.5%). Among males, the predominant cusp pattern was bicuspid (61%) and the predominant groove pattern was Y shaped (45%). Among females, the predominant cusp pattern was bicuspid (51%) and the predominant groove pattern was Y shaped (41.9%).

**Conclusion:** Dental identification is an important identification tool in forensic odontology. It may be concluded that variation in degree of expression and frequency of Permanent mandibular second premolars of different populations is different, which may help in forensic identification.

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## INTRODUCTION

The permanent mandibular second premolars are the fifth tooth from the midline and also the succedaneous tooth of deciduous mandibular second molars [1]. In mandibular first premolars, the lingual cusp is not functional but the mandibular second premolars are of two cusp and three cusp varieties [10]. So they are divided into two types namely bicuspid and tricuspid premolars.

There are three different occlusal groove patterns in permanent mandibular second premolars. “Y” shaped pattern is associated with three cusp type variety and “U” shaped, “H” shaped and “Straight groove” pattern are associated with two cusp type variety. The existence of these type of 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, first and second premolars respectively [2,3].

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This knowledge of 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 [3,6]. The permanent mandibular second premolars of three cusp type is relatively larger mesio-distally than the two cusp premolars [7]. 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 guidelines discrepancy [6]. Degree of expression and frequency of teeth in dentitions of different populations is different, which may help in forensic identification. This study was undertaken to find the prevalence of different occlusal morphological patterns of permanent mandibular 2nd premolars in the South Indian population.

## MATERIALS AND METHODOLOGY

A total of 100 mandibular second premolars were randomly evaluated in this study. The participant consent form and the participant information details were collected. The subjects

## Prevalence Of Two Variants Of Permanent Mandibular Second Premolars

included were students from Saveetha dental college, Chennai, India.

### Inclusion Criteria

1. Permanent mandibular second premolars free from occlusal or proximal caries.
2. Presence of bilaterally completely erupted permanent mandibular second premolars.
3. Permanent mandibular second premolars showing clear occlusal outline with all cusps and groove pattern.

### Exclusion Criteria

1. Participants with restorations and prosthesis in the permanent mandibular second premolars.
2. Presence of unilateral erupted permanent mandibular second premolars.
3. Participants with caries in permanent mandibular second premolars.
4. Permanent mandibular second premolars clinically showing hypoplastic features.

The participant consent form and the participant information details (name, age, gender, occupation, address) were collected. Direct oral examination was performed. The examinations were carried out using a dental mouth mirror and dental explorer. The pictures were taken using iPad. The number of cusps, groove pattern and occlusal morphologies of both left and right permanent mandibular second premolars were noted.

## RESULTS

Table 1 and graph 1 shows the general distribution of study population. In our study, out of 100 subjects 44 (44%) were males and 56 (56%) were females.

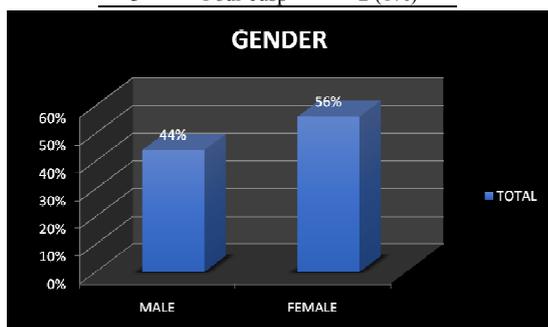
**Table 1** Distribution of gender

S. No	Gender	Total (%)
1	Male	44 (44%)
2	Female	56 (56%)

Table 2 and graph 2 shows the distribution of number of cusps in permanent mandibular second premolars. Out of 200 teeth, about 111 teeth (55.5%) of the mandibular second premolars showed 2 cusp pattern, 87 teeth (43.5%) showed 3 cusp pattern and 2 teeth (1%) showed 4 cusp pattern.

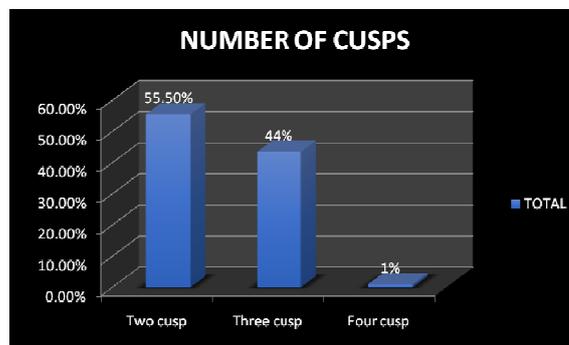
**Table 2** Distribution of number of cusps in mandibular second premolars

S. No	Number of cusp	Total (%)
1	Two cusp	111 (55.5%)
2	Three cusp	87 (43.5%)
3	Four cusp	2 (1%)



**Figure 1** Distribution of gender

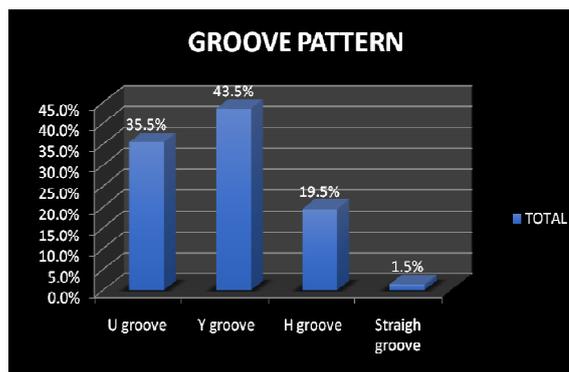
Table 3 and graph 3 shows the distribution of types of grooves in permanent mandibular second premolars. Out of 200 teeth, about 71 teeth (35.5%) of the mandibular second premolars showed U shaped groove, 87 teeth (43.5%) showed Y groove pattern, 39 teeth (19.5%) showed H groove pattern and 3 teeth (1.5%) showed straight groove pattern.



**Figure 2** Distribution of number of cusps in mandibular second premolars

**Table 3** Distribution of type of groove patterns in mandibular second premolars

S. No	Type of groove	Total (%)
1	U groove	71 (35.5%)
2	Y groove	87 (43.5%)
3	H groove	39 (19.5%)
4	Straight groove	3 (1.5%)



**Figure 3** Distribution of types of groove patterns in mandibular second premolars

Table 4 and graph 4 shows the distribution of combination of cusps and grooves in permanent mandibular second premolars. Out of 200 teeth, about 55 teeth (27.5%) were 2U, 35 teeth (17.5%) were 2Y, 18 teeth (9%) were 2H groove, 3 teeth (1.5%) were straight groove, 16 teeth (8%) were 3U, 50 teeth (25%) were 3Y, 21 teeth (10.5%) were 3H, 2 teeth (1%) were 4Y. The 4U, 4H and 4 straight and 3 straight combinations were not seen.

**Table 4** Distribution of combination of cusps and grooves in mandibular second premolars

S. No	Combination of cusp and groove	Total (%)
1	2U	55 (27.5%)
2	2Y	35 (17.5%)
3	2H	18 (9%)
4	2 straight	3 (1.5%)
5	3U	16 (8%)
6	3Y	50 (25%)
7	3H	21 (10.5%)
8	3 straight	0 (0%)
9	4U	0 (0%)
10	4Y	2 (1%)
11	4H	0 (0%)
12	4 straight	0 (0%)

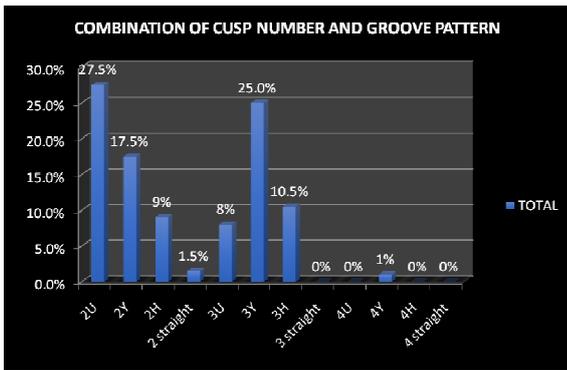


Figure 4 Distribution of combination of cusp and groove in mandibular second premolars

Table 5 and graph 5 shows the number of cusps in permanent mandibular second premolars in males. Out of 88 teeth of 44 males, about 54 teeth (61%) showed two cusp pattern, 32 teeth (36.3%) showed three cusp pattern and 2 teeth (2.2%) showed four cusp pattern.

Table 5 Distribution of number of cusps in males in mandibular second premolars

S. No	Number of cusps in males	Total (%)
1	Two cusp	54 (61%)
2	Three cusp	32 (36.3%)
3	Four cusp	2 (2.2%)

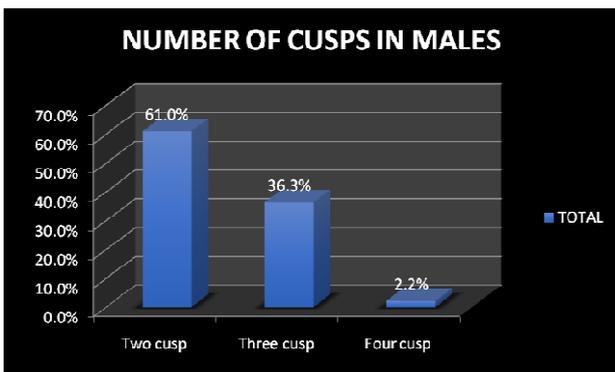


Figure 5 Distribution of number of cusp in mandibular second premolars of males

Table 6 Distribution of types of groove patterns in males in mandibular second premolars

S. No	Groove pattern in males	Total (%)
1	U groove	30 (34%)
2	Y groove	40 (45%)
3	H groove	18 (20%)
4	Straight groove	0 (0%)

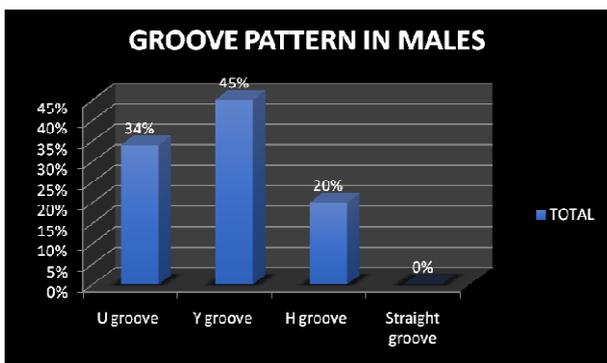


Figure 6 Distribution of groove pattern in mandibular second premolars in males

Table 6 and graph 6 shows the types of groove in permanent mandibular second premolars in males. Out of 88 teeth of 44 males, about 30 teeth (34%) were U groove, 40 teeth (45%) were Y groove, 18 teeth (20%) were H groove and none showed straight groove.

Table 7 and graph 7 shows the distributional number of cusps in permanent mandibular premolars in females. Out of 112 teeth of 56 females, about 57 teeth (51%) were two cusp and 55 teeth (49%) showed three cusp pattern and none showed four cusp pattern.

Table 7 Distribution of number of cusps in females in mandibular second premolars

S. No	Number of cusps in females	Total (%)
1	Two cusp	57 (51%)
2	Three cusp	55 (49%)
3	Four cusp	0 (0%)

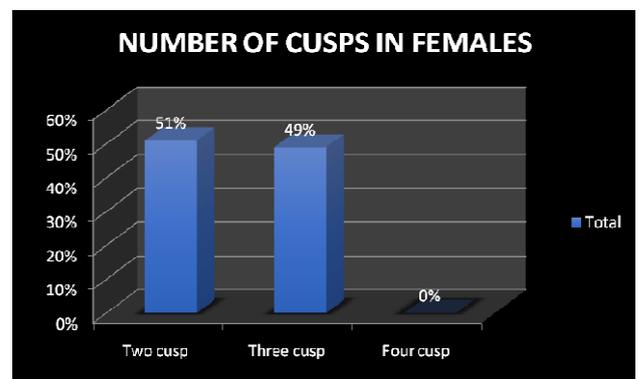


Figure 7 Distribution of number of cusp in mandibular second premolars in females

Table 8 and graph 8 shows the distribution of types of grooves in permanent mandibular second premolars in females. Out of 112 teeth of 56 females, about 41 teeth (36.6%) were U groove, 47 teeth (41.9%) were Y groove, 21 teeth (18.7%) were H groove and 3 teeth (2.6%) were straight groove.

Table 8 Distribution of types of groove patterns in mandibular second premolars in females

S. No	Groove patterns in females	Total (%)
1	U groove	41 (36.6%)
2	Y groove	47 (41.9%)
3	H groove	21 (18.7%)
4	Straight groove	3 (2.6%)

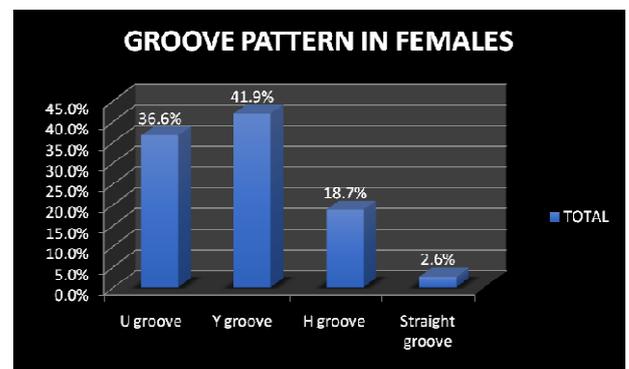


Figure 8 Distribution of types of groove pattern in mandibular second premolars in females

The study revealed that the predominant cusp pattern was two cusp pattern (55.5%) and the predominant groove pattern was Y shaped (43.5%). The predominance in the combination of cusp and groove pattern was 2U (27.5%). Among males, the predominant cusp pattern was bicuspid (61%) and the predominant groove pattern was Y shaped (45%). Among females, the predominant cusp pattern was bicuspid (51%) and the predominant groove pattern was Y shaped (41.9%).

**DISCUSSION**

Mandibular second premolars is one of those permanent teeth with diverse morphological features existing in different population [4, 5]. That is why the knowledge of its type is very important from the clinical point of view so that not only it's other variants are identified from one another but also differentiate it from the second deciduous molar.

The study of dental morphological characteristics and odontometry is important in anthropological research as it can provide information on the phylogenetic relationship between species, well as variations and diversities within a population [8]. Further more, knowing common variations in dental anatomy and morphology about each individual tooth can help in performing some dental treatments. Degree of expression and frequency of teeth in dentitions of different populations is different, which may help in forensic identification.

In our study, the predominant cusp type was found to be two cusp (55.5%). This was found to be in accordance to the study done by Sunil.S & Gopakumar.D who reported that bicuspid (52.8%) were predominant in Kerala population. But the study done by Ash & Nelson reported a higher Prevalence for the 3 cusp pattern in their study. Asrar *et al* study showed a predominance in tricuspid (62.4%). Similarly, in Bath-Balogh.M and James fuller JL study the predominant pattern was tricuspid variety (55%). (Table 9)

**Table 9** Discussion table

S. No	Studies	Predominance of cusp	Predominant groove pattern
1	My study	Bicuspid (55.5%)	Y shaped (43.5%)
2	Sunil & Devi Gopakumar study	Bicuspid (52.8%)	U/Crescent shaped and Y (45.27%)
3	Asrar Ahmed et al study	Tricuspid (62.4%)	Y shaped
4	Ash and Nelson study	Tricuspid	Y shaped
5	Bath-Balogh. M and James fuller JL study	Tricuspid	Y shaped

Regarding the groove patterns, the predominant groove pattern in our study was Y groove with 43.5%. Asrar *et al* showed a higher prevalence of Y groove and Sunil.S & Gopakumar.D study in Kerala population showed U groove pattern and Y groove pattern (45.27%). The study done by Ash & Nelson study reported a higher prevalence of Y shaped groove. (Table 9)

**CONCLUSION**

Dental identification is an important identification tool in forensic odontology. Due to variants in permanent mandibular second premolars there is a difference of opinion regarding whether ethnicity influences dental morphology or not. Comparison of present study to other studies in literature showed that the prevalence pattern of cusp of carabelli was different in different populations. The variation may be due to ethnic and regional differences. More number of samples is needed for better evaluation and comparison.

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