



## CUSP OF CARABELLI- FREQUENCY, DISTRIBUTION, SIZE AND CLINICAL SIGNIFICANCE

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### ABSTRACT

**Background:** The Cusp of Carabelli is a characteristic morphological trait often seen on the palatal surface of the mesiopalatal cusp of maxillary permanent molars. Dental anatomic features are used primarily to determine a person's identity. The significance of a dental anatomical trait depends on its frequency of occurrence and distinctiveness in a given population.

**Objective:** To determine the Frequency, Distribution, Size and Clinical significance of Cusp of Carabelli

**Methodology:** A total of 100 students and patients of Saveetha Dental College, Chennai, India (females 68 and males 32) were randomly selected and were examined for the prevalence pattern of cusp of carabelli.

**Results:** In our study, prevalence of cusp of carabelli was found to be only 7%. The predominant gender showing presence of cusp of carabelli was found to be females (85.71%). The predominant distribution was seen in maxillary right First molar (32%).

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### INTRODUCTION

The cusp of Carabelli, or Carabelli's tubercle, or tuberculomanale of Georg Carabelli is a small additional cusp at the mesiopalatal line angle of maxillary first molars. This extra cusp is usually found on the first molar, and becomes progressively less likely in the second, third molars.<sup>1</sup> This cusp is entirely absent in some individuals and present in others in a variety of forms. In some cases, Carabelli's cusp may rival the main cusps in size. Other related forms include ridges, pits, or furrows. This additional cusp was first described in 1842 by the Hungarian Georg Carabelli (Carabelli György), the court dentist of the Austrian Emperor Franz. The cusp of Carabelli is a heritable feature. Kraus (1951) proposed that homozygosity of a gene is responsible for a pronounced tubercle, whereas the heterozygote shows slight grooves, pits, tubercles or bulge.<sup>1</sup> Later studies showed that the development of this trait is affected by multiple genes. Carabelli's cusp is most common among Europeans (75-85% of individuals) and rarest in Pacific Islands (35-45%) The studies involved its prevalence, expression, size, shape, symmetry, dentition predilection, inheritability, morphogenesis and its association with fluoride and nutrients intake. If present, the level of expression of CT varies from a mere pit or groove to a well developed cusp.<sup>2</sup> Studies claim that there is variation in the prevalence pattern of cusp of carabelli, particularly regional variations.

So this study was done to assess the Frequency, Distribution, and Size and Clinical significance of Cusp of Carabelli in South Indian population.

### MATERIALS AND METHODOLOGY

A total of 100 students and patients of Saveetha Dental College, Chennai, India (females 68 and males 32) were randomly selected and were examined for the presence of cusp of carabelli. The examinations were carried out using a dental mouth mirror and dental explorer.

#### Inclusion Criteria

1. The teeth 16/26 and 17/27 free of dental caries were included.
2. The teeth 16/26 and 17/27 which did not have restoration were included.
3. The Indian nationals were only included.

#### Exclusion Criteria

1. The teeth 16/26 and 17/27 which had dental caries were excluded
2. The teeth 16/26 and 17/27 which had restoration that made observations unreliable were excluded.

### RESULTS

Table 1 shows general characteristics of study population. In our study out of 100 participants 68(68%) were females and 32(32%) were males.

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**Table 1** General characteristics of study population

S.No	Gender	No of participants
1	Males	32(32%)
2	Females	68(68%)

**Table 3** Distribution of cusp of carabelli

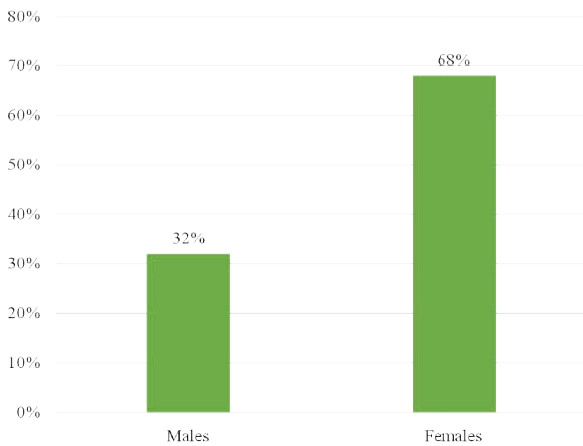
S.No	Teeth No	Distribution
1	16	9(32%)
2	17	0
3	26	8(29%)
4	27	1(4%)
5	16/17	0
6	26/27	0
7	16/26	3(10%)
8	17/27	0
9	16/27	1(4%)
10	17/26	1(4%)

Table 2 shows the prevalence of cusp of carabelli. Out of 400 tooth samples only 28(7%) showed cusp of carabelli. Remaining 372(93%) showed absence of cusp of carabelli.

**Table 2** Prevalence of cusp of carabelli

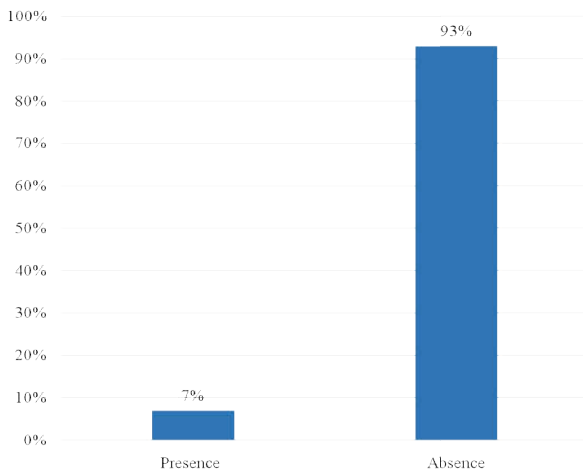
S.No.	Prevalence of cusp of carabelli	No. (%)
1	Presence	28(7%)
2	Absence	372(93%)

**General characteristics of study population**



**Graph 1** graph showing the general characteristics of study population.

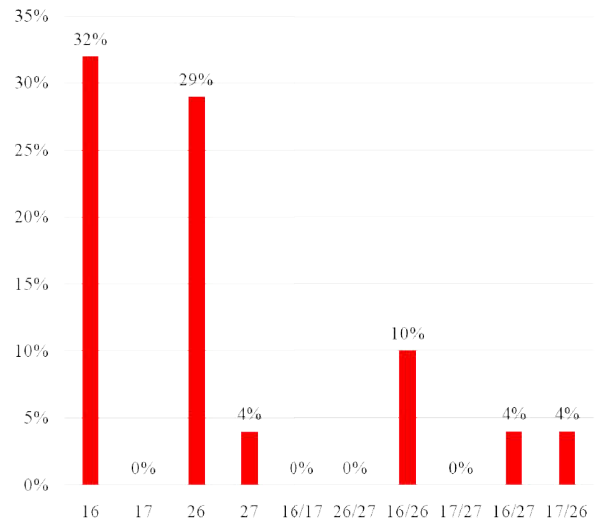
**Prevalence of cusp of carabelli**



**Graph 2** graph showing the prevalence of cusp of carabelli.

Table 3 shows the distribution of cusp of carabelli. Unilateral presence of cusp of Carabelli in maxillary right first molar accounted for 32%. Unilateral presence of cusp of carabelli in maxillary right second molar accounted for 0%. Unilateral presence of cusp of Carabelli in maxillary left first and second molar accounted for 29% and 4% respectively. Bilateral presence of cusp of carabelli in maxillary right first and second molar accounted for 0%.

**Distribution of cusp of Carabelli**

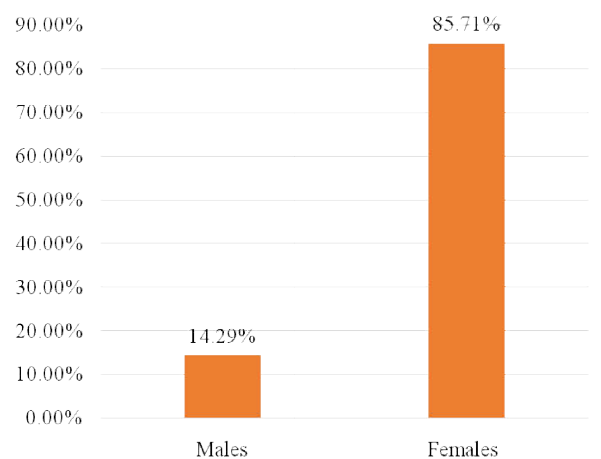


**Graph 3** graph showing the distribution of cusp of carabelli.

**Table 4** Gender distribution of cusp of carabelli

S.No.	Gender	Prevalance%
1	Males	14.29%
2	Females	85.71%

**Gender distribution**



**Graph 4** graph showing the gender distribution of cusp of carabelli.

Bilateral presence of cusp of carabelli in maxillary Left first and second molar accounted for 0%. Bilateral presence of cusp of carabelli in maxillary right and left first molar accounted for 10%. Bilateral presence of cusp of carabelli in maxillary right and left second molar accounted for 0%.

## Cusp Of carabelli- Frequency, Distribution, Size And Clinical Significance

Bilateral presence of cusp of carabelli in maxillary right first molar and left second molar accounted for 4%. Bilateral presence of cusp of carabelli in maxillary right second molar and left first molar accounted for 4%.

Table 4 shows the prevalence of individuals showing the cusp according to sex. Out of 400 samples, 28 showed presence of cusp of carabelli in which 4 (14.29%) were males and 24 (85.71%) were females.

### DISCUSSION

Dental anatomic features are used primarily to determine a person's identity, origin and gender. The significance of a dental anatomical trait depends on its frequency of occurrence and distinctiveness in a given population. The Cusp of Carabelli is a characteristic morphological trait often seen on the palatal surface of the mesiopalatal cusp of maxillary permanent molars and maxillary second deciduous molars.

The fifth cusp in the upper molars or Carabelli trait is the most commonly occurring dental morphological characteristic that is useful in forensic, anthropological and ethnic studies. It has no established etiology, nor known function or clinical importance. The studies involved its prevalence, expression, size, shape, symmetry, dentition predilection, inheritability, morphogenesis and its association with fluoride and nutrients intake. If present, the level of expression of CT varies from a mere pit or groove to a well developed cusp. It has been given innumerable names: trait of Carabelli, tubercle of Carabelli, molar tubercle, enamel elevation, fifth cusp, accessory cusp, mesiopalatal prominence and tuberculumanomalum.

Table 5 shows the comparison of present study with other studies.

**Table 5** comparison of present studies with other studies

S.No		Prevalence	Predominant gender	Predominant distribution
1	Our study	7.10%	85.71% females	16 –32%
2	Olubode O. Falomo	17.43%	18.81% males	16/26 - 71%
3	Syed Sadatullah	44.93%		16/26 - 83%

In the present study the prevalence of cusp of carabelli was 7%, while in other studies like Olubode O. Falomo's study showed the prevalence to be 17.43% and in Syed Sadatullah study to be 44.93%.

In the present study the predominant gender was females (85.71%). But this was in contradiction to the study done by Olubode O. Falomowhere males (85.71%) were the predominant gender.

In the present study the predominant distribution was unilateral 16 (32%). But this was in contradiction to the study done by Olubode O. Falomo and Syed Sadatullah where the prevalent distribution was 16/26 (71%) and 16/26 (83%) respectively.

### CONCLUSION

According to present study the prevalence of cusp of carabelli in Indian population was found to be less than in the Nigerian population and Saudi Arabian population. The variation may be due to ethnic and regional differences. More number of samples are needed for better evaluation and comparison.

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