

# Morphological Variations of Permanent Mandibular Molar's Occlusal Groove Pattern

Asma Saher Ansari<sup>1\*</sup>, Aynah Tariq Shaikh<sup>1</sup>, Zairah Muqaddas Ansari<sup>2</sup> and Atif Siddique<sup>1</sup>

<sup>1</sup>Department of Oral Biology, Dr. Ishrat ul Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences, Karachi, Pakistan

<sup>2</sup>Liaquat National School of Physical Therapy, Liaquet National Hospital, Karachi, Pakistan

## Research Article

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### \*For Correspondence

Asma Saher Ansari, Department of Oral Biology, Dr. Ishrat ul Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences, Karachi, Pakistan, Tel: +92 3312221968.

**E-mail:** asma.ansari@duhs.edu.pk

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### ABSTRACT

**Aim:** The study was conducted to determine the prevalence of different occlusal patterns in permanent mandibular second molars in a sample of Pakistani population.

**Materials and methods:** This cross sectional study was conducted in the Oral Biology department of Dr Ishratullbad Khan Institute of Oral Health Science. 500 casts were studied for the number of cusps and fissure pattern. Descriptives and association test were used for statistical analysis.

**Results:** 500 casts were observed, 51% were of boys and 49% of girls. The four-cusped form was the most frequent (95.4%). The most prevalent occlusal groove form was "+" shape (88.4%). Frequently present occlusal pattern was the "+4" form (85.4%).

**Conclusion:** The occlusal morphology show different degree of variability. The most frequent occlusal configuration of mandibular second molars found in Pakistani adolescent was the "+4" form.

## INTRODUCTION

It is stated in majority of relevant tooth morphology literature that the mandibular second molar of permanent set of dentition has a unique morphological structure, which comprised of 4 cusps, located on a occlusal surface and a plus sign (+) groove pattern <sup>[1,2]</sup>. Comparison at population level for mandibular molar dimension, number of cusp and occlusal pattern showed extreme variability <sup>[1]</sup>. Other anthropological researches regarding different shapes as described by Gregory and Hellman, later Hellman in another study explained this variability on occlusal topography as "5 - Y," "4 - Y" , "+5" and "+4" <sup>[3,4]</sup>. The fusion of metacone with the hypocone determine the future pattern to be assumed whether "Y" or a "+". If the primary parts come in contact with each other the occlusal groove pattern appear more like a "y"; whereas if no fusion takes place the configuration bear a resemblance to a "+" <sup>[5]</sup>. The formation of "y" or "+" fissures take place irrespective to the cusps number <sup>[6]</sup>. Phenotypically grooves form and number of cusp are therefore taken into account individually as no correlation was found between their evolutionary changes <sup>[7]</sup>. Fissure patterns are assumed to be polygenic trait; arrangements of alleles at two or more loci determined their expression <sup>[6]</sup>. Mandibular second molar having five-cusp is characteristically present among Mongoloid and Negroid populations as compared to Caucasians <sup>[1,8]</sup>.

It is therefore usually observed that different ethnic population are differentiate by these differences in their morphological features though whether ethnicity effects dental morphology is not clear <sup>[9,10]</sup>. The degrees of expression and frequency are observed to be different in teeth dentition of different populations <sup>[11]</sup>. The effect of genetic factors combined with the environmental factor give the tooth its final shape <sup>[1]</sup>. Dental anthropology is the valuable mean used for the determination of the geographical and racial similarities. Dental morphologies are expedient in the recognizing and differentiation <sup>[12,13]</sup>. A number of anthropological researches have been used qualitative methods to explore the association among unique dental traits in humans <sup>[14-18]</sup>. The study was focused on finding the most prevalent of mandibular second molars occlusal configuration in young adults using dental casts in a sample of Pakistani population <sup>[19,20]</sup>.

## MATERIALS AND METHODS

This cross sectional study was conducted in Oral Biology department of Dr. Ishrat ul Ebad khan institute of oral health sciences, Dow University. The study population comprised of 500 hundred medical and dental students of SMC and DIKIOHS and healthy subjects from dental OPD with age ranging between 17 to 25 years. The participants were selected by simple random sampling method.

The study was performed in two steps. In the first step oral examination along with alginate impressions for dental casts were prepared using dental stone. After getting medical and dental history, a careful intraoral examination was performed and the anatomical particulars for the occlusal table of mandibular second molar were recorded including, the presences of cusp, along with groove configurations. The cases with bilaterally erupted mandibular second molars were included in the study. Heavily restored or broken down molars were excluded from the study. Hydrocolloid impression material (Alginmajor, high precision alginate) and type III dental stone was material of choice for dental casts.

The cusp in this study was described as a raised structure present on occlusal table of a tooth ending in a conically rounded or flat surface and a groove was considered as a shallow depression <sup>[6]</sup>.

From the 500 study casts, cusps number along with groove form on permanent mandibular second molars were studied among six classified forms of occlusal fissures (4 - y, +4, 5 - y, +5, 6 - y and +6) were recorded.

The statistical analysis was performed on SPSS version 16. Descriptive statistics was calculated using mean and standard deviation. Means were compared. Statistical correlation for qualitative variables was calculated using chi square test.

## RESULTS AND DISCUSSION

Of the 500 casts examined, 51% were of males and 49% of females. Most frequent form of occlusal configuration is four-cusped form (95.4%) whereas 5-cusped form (4.6%). The groove form with a "+" morphology (88.4%) was highest among all occlusion configuration where as "Y" morphology found only in few casts (11.6%). The predominate configuration of occlusal configuration was "+4" form (85.4%) only few casts demonstrated the "+5" form (3%). 10% of cast showed "4-Y" pattern while "5-Y" was observed only in few casts (1.6%). Most cases in total study population were bilateral "+4" form (71.4%). Statistically no significant difference was found between boys and girls occlusal patterns amongst the classified six morphologies. Still, the number of "+5" configuration was significantly higher in boys when compared to girls. Chi-square test showed significantly higher percentage in boys in the "4 - Y" group ( $P < 0.005$ ). Pearson correlations between left and right mandibular occlusal pattern was not statistically significant ( $P > 0.05$ ).

## CONCLUSION

Odontometric study of tooth morphological features were very important in anthropological comparison among populations as it can deliver evidence on the phylogenetic connexion among different species, so as provide the disparities and diversities within a same populace. Moreover, clinically knowledge of variants in dental anatomy of individual tooth can guide in the accomplishment various procedures effectively, as to improve our knowledge both anthropological as well as clinical traits of dental sciences.

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