

COMPARISON OF NUMBER OF CUSPS IN PERMANENT MANDIBULAR FIRST MOLARS IN DIFFERENT ETHNIC GROUPS OF KHYBER PAKHTUNKHWA

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ABSTRACT

Human teeth of both permanent and deciduous dentitions may show variations in morphological features. The aim of the present study was to determine and compare the number of cusps on permanent mandibular first molars in three ethnic groups' i.e Swatis, Gujars and Jadoons. The sample size was 240 (80 volunteer students from each ethnic group) aged 12-21 years. They were selected by random sampling method. The study casts were made from their alginate impressions and cusps numbers were determined. The results showed highest percentage of 5 numbers of cusps on permanent mandibular first molars in all three groups. Four and six numbers of cusps were also present in some casts. There was no significant difference observed between these three groups.

Key Words: Mandibular first molars, Cusp numbers, Ethnic groups

INTRODUCTION

Variation in number of cusps in human dentition can be a diagnostic tool in clinical dental research and anthropology for characterizing and classifying various ethnic groups.¹ Cusps which basically build the occlusal surface of dentition also vary in number within different species of primates' also.² Various studies have shown different results regarding the presence of cusp numbers in mandibular molars to show whether they show the ethnicity or not. However, it is reported that there are different number of cusps and their degree of expression differs in dentition of different ethnic groups.³⁻⁵ It has been reported that in mandibular molars the buccal accessory cusps are very rare and existence of an oblique ridge even more rare in mandibular molars.^{6,7} Another study done on Australian natives has reported that maxillary first molar which forms early showed less variations than

the cusps of maxillary second molar.⁸ It is generally believed that individuals belonging to similar origin shows common phenotypic patterns specifically cusp number.⁹ The determination of cusps numbers are not only essential in anthropology, it is also important in the fields of orthodontics, dental occlusion, prosthetics and restorative dentistry.

The majority of investigations on cusp numbers in mandibular molars of human dentition and fossils were done by Bailey and Hellman.^{10,11} They investigated cuspal variations and reported presence of five cusps on permanent mandibular first molar and 4 cusps on second mandibular molars. Majority of studies describe 5 cusps in first mandibular molar and 4 cusps number in permanent mandibular second molar.¹²⁻¹⁴ Recent studies on cusp number of mandibular second molars in Iranian population have reported that most common occlusal surface configuration is 4 cusp pattern.¹³⁻¹⁴

To date, no investigations has been reported regarding the cusp numbers of permanent mandibular first molars and their comparison among three ethnic groups (Swati, Jadoon and Gujar) of Khyber Pakhtunkhwa so it is necessary to examine this morphological trait in these groups.

METHODOLOGY

This study was conducted in the high schools of Baffa, Attar Shisha and Mirpur city, Pakistan. The sample size was 294 dental casts (98x3 of each ethnic group). The volunteer students both male and female of age 12-20 years were chosen by random sampling method. The participants were provided with an informed consent form in their own language to understand the

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procedure fully. The inclusion criteria included (i) the Presence of bilaterally erupted permanent mandibular first and second molars showing clear occlusal morphology, (ii) free from any carious lesion, (iii) age 12-20 years and (iv) belonging to one of three specific ethnic groups (Swati, Gujar and Jadoon). Carious, restored, missing, hypoplastic, malformed, orthodontically moved and worn out teeth were not included in present study. The teeth were examined with mouth mirror. After that impression of participants were taken with an alginate impression material (Zhengzhou, Henan, China) which took about 8 minutes and then the dental stone type II (Zhengzhou, Henan, China) was poured immediately to avoid any shrinkage in the impression. The number of cusps of the permanent mandibular first and second molars were recorded on all dental casts. A cusp was considered as a "pronounced elevation on the occlusal surface of a tooth terminating in a conical, rounded or flat surface".¹⁵

RESULTS

According to the results 4, 5 and 6 cusps were

S #	Ethnic group	4-Cusp # RMI	4-Cusp # LM1	5-cusp # RMI	5-cusp # LM1	6-cusp # RMI	6-cusp # LM1
01	Swati	17	21	71	71	10	7
02	Jadoon	27	25	63	65	8	10
03	Gujar	13	16	79	75	6	8

changing in number according to Dahlberg these changes in various racial groups are not taking place at the same rate because of evolutionary tendency and this tendency is mainly responsible for various enormous variations in number of cusps on molars.¹⁶⁻¹⁹

In this study the most frequent occlusal configuration was 5 cusps form (Table 1), however there existed some cases in which 4 and 6 number of cusps were also found on permanent Mandibular first molar. Most recently, Madhushankari reported left mandibular permanent first molar exhibited 4 cusps with an oblique ridge in a 20-year-old patient.²⁰ The Scott and Turner have divided the various populations according to geographic variations of having 4 number of cusps into 3 groups. The group 1 includes Sunda-Pacific, Sub-Saharan Africa & Sino-Americas, Australia (0-3%) fell in low frequency group. Group 2 consists of New Guinea, Melanesia, Prehistoric Europe (5-10%) fell in Intermediate frequency group while group 3 includes Western Eurasia (10-20%) which are considered as high frequency groups.²¹ Therefore the data from current study falls into high frequency groups.

In 1995 the dental trait analysis of south Dakota Arikara population was done by Grant who also showed that majority of first mandibular molars in study sample

observed on the occlusal surface of permanent mandibular first molars. The highest of percentage among the number of cusps fell in the category of 5 cusps form in all the three ethnic groups, the greatest being in Gujar group.

The determination of cusp number on mandibular first molar of three ethnic groups showed highest percentage of 5 cusps in all study groups (table 1). 4 cusps pattern was also observed and its prevalence was highest in Jadoons that was 27% while it was almost same in both Swatis and Gujars on right permanent mandibular first molars. Furthermore the left sided first molars also showed same results comparatively.

In Gujars the frequency 5 cusps on first mandibular molar was highest (80%), while it was 72% in Swatis and 63% in Jadoons. The 6 cusp form was less frequent, its percentage was 10% in Jadoons and 7% and 8% in Swatis and Gujars respectively (Table 1).

DISCUSSION

In human beings the dentition is continuously

exhibited 5 cusps which proved that Arikara are similar to Asian derived populations in frequency of highest frequency of number of cusps.²³ Another study done on Korean population also showed maximum frequency of 5 cusps numbers on permanent mandibular first molar which is similar with findings of the current study.²³ In current study we also found 6 numbers of cusps on mandibular first molar but their frequency was very less among all these three populations. This observation coincides with the study done by Poornima et al in 2013.²⁴ In current research it is now considered that these morphological variations in cuspal forms may be due to gradual variations in evolutionary process.²⁵

CONCLUSION AND RECOMMENDATIONS

The present study showed highest percentage of 5 cusps numbers on permanent mandibular first molar of three ethnic groups which leads to the conclusion that these groups may be of same origin. Teeth were being used since centuries as a diagnostic tool for determination of different races.

It is recommended that similar studies should also include other ethnic groups of Pakistan.

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