ORIGINAL ARTICLE

STUDY ON TOOTH MORPHOLOGICAL VARIATIONS AMONG VARIOUS ETHNIC GROUPS OF PAKISTAN

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ABSTRACT

The aim of the study was to elucidate the prevalence of some accessory dental morphological traits variations in permanent teeth of population belonging to Swati, Gujar and Jadoon ethnic groups. The study sample was 300 subjects (100 of each group) volunteer students both male and females aged 12-21 taken in different schools of targeted areas having specifically Swati, Gujar and Jadoon residents. The study period was from july-janvary 2010. The prepared dental plaster casts were examined for morphological variations such as shoveling, bushman canine, distal accessory ridge and cusp of Carabelli. These traits were analyzed through Arizona state university tooth morphology system. The occurrence rate of each morphological trait was calculated as percentage of total sample size. In results the cusp of Carabelli exhibited maximum expression in Swati group while in Swati and Gujars more shoveling was observed as compared to Jadoons however the Bushmen canine was totally absent in these groups. The dentist should be aware of these dental morphological variations because in actual life the teeth morphology expresses more variations than in textbooks.

Key Words: *Tooth morphological variations, shoveling, Cusp of Carabelli, ethnic groups.*

INTRODUCTION

The dental morphological variations have profound importance for clinical treatment especially their degree of expression and incidence provides valuable data for genetic and phylogenic studies.[1] It is mandatory to understand the concept of morphological variations in esthetics and functional sense as normal morphological knowledge is usually not enough.[2,3]

The dental anthropologists have done extensive work on relationship between dental morphological variations and ancestry.[4-8] The future tooth morphological features as a result of immigration will show the prominent changes in dental makeup of ethnic groups e.g in Caucasoid population the shoveling in incisor is found very rarely that is less than 5%, while on the other hand the shoveling is major characteristic of Japanese and Chinese population and also present in patients with down syndrome so the clinician must be aware to manage these morphological variations in teeth.[9]

The objective of study was to examine how much dental morphological traits e.g shoveling, double shoveling, distal accessory ridge, Bushmen canine and cusp of Carabelli are present in each ethnic group (Gujar, Jadoon & Swati) and their comparison among these ethnic groups.

METHODOLOGY

A stratified random specimen consisting of series of plaster casts was obtained by selecting 300 volunteer school students (ages 12-21) from 8 schools located in Bafa, Attar shisha, Mirpur and Mangal. The ethnic groups selected for this study were Gujars, Jadoon and Swati. The sample size was 100 plaster casts for each ethnic group, comprised of 50 girls and 50 boys.

The students were selected on the basis of four criteria. These were dental status, age and ethnic group identity. All the volunteers were healthy apparently with no major illnesses, showed proper aligned arches with no history of orthodontic treatment, no supernumerary teeth, and possessed no restorations or fixed replacement and no prominent marks of attrition. The selected participants were marked by complete eruption of all permanent teeth except 3rd molar. The school principals were approached by research team representative and thoroughly explained the research

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Received for Publication: February 26, 2018
Revised: May 2, 2018
Approved: May 7, 2018

project. If the principal allowed students to take part in this project, each student was briefed with the purpose of this research. The volunteer students were provided with informed consents, and then an impression of their mandibular and maxillary teeth was taken with fast setting alginate impression material in a proper classroom permitted by school's headmaster. The time involved on per volunteer student was approximately 20 minutes. In order to avoid shrinkage the dental plaster was poured immediately into impressions. In the end all volunteers received gifts of tooth paste, tooth brushes, candies and biscuits.

After the collection of casts, the primary research strategy upon which this research was based, was derived from assessment of a series of different dental morphological traits scored in accordance with "Arizona state university dental morphology system".[10] These dental morphological traits were scored in accordance with "ordinally-graded plaster plaques". For each individual, four morphological crown traits were scored according to AZSUMS standard plaques. These traits were shoveling, Bushmen canine, distal accessory ridge and cusp of Carabelli. The observations were carried under proper lighting system. The one way ANOVA test was done for statistical analysis using SPSS version 20 for level of significance.

RESULTS

The comparison between frequency of morphological variations among Swati, Jadoons and Gujars ethnic groups (Table 1&2) showed that all three populations have high percentage of cusp of Carabelli followed by shoveling and distal accessory ridge trait while Bushmen canine was absent in all three ethnic groups.

In Swatis, the most common morphological trait was found to be cusp of Carabelli that was 80% on right molar and 73% on left molar (Table 2) (figure 1). The shoveling in both central incisors was almost same but in lateral incisors the right lateral incisor exhibited 33% shoveling while the left lateral incisor showed 45% shoveling (Table 1). In case of mandibular incisors only minimal shoveling was examined. The prevalence of distal accessory ridge on right canine was high as compared to left canine (Table 2).

In case of Gujar population also, the most common morphological variation found to be was again cusp of Carabelli (Table 2) that was 69% on right first molar and 63% on left first molar. The shoveling on right and left central incisor was 44% and 39% while on lateral incisors the shoveling was higher comparatively that was 46% on right lateral and 43% on left lateral incisor (pie chart) (Table 1). In Gujars the shoveling was also expressed more higher on mandibular molars as compared to Swati and Jadoons. It was more on left side incisors as compared to right side incisors that is 17 and 19% on left central and lateral incisors while it was only 10 and 8% on right side incisors (Table 1). The distal accessory ridge in Gujars was same as in Swatis (Table 2). This ridge was totally absent in mandibular canines (Table 2).

In Jadoons population the trait most frequently examined was again cusp of Carabelli similar to Swatis and Gujars which was 72% on right side first molar and 69% on left side molar (Table 2). The shoveling was high on right central incisor that was 50% while it was 37% on left central incisor (Table 1). However in case of mandibular incisors the shoveling was very uniformly low on all four incisors (Table 1). The distal

TABLE 1: SHOVELING & BUSHMEN CANINE TRAITS PERCENTAGE IN SWATI, JADOON AND GUJAR POULATIONS

Trait name	Tooth observed	Swati percentage	Gujar percentage	Jadoon percentage
Shoveling	Max right central incisor	49%	44%	50%
Shoveling	Max left central incisor	46%	39%	37%
Shoveling	Max right lateral incisor	33%	46%	30%
Shoveling	Max left lateral incisor	45%	43%	31%
Shoveling	Mand right central incisor	2%	10%	3%
Shoveling	Mand left central incisor	1%	17%	3%
Shoveling	Mand right lateral incisor	7%	8%	3%
Shoveling	Mand left lateral incisor	4%	19%	2%
Bushmen canine	Max right canine	NP	NP	NP
Bushmen canine	Max left canine	NP	NP	NP
Bushmen canine	Mand right canine	NP	NP	NP
Bushmen canine	Mand left canine	NP	NP	NP

TABLE 2: DISTAL ACCESSORY RIDGE AND CUSP OF CARABELLI TRAIT IN IN SWATI, JADOON AND GUJAR POPULATIONS

Distal accessory ridge	Max right canine	43%	43%	33%
Distal accessory ridge	Max left canine	37%	32%	31%
Distal accessory ridge	Mand right canine	NP	NP	NP
Distal accessory ridge	Mand left canine	NP	NP	NP
Cusp of carabelli	Max right ist molar	80%	69%	72%
Cusp of carabelli	Max left ist molar	73%	63%	69%

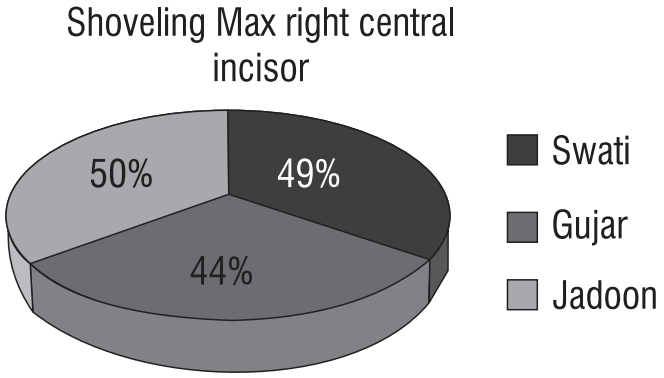

Fig 1: Comparison of shoveling in maxillary right central incisor in three ethnic groups

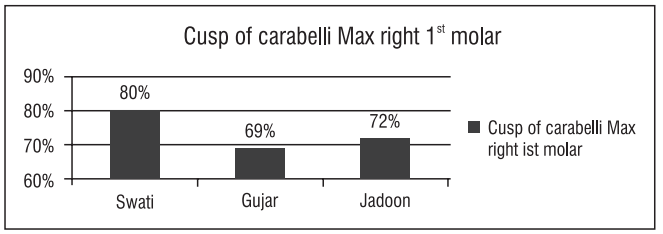

Fig 2: Comparison of cusp of Carabelli in maxillary right first molar in 3 ethnic groups

accessory ridge was 33% on right canine and 31% on left canine (Table 2).

DISCUSSION

The higher percentage of cusp of Carabelli in present study could also be clearly examined in Malaysian population that is 52% and also in south Indian population with frequency of being 29.2%.[11,12] Moreover in another study conducted by Salako and Bello found the percentage of cusp of Carabelli 58.7% in Saudi Arabian children.[13] This observation goes with the fact that the percentage of Carabelli's trait is quite high in Caucasian populations.[14] Furthermore, this trait is also considered as distinguishing feature between Asian and Asian derived populations from African and European populations.[15]

The Bushman canine dental trait showed zero grade of expression in this study for all three ethnic groups. This trait is now limited only to sub-Saharan Africans so can be use to differentiate sub-Saharan Africans from other worldwide samples.[16,17] The high frequency of distal accessory ridge could be observed in Malay and Chinese polulation[18], while in ethnic groups of Pakistan this dental trait is present in low frequency.

The low frequency of Carabelli's trait and high frequency of shovel incisors has been regarded as strong ethnic indicator for the mongoloid populations[19] while the present study showed opposite results, all three ethnic groups exhibited high frequency of cusp of Carabelli and comparatively low percentage of shoveling. Very few cases of shovel trait have been found in mandibular incisors. Again this finding is consistent with the fact the Caucasoid populations differ from Mongoloid by having a low prevalence of Carabelli's trait and high prevalence of shovel trait.[20-23]

On the whole, no significant differences in frequency of occurrence of dental morphological variations were found among three populations of the present study and previous studies on other Pakistani populations. Primary factors for minor contrasting results may be due to genetic factors, sampling techniques, nutrition and effect of local environment. Frequency of dental morphological variations can also provide exclusionary evidence as in present study, the high frequency of Carabelli's trait has been examined in all three ethnic groups as compared to other populations[24-26]. Although seems to be only morphological variations, these dental traits can make significant basis of identification of races i.e. differentiation can be made between negroids, mongoloids and caucasoids.

CONCLUSIONS

Within the limitations of this study, Gujars, Swatis and Jadoons population all exhibited dental morphological variations except Bushmen canine. However, there were no significant differences among these groups. This field needs further evaluation to better understand the cause for the variations in these groups and more other dental morphological variations should also be explored.

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3 Musarrat Burki:	Participation in methodology.