DENTAL SCIENCE

Role of Maxillary First Premolar in Forensic Identification: A Comparative Study between Two Races

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ABSTRACT

Objective: To determine the root morphology, tooth and root length of maxillary first premolars in Indian and Filipino population.

Materials and Methods: A total of 121 maxillary first premolars that were extracted for routine orthodontic procedure were examined in this study. The root forms were identified as one root, two roots, three roots and fused roots. The root length is measured from middle of cemento-enamel junction of buccal aspect and the tooth length is measured from tip of buccal cusp to the root apex using a digital vernier caliper. Root length and tooth length comparisons between gender and two races were done by independent t-test.

Results: In our study, 49.22% and 60.7% of the Indian and Filipino samples are found to have single root respectively. In the present study the mean tooth length was 21.97 mm in Indian samples and 21.45 mm in Filipino sample. The mean root lengths were 13.46 mm and 13.39 mm in Indian and Filipino sample respectively. No significant correlation among age and gender was noted.

Conclusion: Most the maxillary first premolars in Indian and Filipino were single rooted. The mean tooth length was 21.97 mm in Indian samples and 21.45 mm in Filipino sample and the mean root lengths were 13.46 mm and 13.39 mm in Indian and Filipino sample respectively.

INTRODUCTION

Anatomical variationsconstitutes phenotypical expressions that can be characterized as morphological modifications which donot cause practical hindrance to the individual's functions and that can be noted in any of the body structures. In dentistry, the anatomical diversities have been contemplated in, jaws, teeth, bone, muscles etc. It becomes necessary to differentiate the normal from the abnormal, so that the diagnosis is going in the right direction andin turn this assists in treatment planning[1].

Maxillary premolars are found to have various alterations in root frame and additionally root channel framework, which is of significance for general dental specialists and also endodontists. To start with premolars are situated in the middle, between the anterior and posterior set of teeth, they take after with canine and molars in shape and capacity[2]. From labial view, maxillary first premolars appear more similar to maxillary permanent canines, whereas from the functional aspect, they have a similar role as that ofthe molars i.e., they assist in pounding and biting the food particles. Without molars, premolars do the capacity of biting edible particles[3]. In any case they are additionally utilized for tearing the food particles, the character which is fundamentally associated with the capacity of canines.

Maxillary first premolars are normally thought to have two roots. However, there are various racial contrasts on the root shape, number of root and root network framework[4]. Extraction of maxillary first premolar may be troublesome, particularly when it has two separate roots. On the other hand, data about the number and structure of root cumulated as vital safety measures can be taken into consideration while deciding on

Table 1: Samples distribution according to race and gender

Race	Male	Female	Total
Indian	38	27	65
Filipino	34	22	56
Total	72	49	121

Table 2: Distribution and comparison of root form among Indian and Filipino races.

Race	Indian		Filipino		P
	M	F	M	F	
	N (%)	N (%)	N (%)	N (%)	
One root	18 (27.69)	14 (21.53)	19 (33.92)	15 (26.78)	0.5662
	P = 0.6179		P = 0.7410		
Two roots	12 (18.46)	7 (10.76)	9 (16.07)	5 (8.92)	0.5461
	P = 0.8562		0.6318		
Fused roots	8 (12.30)	6 (9.23)	6 (10.71)	2 (3.57)	0.6325
	P = 0.9168		P = 0.5986		
Total	38 (58.46)	27 (41.53)	34 (60.71)	22 (39.22)	

any further clinical treatment strategies[5].

Many studies have been carried out to determine the morphology of maxillary first premolar teeth and significant variations related to ancestry or geographic origins have been noted. Thereareno comparative studiesregardingthetooth and root dimensions among Indian andFilipino populations. Hence the present study was carried out to evaluate the root form, tooth and root length in Indian and Filipino population samples.

MATERIALS AND METHODS

A total of 121 maxillary first premolarsthat were extracted for routine orthodontic procedure were examined in this study. The extracted tooth were rinsed with water immediately after extraction to remove the blood debris and immersedin 5.2% Sodium Hypochlorite solution for two minutes and preserved in 10% formalin. All the patients were informed that their extracted teeth were preserved in our hospital and will be utilized for the research. Fractured premolars and thosewith incompleteroots formation, with open apex and developmental anomalies were not includedin this study. The root forms were identified as one root, two roots, three roots and fused roots. The root length was measured from middle of cemento-enamel junction of buccal aspect and the tooth length was measured from tip of buccal cusp to the root apex using a digital verniercaliper. The measurement till the apex of the longest root was considered in multi-rooted teeth. Statistical analysis was carried out by SPSS 21.0 (Chicago, USA). Root length and tooth length comparisons between gender and two races were done by independent t-test.

RESULTS

In the present study a total of 121 samples were incorporated among which 65 (38 males and 27 females) were Indian and 56 (34 males and 22 females) were Filipino (Table 1).

Among Indian samples, 49.22% were single rooted, 29.22% were having two roots and 21.53 were having fused roots with no significant difference among genders. In Filipino samples 60.7% were single rooted, 24.99% were having two roots and 14.28% were observed with fused roots with no significant difference among genders. Similarly no significant difference was observed when root form was compared between two races (Table 2).

The mean tooth length was 22.02 ± 2.08mm in males and 21.87 ± 1.34 mm in females among Indian samples. Similarly the mean tooth length in Filipino sample was 21.54 ± mm and 21.87 ± 1.34 mm in males and females respectively. The mean root lengths were 13.88 ± 2.57mm and 12.98 ± 1.04 mm in Indian males and females respectively. In Filipino samples, the mean root lengths were13.01 ± 3.62 and 13.88 ± 2.57 in males and females respectively. No significant difference was observed when comparison was made between gender and race (Table 3).

DISCUSSION

Forensic identification depends on both specialized and organic necessities, which are: uniqueness, unchanging nature, classificability, and practicality[6]. It is fundamental that the dental attributes and particularities be interesting, that is, they ought not to be found in more than one person. In this sense, the anatomical varieties also, dental peculiarities which might be controlled by hereditary data or may emerge amid the different phases of advancement are highlighted. It contrasts from the anatomical variety of irregularity, in light of the fact that in the primary case there is no impedance to the functional capacity to be performed by the structure or organ[7]. Along these lines, the anatomical dental varieties essentially include morphological contrasts in the length, width, stature or volume of the crown and root[8].

The present study was carried out to obtain information regarding the tooth length and root form of maxillary premolars in Indian and Filipino population. To date there is no available literature comparing the tooth lengths and toot forms between Indian and Filipino population.

In our study, 49.22% and 60.7% of the Indian and Filipino samples are found to have single root respectively. Walker and Loh from China observed that 60% and 50% of their sample had single root in their two different studies[9]. Similarly a CBCT (Cone-Beam Computed Tomography) study done by Tian et al. in Chinese population has found that 66% of the maxillary first premolars had single root, this was marginally higher compared with the present study[10]. Dashrath et al., found that 58% of their samples from Nepal as having single root[11]. Pecora et al., found that 55.8% of samples with single root[12]. In contrast to our study Chapparo et al (Spanish).,[13] Ingle et al (Brazilian).,[14] Vertucci et al (Caucassian).,[15] Awawdeh et al (Saudi).,[16] Ateih et al (Jordanian).,[17] Rwenyonyi et al (Sudanese).,[18] observed that double rooted maxillary first premolars are common.

Maxillary first premolars with three roots are considered as very rare entity and their prevalence is reported ranging from 0.8-6%[19]. In the present study none of the samples were noted with three roots.

In the present study the mean tooth length was 21.97 mm in Indian samples and 21.45 mm in Filipino sample. The mean root lengths were 13.46 mm and 13.39 mm in Indian and Filipino sample respectively. Dashrath et al., reported a mean tooth length of 21 mm and root length of 12.76 mm in Nepalese population[11]. Pecora et al., observed a mean length of the tooth to be 21.0 mm in Brazilian population[12].

Kim et al., reported that the mean tooth length and root of the extracted maxillary first premolars in Korean population was 21.55 mm and 13.12 mm[20].

Table 3: Comparison of mean tooth length and root length among Indian and Filipino races.

Race	Indian		Filipino		P
	M	F	M	F	
Mean tooth length	22.02 ± 2.08	21.87 ± 1.34	21.98 ± 1.02	21.04 ± 2.04	0.8140
	P = 0.6312		P = 0.6341		
Mean root length	13.88 ± 2.57	12.98 ± 2.57	13.01 ± 3.62	12.45 ± 1.04	0.9450
	P = 0.8543		P = 0.6419		

CONCLUSION

Based on the observations of our study it can be concluded that the maxillary first premolars in Indian and Filipino population have a tendency to be single rooted. The mean tooth length was 21.97 mm in Indian samples and 21.45 mm in Filipino sample and the mean root lengths were 13.46 mm and 13.39 mm in Indian and Filipino sample respectively. No significant correlation among age and gender was noted among both the races.

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