

Gender wise comparative study of mesiodistal width of crown among patients attending Dhulikhel Hospital

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ABSTRACT

Introduction: Tooth dimension is an important consideration in treatment planning as the size of teeth is required for replacement or restoration. The aim of this study was to determine the mesiodistal width of six anterior natural teeth in maxilla. This would be helpful in selecting artificial teeth and also for better esthetics

Methods: The sample consists of 368 patients (184 male 184 female) visiting the Dental Outpatient Department of Dhulikhel Hospital for a period of 3 months (November 2022 to January 2023). Impression of maxillary arches were made with alginate and poured in dental stone. Measurement of widest mesiodistal width of labial surface of anterior six teeth was done with the digital vernier caliper by two observers on the casts. Independent t test was applied to compare the mean measurement between gender. Statistical analysis was done using statistical package for social sciences (SPSS version 21). The level of significance was set at p -value <0.05 .

Results: Mesiodistal width of both right and left maxillary central incisor, lateral incisor and canine were significantly higher in males than in females ($p<0.001$, $p<0.001$ and $p<0.001$, respectively)

Conclusions: Statistically significant difference was observed in mesiodistal tooth width between males and females, where the males showed higher mean values. The results of the mesiodistal tooth width obtained could be helpful to dental practitioners in prosthodontic and esthetic treatment planning.

Key words: Canine; Central Incisor; Lateral Incisor; Mesiodistal; Vernier Caliper.

INTRODUCTION

Width of anterior teeth plays an important role in treatment planning as the size of teeth is required for replacing missing teeth. Maxillary anterior teeth are essential for an attractive face and pleasant smile. Loss of maxillary anterior teeth not only affects the facial appearance but can also create psychological trauma.¹ The difference in dimensional

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measurement accuracy between one tooth to another gives an idea to the prosthodontist and dental laboratory regarding the size of teeth to be replaced or modified during prosthodontic rehabilitation.²

The mean value of the clinical crown length (CL) of MCI was 9.1 ± 1.14 mm on left and 9 ± 1.14 mm on right side. The average value of the mesiodistal width of the clinical crown (MDW) was 8.25 ± 0.59 mm on left and 8.20 ± 0.51 mm on right side.³ The purpose of the study was to determine the mesiodistal width of six anterior teeth so as to select proper teeth close to natural tooth. This enhances esthetics and tooth arrangement.

METHODS

A cross-sectional study was conducted on patients visiting the Dental Outpatient Department (DOPD) of Dhulikhel Hospital, Kathmandu University school of medical sciences. The sample consists of 184 male and 184 female (total 368) patients visiting the Dental Outpatient Department of Dhulikhel Hospital for a period of 3 months (November 2022 to January 2023). After receiving Ethical approval from the institutional review committee (IRC) of Kathmandu University school of medical sciences. (IRC –KUSMS Approval No 162/22). Inclusion criteria included patients of age group 18 to 25 years with complete permanent dentition. Patients were excluded from the study if they had congenital or acquired maxillofacial defects, missing anterior teeth, attrition, severe malocclusion, fractured or rotated teeth, microdontia or macrodontia history of previous or current orthodontics treatment, history of previous coronoplasty and damaged cast.

Sample size was calculated based on the study done, ⁴ in Province II, Nepal, using formula, $n = Z^2 p(1-p)/d^2$, Where Z=static constant corresponding to level of confidence, p=expected prevalence and d= precision or margin of error. with 5% margin of error, at 95% confidence interval and Z=1.96 and power 80%.

Impressions of maxilla were made using standard protocols and according to manufacturer's recommendations using Alginate (Zelgan 2002, Dentsply). It was poured with dental stone type III (Kalstone et III, Kalabhai, Mumbai). After the cast sets in one hour, it is removed. Casts that were damaged were discarded and re-impression was made, using Hunter and Priest ⁵ actual tooth size was investigated. Measurements were done using an electronic digital calliper accurate to 0.01 mm (Mitutoyo Digital Caliper, Japan). (Figure1) on the casts perpendicular to long axis of the tooth in the

maximum tooth contours of the teeth between a line parallel to occlusal and labial surfaces (Figure 2). Mesiodistal widths were measured by three observers. The measurements were repeated three times and mean was recorded (Figure 2). While measurements were made, it was made sure to avoid damage to the casts. Independent t-test was used to compare between male and female population. The significance level was set at p value ≤ 0.05 .

RESULTS

Mesiodistal width of maxillary right central incisor, right lateral incisor and right canine were significantly higher in males than in females ($p < 0.001$, $p < 0.001$ and $p < 0.001$, respectively) (Table 1).

Mesiodistal width of maxillary left central incisor, lateral incisor and canine were significantly higher in males than in females ($p < 0.001$, $p < 0.001$, $p < 0.001$, respectively) (Table 2).

The mean mesiodistal width of maxillary right central incisor, lateral incisor and right canine were 8.83mm, 7.05mm and 8.08mm respectively in male population. Similarly, it was 8.55mm, 6.96mm and 7.80mm respectively in female population.

The mean mesiodistal width of maxillary left central incisor, lateral incisor and left canine were 8.89mm, 7.10mm and 8.05mm respectively in male population. Similarly, it was 8.61mm, 6.96mm and 7.77mm respectively in female population.

The mean mesiodistal width of maxillary right central incisor in male was 0.28 mm larger than in female whereas right lateral incisor was larger by 0.09mm in male (Table 1). The mean mesiodistal width of maxillary left central incisor in male was 0.28 mm larger than female, where as in left lateral incisor was larger by 0.14mm in male (Table 2).

The mean mesiodistal width of maxillary right canine in male was 0.28mm larger than in female. The same difference was observed in maxillary left canine as well.

DISCUSSION

This study shows that gender wise comparison indicates the presence of sexual dimorphism. Maxillary anterior six teeth were larger in male than in female. This study could be helpful in replacement of artificial teeth of prosthesis in this cross section of population.

The concern regarding accuracy and precision of plaster casts made from alginate impressions whether it gave actual mesiodistal tooth width was studied by Coleman et al⁶. The findings of these studies pointed out that alginate impressions produce clinically acceptable

accuracy of dental casts. Advantage in the measurement of teeth on the dental cast was more accurate than measuring teeth directly in the mouth which was established by Hunter and Priest.⁵ The various studies carried out so far are characterized by a lack of homogeneity in the analytical methods used.⁷ Some authors perform measurements on anatomical crowns of extracted teeth while others obtain digital photographs to measure the clinical crown using virtual callipers.⁷ Plaster casts have also been used.⁷ These methodological differences make it difficult to compare the different published studies. Variability is moreover also observed in the methods used to determine the proportions.⁷ Therefore, the stone cast was adapted to take mesiodistal width in our study.

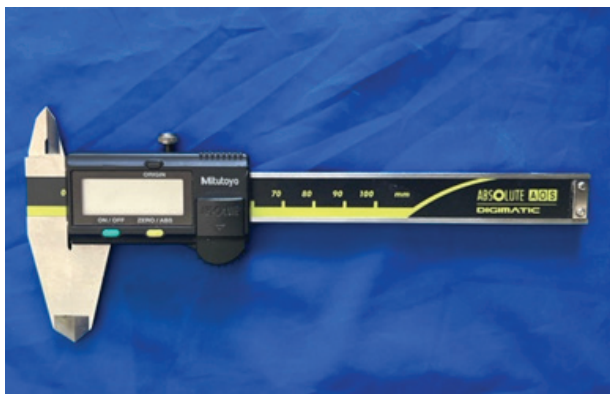


Figure 1: Vernier calliper



Figure 2: Measurement of maxillary teeth using Vernier caliper

Table 1: Comparison of mesiodistal width of anterior teeth right maxillary arch

Tooth number	Male (n=184)		Female (n=184)		t	P-Value*
	Mean	SD	Mean	SD		
Maxillary left central incisor	8.89	0.55	8.61	0.56	4.785	<0.001
Maxillary left lateral incisor	7.10	0.69	6.96	0.62	5.543	<0.001
Maxillary left canine	8.05	0.52	7.77	0.42	5.648	<0.001

Table 2: Comparison of mesiodistal width of anterior teeth left maxillary arch

Tooth number	Male (n=184)		Female (n=184)		t	P-Value*
	Mean	SD	Mean	SD		
Maxillary right central incisor	8.83	0.60	8.55	0.59	4.624	<0.001
Maxillary right lateral incisor	7.05	0.72	6.96	0.64	4.837	<0.001
Maxillary right canine	8.08	0.52	7.80	0.43	5.687	<0.001

The study of gender differences in mesiodistal tooth width have been carried out by several earlier researchers. In this research the males had larger teeth than females for each type of tooth, whether it be maxillary central, lateral or canine. Central incisor and Canine on maxillary arch showed statistically significant association according to gender in mesiodistal tooth size ($p < 0.001$). This was in agreement with the results of Hattab et al.⁸

Similarly, significant differences were seen in relation to maxillary lateral incisors of maxillary arch compared between male and female population ($p < 0.001$).

The mesiodistal width of maxillary central incisor was 8.5 mm⁹ and 8.6 mm¹⁰ in different ethnic groups. In our study the mean mesiodistal width was 8.83mm and 8.89mm for right and left maxillary central incisor respectively in male population which was close to the width of 8.74±1.16 8.66±1.30 for right and left central incisor for male respectively.¹¹ In the present study the mean mesiodistal width was 8.55 mm and 8.61mm for right and left maxillary central incisor respectively in female population. This was close to the width of 8.62±0.75 and 8.20±0.61 for right and left central incisor for female respectively. .¹¹

The mesiodistal width of lateral incisor was 6.5 mm and 6.6 mm .^{9,10} Studies done by various authors^{12,13,14,15} vary between 6.32 and 7.61 mm in male subjects. The mesiodistal width of maxillary right lateral incisor in male subjects is 7.04 mm in the present study which was close to 7.07 mm as mentioned in similar study.¹⁵ In the female population the mesiodistal width of maxillary right lateral incisor in the present study was 6.96 mm and as mentioned by different investigators^{12,14} varies between 6.53 mm and 6.71 ± 0.64 mm. The reading of left lateral incisor in the present study is 6.96 mm.

The mesiodistal width of left lateral incisor varies between 6.57 and 6.28 ± 0.56 mm. ¹³

The mesiodistal width of maxillary canine was 7.5 and 7.6mm. ^{9,10} The mesiodistal width of right and left maxillary canine of male subjects in present study was 8.08 and 8.05 mm, respectively. The mesiodistal width of maxillary right canine was closer to 7.90±0.48 mm mentioned in a study¹⁶ and on the left side was closer to 7.92±0.44 mm mentioned in same study. Whereas in female subjects the mesiodistal width of right and left maxillary canine, in present study, is 7.80 and 7.7mm, respectively. In female subjects it varies in the range 7.83 ± 0.45mm on right side and 7.75 ± 0.45mm on left side as per Radha Baral et al ¹⁶.

The results will pave way in providing useful clinical information to diagnose and treatment planning for Prosthodontics patients of Dhulikhel hospital.

The main limitation of this study was the small sample size due to time constraint of study. Therefore, it was recommended that the future studies should include more number of samples. As impressions were obtained using alginate, minor discrepancies may have occurred in the cast if it was not poured immediately. While measuring with digital caliper minor position difference may have occurred which may affect the result.

CONCLUSIONS

There was a statistically significant difference in mesiodistal tooth width between males and females where the males showed higher mean values than that of females for each type of tooth. Gender dimorphism existed for various tooth dimensions as the central incisors were 0.28mm wider, the lateral incisors were 0.09 mm wider and canine teeth were 0.28mm wider in males compared to females.

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