

Crown Dimensions of Maxillary Molar teeth For the Adult Sudanese and their benefits

Mahmoud Satte *, Mahmoud Sheikh Satte **

* Department of Anatomy, Faculty of Medicine, Najran University, Najran, 55461, KSA

** Asst/Prof., Anatomy Department, Medical College, Najran University, Najran, 55461, KSA

DOI: 10.29322/IJSRP.13.02.2023.p13419

<http://dx.doi.org/10.29322/IJSRP.13.02.2023.p13419>

Paper Received Date: 1st January 2023

Paper Acceptance Date: 2nd February 2023

Paper Publication Date: 15th February 2023

Abstract- Background: The teeth are the hardest tissues in our bodies and after death; they maintain their original features for the long term. Teeth measurements were used in forensic medicine for sex determination and can support dental students and orthodontists to apply their practical sections. **Aims:** The current study aimed to measure the crown dimensions from the buccolingual (BL) and mesiodistal (MD) directions and their benefits for adult Sudanese maxillary molars teeth. **Material and methods:** This study was conducted on 120 adult Sudanese extracted sound maxillary molar teeth (60 male and 60 female), ages ranging between 26 to 48 years. The teeth were fixed in 10% formalin immediately after they were removed. The measurements in millimeters were applied by using Vernier caliper on the crown buccolingual and mesiodistal dimensions. The data values were analyzed by using the SPSS program. **Results:** The crown dimensions of molars teeth are slightly large in males than in females, and the buccolingual crown dimension is slightly large than mesiodistal. **Conclusion:** The morphometric data values of the adult Sudanese extracted molar teeth can be used in forensic cases identity, orthodontics, and teaching dental students and professionals.

Index Terms- Crown, dimensions, Sudanese, maxillary molars

I. INTRODUCTION

Human permanent maxillary molar teeth are present on the posterior part of the upper jaws; with three teeth on each right and left side. There are basic international dental terms used for describing the morphology and morphometrics of the molar teeth. The mesial refers to the surface of the teeth toward the front of the mouth, distal refers to the side of teeth toward the back of the mouth, buccal refers to the surface of the teeth toward the cheek, lingual refers to the side of the teeth toward the tongue, and occlusal refers to the surface of downward, crown refers to the part of the teeth which is visible on the mouth [1]. Many studies have applied the metric of the crown dimensions of permanent maxillary molars teeth on different populations and showed that can help a lot in forensic and dental medical fields such as gender determination in sudden and unexpected death, floods, explosions, fires, and accidents [2, 3, 4]. This study aimed to evaluate the

crown dimensions and their advantages for the extracted adult Sudanese maxillary molar teeth.

II. MATERIALS AND METHODS

Several 120 healthy permanent maxillary molar teeth (not affected by caries) were collected after their extraction for other pathological reasons for adult Sudanese patients (age range=26-48 years) in Dental Hospital, Khartoum state, Sudan. The ethical importance of the patients is taken during sample collection. Extracted molar teeth include 20 male and 20 female first maxillary molars, 20 male and 20 female second maxillary molars, and 20 male and 20 female third maxillary molars. Each extracted tooth kept in a plastic box contains 10% formalin solution, with a capacity of 200ml. The name and type of the teeth were identified before their removal from the mouth cavity. The age and gender of each patient were written on the out surface of each box. The metric design in millimeters for each tooth was measured on crown mesiodistal (MD) and buccolingual (BL) dimensions by using the Vernier caliper (Figures 1, 2). The data values were analyzed by the SPSS ((Statistical Package for the Social Sciences) program.

III. RESULTS

In general, we revealed that the mean value of the crown dimensions of all maxillary molar teeth are bigger in males than females, and the buccolingual crown dimensions are larger than mesiodistal in both genders. The first maxillary molar teeth are the largest one followed by the second while the third molar is the smallest one.

The mean values of the buccolingual crown dimensions for the male was 10.10, 9.90, and 9.70 for the first, second, third maxillary molar teeth respectively, while for the female was 9.90, 9.70, 9.60 for the first, second, third maxillary molars teeth respectively (Table 1).

The mean values of the mesiodistal crown dimensions for the male was 9.80, 8.80, and 8.60 for the first, second and third maxillary molars respectively while for the female was 9.65, 8.60 and 8.50 for the first, second and third maxillary molar teeth respectively (Table 1)

Table 1: Statistical analysis of the crown dimensions of maxillary molar teeth for adult Sudanese

Male and Female		BLCDOM1	MDCDOM1	BLCDOM2	MDCDOM2	BLCDOM3	MDCDOM3
Male	Mean	10.10	9.80	9.90	8.80	9.70	8.60
	Std. Deviation	1.07	.94	.93	.63	1.00	.61
	Minimum	8.50	8.00	8.50	7.50	7.00	8.00
	Maximum	11.50	11.00	11.00	9.50	10.50	9.50
Female	Mean	9.90	9.65	9.70	8.60	9.60	8.50
	Std. Deviation	.80	.78	.97	1.10	1.19	.91
	Minimum	8.50	9.00	7.50	7.00	7.50	7.00
	Maximum	11.00	11.00	11.00	10.00	11.00	10.00
Total	Mean	10.00	9.72	9.80	8.70	9.65	8.55
	Std. Deviation	.93	.85	.93	.87	1.07	.75
	Minimum	8.50	8.00	7.50	7.00	7.00	7.00
	Maximum	11.50	11.00	11.00	10.00	11.00	10.00

- **BLCDOM1**= Buccolingual crown dimension of the first maxillary molar tooth
- **MDCDOM1**= Mesiodistal crown dimension of the first maxillary molar tooth
- **BLCDOM2**= Buccolingual crown dimension of the second maxillary molar tooth
- **MDCDOM2**= Mesiodistal crown dimension of the second maxillary molar tooth
- **BLCDOM3**= Buccolingual crown dimension of the third maxillary molar tooth
- **MDCDOM3**= Mesiodistal crown dimension of the third maxillary molar tooth
- **Std**= standard



Figure 1: How the bucco-lingual crown dimensions was applied



Figure 2: How the mesiodistal crown dimension was applied

IV. DISCUSSION

Odontometric plays an important role in sex determination in forensic dentistry such as identification of the dead bodies during criminal accidents, and also knowing the personality in cases of mysterious crimes [5]. The obtained human sound extracted teeth can help a lot in education for dental students and specialists [6, 7, 8].

In this study, buccolingual and mesiodistal crown dimensions of the first, second, and third permanent maxillary molars were measured for the adult Sudanese population. The results showed that the mean value of the teeth size was bigger in the male than that the female. A study done by Ashwini on 100 Indian populations (48 male, 52 female) presented that the buccolingual and mesiodistal crown dimensions were larger in males than in females for all maxillary molar teeth [9]. Lund and Mornstad studied a Swedish population of 29 males and 29 females, ranging in age from 14 to 38, and showed that the mean diameters for males were larger than those for females in all variables [10].

Our study showed that there was a difference between male and female crown dimensions of maxillary molar teeth and this finding can help in sex determination among adult Sudanese in forensic medicine cases. A study conducted on the adult Indian population showed that the crown dimensions are reliable indicators and can be used along with or/and instead of linear measurements in sex determination [11, 12]. The mesiodistal crown dimensions of permanent first maxillary molar teeth were used for sex identification and showed that as well founded mark for gender determination [13].

Previous studies have been carried out in different countries on the subject of measuring the crown dimension of permanent maxillary molar teeth and showed that there are differences in their measurements between populations and those results are correlated with our study on the adult Sudanese maxillary molars are different in size when compared to other nationalities and this finding can be used as evidence to determine the specific nationality in forensic medicine. The means value of the mesiodistal crown dimension of the permanent first maxillary molar for the Indian population was 10.60mm for males and 10.40mm for females [12], while in the current study for adult Sudanese was 9.80mm for the male and 9.65mm for the female, and this indicates that Indian populations molar teeth slightly large than that of the Sudanese. The study done on the Turkish population showed the mean value of Buccolingual crown

dimension of first maxillary molar teeth was 11.76mm for the male and 11.40mm for the female, in our study was 10.10mm for the male and 9.90mm for the female [14].

In the present study, the measurements data of the obtained extracted sound maxillary molars teeth of the adult Sudanese are reasonably employed for teaching and researching for dental professionals and students, and also can be used in an ethical human teeth bank, therefore, are credibly used in the technical process in orthodontics. Previous studies indicated that the extracted sound teeth were used in training and research operations for dental professors and students, and also work to make a dental bank [6, 7, and 8].

V. CONCLUSIONS

This study concludes that the crown dimensions of the adult maxillary molars teeth are different in size in comparison between males and females. Therefore the obtained data can be used as evidence for gender identifications in forensic cases, however, can be sued for teaching and training dental professionals and students, however, in technical procedures during orthodontics.

REFERENCES

- [1] Scheid, R.C., and Woelfel, J.B. (2007). *Woelfel's Dental anatomy*. 7th edition. Ed.Mass publishing _Philadelphia (USA). 25-229.
- [2] Zorba E, Moraitis K, Eliopoulos C, Spiliopoulou C. Sex determination in modern Greeks using diagonal measurements of molar teeth. *Forensic Sci Int*. 2012 Apr 10;217(1-3):19-26. doi: 10.1016/j.forsciint.2011.09.020. Epub 2011 Oct 17. PMID: 22005548.
- [3] Zorba E, Moraitis K, Manolis SK. Sexual dimorphism in permanent teeth of modern Greeks. *Forensic Sci Int*. 2011 Jul 15;210(1-3):74-81. doi: 10.1016/j.forsciint.2011.02.001. Epub 2011 Mar 2. PMID: 21371836.
- [4] Prabhu S, Acharya AB. Odontometric sex assessment in Indians. *Forensic Sci Int*. 2009 Nov 20;192(1-3):129.e1-5. doi: 10.1016/j.forsciint.2009.08.008. Epub 2009 Sep 9. Erratum in: *Forensic Sci Int*. 2011 Mar 20;206(1-3):218.e1-2. PMID: 19744808.
- [5] Priyadarshini KI, Ambika M, Sekar B, Mohanbabu V, Sabarinath B, Pavithra I. Comparison of cheiloscopsy, odontometric, and facial index for sex determination in forensic dentistry. *J Forensic Dent Sci*. 2018 May-Aug;10(2):88-91. doi: 10.4103/jfo.jfds_102_17. PMID: 30745784; PMCID: PMC6344791.
- [6] Meza MS, Michel IM, Rivas RA, Benítez GB, Solaeche SM, Salas-de la Cruz D, Moran KS. Obtaining human teeth for dental education: A cross-sectional study to create ethical and transparent processes. *J Dent Educ*. 2023 Jan;87(1):50-59. doi: 10.1002/jdd.13094. Epub 2022 Aug 31. PMID: 36044346.
- [7] Al-Anesi MS, AlKhawlani MM, Alkheraif AA, Al-Basmi AA, Alhajj MN. An audit of root canal filling quality performed by undergraduate pre-clinical

- dental students, Yemen. BMC Med Educ. 2019 Sep 13;19(1):350. doi: 10.1186/s12909-019-1798-1. PMID: 31519180; PMCID: PMC6743157.
- [8] Sahebalam R, Talebi M, Kazemian S, Akbari M. Natural model training, an alternative way to enhance learning in pediatric dentistry. J Dent (Tehran). 2014 Sep; 11(5):531-5. Epub 2014 Sep 30. PMID: 25628679; PMCID: PMC4290772.
- [9] Ashwini S. Assessment of Tooth Metrics in Gender Determination-A Cross Sectional Study. J Forensic Investigation. 2015;3(1):3
- [10] Lund H, Mörnstad H. Gender determination by odontometrics in a Swedish population. J Forensic Odontostomatol. 1999 Dec;17(2):30-4. PMID: 10709560.
- [11] Manchanda AS, Narang RS, Kahlon SS, Singh B. Diagonal tooth measurements in sex assessment: A study on North Indian population. J Forensic Dent Sci. 2015 May-Aug;7(2):126-31. doi: 10.4103/0975-1475.146371. PMID: 26005301; PMCID: PMC4430570.
- [12] Shireen and Ara: Sex determination from permanent maxillary first molar. Journal of Forensic Dental Sciences / September-December 2016; 8(3): 145-149
- [13] Soundarya N, Jain VK, Shetty S, Akshatha BK. Sexual dimorphism using permanent maxillary and mandibular incisors, canines and molars: An odontometric analysis. J Oral Maxillofac Pathol. 2021 Jan-Apr;25(1):183-188. doi: 10.4103/jomfp.jomfp_400_20. Epub 2021 May 14. PMID: 34349433; PMCID: PMC8272500.
- [14] Işcan MY, Kedici PS. Sexual variation in bucco-lingual dimensions in Turkish dentition. Forensic Sci Int. 2003 Nov 26;137(2-3):160-4. doi: 10.1016/s0379-0738(03)00349-9. PMID: 14609652.

AUTHORS

First Author – Mahmoud Satte, Department of Anatomy, Faculty of Medicine, Najran University, Najran, 55461, KSA

Correspondence Author – Asst/Prof. Mahmoud Sheikh Satte, Anatomy Department, Medical College, Najran University, Najran, 55461, KSA. Tel.: +966553125185; E-mail: hageeg.yoo@gmail.com