

How to Cite:

Jatana, I., Arora, B., Goyal, D., Grewal, T. S., & Dugal, S. (2022). Sex determination by using mesiodistal dimensions of anterior teeth in Punjab population. *International Journal of Health Sciences*, 6(S2), 8323–8328. <https://doi.org/10.53730/ijhs.v6nS2.7121>

Sex determination by using mesiodistal dimensions of anterior teeth in Punjab population

Dr. Indrani Jatana

Professor Department Of Prosthodontics Adesh Institute Of Dental Sciences And Research

Dr. Bhavana Arora

Professor Department Of Pedodontics Adesh Institute Of Dental Sciences And Research

Dr. Deepak Goyal

Reader Department Of Prosthodontics Adesh Institute Of Dental Sciences And Research

Corresponding author email: goyal.drdeepak@gmail.com

Dr. Tejbir Singh Grewal

Senior Lecturer Department Of Pedodontics Adesh Institute Of Dental Sciences And Research

Dr Sukhman Dugal

Junior Lecturer Department Of Pedodontics Adesh Institute Of Dental Sciences And Research

Abstract---Aim: Sex determination by Using Mesiodistal Dimensions of Anterior Teeth in Punjab population. Methods: This study had a total of 60 study individuals who were chosen at random. The patients ranged in age from 18 to 30 years old, with no history or clinical signs of crown repair, orthodontic therapy, or trauma. They had a full set of erupting teeth. The teeth were noncarious, nonattrited, intact, and periodontally healthy. All of the maxillary teeth were properly positioned. Following informed permission, the mesiodistal dimensions of maxillary front teeth were measured between anatomic contact sites using a vernier calliper held parallel to the occlusal plane. Results: The study's findings revealed that teeth 13 and 23 had sexual dimorphism, but teeth 11, 12, 21, and 22 had no statistically significant sexual dimorphism. The precision with which gender may be determined using 13. It was discovered that 13 (43.33 percent) females and 15 (50 percent) males were accurately categorised. When

the degree of accuracy for sex determination was examined using 23 unique males and females, it was discovered that 63.33 percent of females and 63.33 percent of males were accurately categorised. The precision of detecting gender with 13 and 23 When the degree of accuracy for sex determination was assessed using 13 and 23 combined for men and females, it was discovered that 66.67 percent of females and 53.33 percent of males were properly categorised. Conclusion: The study found that maxillary canines had strong sexual dimorphism and can be utilised for sex determination in conjunction with other methods.

Keywords---anterior teeth, forensics odontology, mesiodistal dimension, sexual dimorphism.

Introduction

Forensic dentistry develops from forensic medicine and dental anthropology. In cases of unknown human remains, this is the branch of dentistry that focuses on the issues of identifying human remains by direct comparison, bite mark identification, clinical malpractice, and forensic dental profiling, such as sex and age estimation, in order to facilitate their subsequent identification.^{1,2} Teeth are the most durable organ in the human body and are crucial in postmortem identification processes. Although pelvic and cranial bones are more reliable in determining sex, they are rarely in perfect condition in extreme situations like as natural catastrophes or mass burials, which may hinder precise assessment through them. Teeth are regarded quite beneficial in these situations since they are frequently retrieved undamaged.³⁻⁶

However, there may be several delays that hinder the emergence of valuable forensic teeth.⁷ Because it excludes almost half of the population, accurate sex prediction is a critical step in developing a postmortem forensic profile.⁸ According to several studies, teeth show a significant degree of sexual dimorphism.⁹ Male teeth are often bigger than female teeth, however data are not consistent, and reverse dimorphism occurs.¹⁰ Sexual dimorphism may differ amongst populations owing to differences in the environment, available dietary supplies, or genetic pool.¹⁰ The most common method of obtaining data is via dental casts with a digital calliper. There are several metrics to consider, and their examination can be accomplished by direct comparison of measures, statistical analyses, or indexes.

Only two prior research used dental measures to develop plausible predictive sex models for Portuguese people. Pereira et al. (2010)² calculated incisors mesiodistal and canine diagonal distances using upper canine-to-canine teeth. The suggested approach lacks a thorough teeth analysis because it is limited to only six teeth. Silva et al. (2015)¹¹, on the other hand, used the mandibular canine index with a low success rate of 64.2 percent, indicating that this index should be restricted to the Portuguese context in sex identification.

Material and Methods

After receiving clearance from the protocol review committee and the institutional ethics committee, a prospective observational research was undertaken at Deepak dental implant clinic, amrik singh road bathinda punjab, India, from December 2020 to November 2021. Following informed consent, a comprehensive history was obtained from the patient or relatives. All patients were informed about the procedure's approach, risks, advantages, outcomes, and related complications. This study had a total of 60 study individuals who were chosen at random. The patients ranged in age from 18 to 30 years old, with no history or clinical signs of crown repair, orthodontic therapy, or trauma. They had a full set of erupting teeth. The teeth were noncarious, nonattrited, intact, and peridontally healthy.

All of the maxillary teeth were properly positioned. Following informed permission, the mesiodistal dimensions of maxillary front teeth were measured between anatomic contact sites using a vernier calliper held parallel to the occlusal plane. To minimise error, each reading was taken three times and the average of the three results was calculated. The acquired data was statistically analysed.

Results

Only two of the six anterior permanent maxillary teeth were found to be statistically significant out of the six teeth selected. These teeth were numbered 13 and 23. The study's findings revealed that teeth 13 and 23 had sexual dimorphism, but teeth 11, 12, 21, and 22 had no statistically significant sexual dimorphism. The precision with which gender may be determined using 13. When the degree of accuracy for sex determination was assessed using men and females individually, it was discovered that 13 (43.33 percent) females and 15 (50 percent) males were accurately categorised.

The precision of establishing gender using 23. When the degree of accuracy for sex determination was examined using 23 unique males and females, it was discovered that 63.33 percent of females and 63.33 percent of males were accurately categorised. The precision of detecting gender with 13 and 23 When the degree of accuracy for sex determination was assessed using 13 and 23 combined for men and females, it was discovered that 66.67 percent of females and 53.33 percent of males were properly categorised.

Table 1 Gender and age distribution of the participants

Gender	Number	Percentage
Male	30	50
Female	30	50
Age	26.58±4.68	

Table 2 Mean value of each tooth in male and female

Tooth	Male	Female	P-value
11	8.72±0.65	8.59±0.77	Non significant
12	6.91±0.88	6.91±0.54	Non significant

13	7.88±0.11	7.57±0.64	Significant
21	8.30±0.98	8.19±0.25	Non significant
22	6.89±0.36	6.82±0.54	Non significant
23	7.94±0.55	7.86±0.74	Significant

Table 3. Accuracy of determination of sex using teeth 13

Gender	Classified	Not classified
Male	15(50%)	15(50%)
Female	13(43.33%)	17(56.67%)

Table 4. Accuracy of determination of sex using teeth 23

Gender	Classified	Not classified
Male	19(63.33%)	11(36.67%)
Female	19(63.33%)	11(36.67%)

Discussion

Sex estimate is an important stage in forensic medicine for identifying bodies in both single and widespread disaster occurrences. In India, sex estimation models based on dental hard tissues are uncommon, and prior proposed models lacked consistency and only accounted for a tiny proportion of teeth. Gender identification in injured and disfigured deceased corpses or from skeletal remains is the first stage in medico-legal assessment and bioarcheology. When it is feasible to forecast the sex, identification becomes easier because only missing people of that sex must be considered.¹² Although the DNA profile produces precise findings, linear dimensions such as arthropometric or odontometric characteristics can be used to determine sex in a large population since they are simple, dependable, affordable, and straightforward to measure. Given the variability in odontometric characteristics between populations, even within the same population, in the historical and evolutionary context, unique population values must be determined in order to allow identification based on dental measurements.¹³ Thus, the study assessed the mesiodistal dimension of permanent maxillary incisors and canines in North Indian boys and girls.

Doris et al. found that early permanent dentitions give the greatest sample for tooth size assessments since early adulthood dentitions had less mutilation and attrition in most people. As a result, the impact of these variables on real mesiodistal tooth width would be minimal.¹⁴ As a result, only people aged 18 to 30 were included in the research sample. Various odontometric measurements, such as the mandibular canine index,¹⁵ buccolingual dimension of teeth, and tooth height, have been used to estimate sex.¹⁶ Sexual dimorphism refers to the systematic disparities in form (size, shape, and colour) that exist between individuals of different sexes within the same species. Sexual dimorphism refers to distinctions in size, height, and appearance between men and women that may be used to identify teeth. It is a valuable tool for differentiating them, particularly in forensic investigations. Teeth are incredibly resilient, even when the rest of the body decomposes and is ruined beyond recognition. Sexual dimorphism has been

seen in the teeth of several animals, including humans. As a result, they are a helpful supplement to determining sex on fragmented adult skeletons. The canines are the least often excised teeth in the human dentition, presumably due to the lower frequency of caries and periodontal disease.¹⁷ Canines have been found from human remains in a variety of harsh circumstances, including air catastrophes and storms. There are other possibilities, but Moss believes it is related to men having thicker enamel due to a longer time of amelogenesis than females. Because of the Y chromosome, male maturation is delayed.¹⁸ According to the study done by Hashim HA and Murshid ZA in 1993, only canines demonstrated statistically significant sexual dimorphism in our investigation.¹⁹

Conclusion

The study found that maxillary canines had strong sexual dimorphism and can be utilised for sex determination in conjunction with other methods.

Reference

1. Pereira, C.; Bernardo, M.; Pestana, D.; Santos, J.C.; de Mendonça, M.C. Contribution of teeth in human forensic identification—Discriminant function sexing odontometrical techniques in Portuguese population. *J. Forensic Leg. Med.* 2010, 17, 105–110.
2. Khamis, M.F.; Taylor, J.A.; Malik, S.N.; Townsend, G.C. Odontometric sex variation in Malaysians with application to sex prediction. *Forensic Sci. Int.* 2014, 234, 183.e1–183.e7.
3. Isıcan, M.Y.; Kedici, P.S. Sexual variation in bucco-lingual dimensions in Turkish dentition. *Forensic Sci. Int.* 2003, 137, 160–164.
4. Mitsea, A.G.; Moraitis, K.; Leon, G.; Nicopoulou-Karayianni, K.; Spiliopoulou, C. Sex determination by tooth size in a sample of Greek population. *HOMO-J. Comp. Hum. Biol.* 2014, 65, 322–329.
5. Peckmann, T.R.; Logar, C.; Garrido-Varas, C.E.; Meek, S.; Pinto, X.T. Sex determination using the mesio-distal dimension of permanent maxillary incisors and canines in a modern Chilean population. *Sci. Justice* 2016, 56, 84–89.
6. Capitaneanu, C.; Willems, G.; Thevissen, P. A systematic review of odontological sex estimation methods. *J. Forensic Odontostomatol.* 2017, 35, 1–19.
7. Isola, G.; Anastasi, G.; Matarese, G.; Williams, R.; Cutroneo, G.; Bracco, P.; Piancino, M. Functional and molecular outcomes of the human masticatory muscles. *Oral Dis.* 2018, 24, 1428–1441.
8. Isola, G.; Alibrandi, A.; Rapisarda, E.; Matarese, G.; Williams, R.C.; Leonardi, R. Association of vitamin D in patients with periodontitis: A cross-sectional study. *J. Periodontal Res.* 2020, 1–11.
9. Staderini, E.; Patini, R.; Guglielmi, F.; Camodeca, A.; Gallenzi, P. How to manage impacted third molars: Germectomy or delayed removal? A systematic literature review. *Medicina* 2019, 55, 79.
10. Botelho, J.; Machado, V.; Proença, L.; Delgado, A.S.; Mendes, J.J. Vitamin D deficiency and oral health: A comprehensive review. *Nutrients* 2020, 12, 1471.

11. Silva, A.M.; Pereira, M.L.; Gouveia, S.; Tavares, J.N.; Azevedo, Á.; Caldas, I.M. A new approach to sex estimation using the mandibular canine index. *Med. Sci. Law*. 2016, 56, 7–12
12. Dahberg AA. Dental traits as identification tools. *Dent Prog*. 1963;3:155–60.
13. Iscan MY, Kedici PS. Sexual variation in bucco-lingual dimensions in Turkish dentition. *Forensic Sci Int*. 2003;137:160–4
14. Doris JM, Bernard BW, Kuftinec MM, Stom D. A biometric study of tooth size and dental crowding. *Am J Orthod*. 1981;79:326–36.
15. Kaushal S, Patnaik VV, Sood V, Agnihotri G. Sex determination in north Indians using mandibular canine index. *JIAFM*. 2004;26:45–49.
16. Vodanović M, Demo Ž, Njemirovskij V, Keros J, Brkić H. Odontometrics: A useful method for sex determination in an archaeological skeletal population? *J Archaeol Sci*. 2007;34:905–13.
17. Kaushal S, Patnaik VVG. Sex determination in North Indians using mandibular canine index. *JIAFM* 2004;26(2):971-973
18. Acharya BA, Mainali S. Univariate sex dimorphism in the Nepalese dentition and use of discriminant functions in gender assessment. *Forensic Sci Int* 2007;173:47-56
19. Hashim MA, Murshid ZA :mesiodistal tooth width :a comparision between saudi males and females, part1. *Egypt Dent* 1993;39;343-346