MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 31 Issue 2, December – 2021, Pages: 58-65

Gender determination using odontometric measurement of mandible

Jessly Daniel
Department of Anatomy
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University, Chennai - 600077.
Email id: jesslydaniel69@gmail.com

Yuvaraj Babu.K*
Department of Anatomy,
Saveetha Dental College & Hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University, Chennai - 600077.
Email id: yuvarajbabu@saveetha.com

Corresponding Author*

ABSTRACT:

Introduction:
Teeth are known for being the foremost resistant mineralized tissue against different agents for destruction. They are used for reconstructive identification. They are useful in the determination of gender by using different odontometric techniques and are of real interest just in case of major catastrophes when bodies are often damaged beyond recognition.male teeth have been found to be larger than those of the female.

Materials and methods: The studied sample consists of 60 people (30 males and 30 females) and age groups from 18 - 20 years. The measurements of width between the 2nd mandibular premolar. All the measurements were taken using a Digital Vernier Caliper. For one person, an average of three different values were taken. After collecting the data, it was uploaded in Excel sheet and then uploaded in SPSS software version 23.

Result: Wilcoxon Signed Rank test was done. The p value was 0.009 that is less than 0.05. That is gender determination can be done using odontometric measurements of the mandible

Conclusion: Odontometric measurement of mandibles is a reliable source of gender determination.

Keywords: odontometric measurement , mandible , novel gender determination,.2nd premolar

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 31 Issue 2, December – 2021, Pages: 58-65

INTRODUCTION:

Teeth is the most mineralised tissue against various agents for destruction. They are used for reconstructive identification. They are also used for gender determination using odontometric measurement.(1) Various methods used for sex determination are mandibular canine indx, mesiodistal width measurement of maxillary incisor , canine and first molar. Male teeth are larger than females. This method can be a problem due to crowding , attrition, cervical abrasion, presence of dental calculus etc.(2)

The durability of dentition to survive fire, bacterial decomposition etc makes it invaluable for identification of diagnostic features in the innominate bones of an adult. Sec may be determined by the cranium, long bone dimension, pelvic structure etc, tooth enamel can withstand high temperature , humidity, desiccation, extensive trauma etc;(Mohommed Asif Syed(3) odontometric studies of dentition plays are important role due to strength of the teeth and their resistance to post mortem destruction and fragmentation. Widely used dimensions are maximum mesiodistal and buccolingual crown measurements. But these measurements are different to attain worn off teeth.(4) Gender determination has cheif importance in forensic investigation sex determination ca be done by DNA anlysis , odteometry, odontometric parameters. Osteometry is not preferred because the bodies will be badly mutilated .(5)odontometric measurements exhibit sexual dimorphism. 70% of identification are obtained from forensic dentistry; it is a great alternative for DNA analysis. Molars have greater potential free radical determination. When visual identification of sex is imposible we use odontometric measurement challenges faced by man is early days is to establish the identity of an individual. (5,6)Establishment of identity is accomplished byb age, sex, footprint, race, communak characters complexion features etc

Teeth being the central component of the masticatory apparatus of the skull are good sources of materials for civil and medico legal identification.(5–7) In addition to degree to which they provide resistance to damage in terms of bacterial decomposition , fire and fracture. Sexual dimorphism refers to the difference in the size, structure,appearance between male and female. Tooth size is determined by cultural, environmental, racial and genetic factors (8).Our team has extensive knowledge and research experience that has translated into high quality publications (9–16),(17),(18),(19),(20,21),(22),(23),(24–28). The aim of the research is to determine gender using odontometric measurements of width of mandibular 2nd inter premolar distance

MATERIALS AND METHODS:

The study population was taken from the dental students of Saveetha dental College and hospitals, Chennai. The sample size chosen for the study was 60, which included 30 females and 30 males. A digital verniers caliper, with accurate adjustments were used to measure the inter-2nd premolar mandibular distance of the participants with their prior consent. The premolar distance was taken by inserting the digital verniers caliper into the oral cavity of the subjects and measuring the distance from the buccal surface of the mandibular right second premolar to the buccal surface of the mandibular left second premolar. Separate measurements were taken for males and females to use the data collected for analysing whether the second mandibular premolar odontometric measurement can be useful for determination of gender.The data collected was then subjected to statistical analysis

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 31 Issue 2, December – 2021, Pages: 58-65

using the statistical package for social sciences (SPSS 23) software and related samples Wilcoxon signed rank test was done.

Figure 1: measurement of 2nd premolar mandible

RESULT:

Table 1- Range, mean and standard deviation of mandibular 2nd interpremolar width in males and females

Mandibular 2nd inter premolar width in cms	N	MINIMUM	MAXIMUM	MEAN	STANDARD DEVIATION
Male	30	35.32	52.55	46.59	4.01
Female	30	34.27	52.55	43.28	4.47

*Related samples Wilcoxon signed rank test, p value was 0.009 ($p<0.05$)

Related samples Wilcoxon signed rank test was done. The mean value is 46.59cm for male and 43.28 for female , the standard deviation for male is 4.01 and 4.47 for female.The p value was 0.009 ($p<0.05$). So, it is statistically significant, hence sexual dimorphism can be determined using mandibular 2nd inter premolar width.

DISCUSSION:

The present study establishes the existence of a particular statistically significant sexual dimorphism in mandibular canine.(29) It establishes the intercanine distance and mandibular canine index as useful parameters in differentiating the sexes.(30) It is the y chromosomes which intervene the most

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 31 Issue 2, December – 2021, Pages: 58-65

in the size of the teeth by controlling the thickness of dentine, whereas the x chromosome comes into play concerning the thickness of enamel.(31). The mandibular canines are considered to demonstrate the greater percentage of sexual dimorphism among all teeth in their mesiodistal width.Odontometry has been performed on various tooth groups with the objective of establishing measurements that can serve as standard in dental surgery and forensic odontology.(32) Dental identification involves either a comparative method or post mortem dental profiling.Various odontometric dimension have been used for the purpose of sex estimation.(33)

The buccolingual dimension of the teeth, and the height of the teeth studied the magnitude of sexual dimorphism by measuring the mesiodistal width of canine teeth and showed that mandibular canines showed a greater degree of sexual dimorphism than maxillary canine.(33). Any measurement of the teeth unaccompanied by information about age, sex , race must be created with great caution. The correct identification of sex from skeletal remains is one of the main challenge in forensic anthropology and osteoarchaeology as a reliable biological feature.(34). The diversity of factors which contribute to dimorphism such as environmental factors, food resources used by different populations, cultural factors and generate factors.(35).. The correct identication of sex from skeletal remains is one among the most challenges in forensic anthropology and osteoarchaeology. Dental sexual dimorphism has long been acknowledged as a reliable biological feature during this respect, and studies have demonstrated that dental dimensions are often wont to accurately assess the sex of skeletal remains in dierent populations.(36). In view of the fact that odontometric parameters show differences in specific populations and even within the same population. This necessitates the need to determine population specific and region specific values of odontometric parameters in order to assist in forensic investigation.(35,37)

LIMITATIONS:

The sample size taken for the study was considerably small and the results of the study can not be generalized.

FUTURE SCOPE:

To increase the sample size and also to include people with various age group and race,

CONCLUSION:

From the present study it was found sexual dimorphism can be determined using mandibular 2nd inter premolar width, Significant dimorphic differences between male and female teeth width, males exhibiting larger teeth than females. So odontometric measurement of mandibles was found to be a reliable source of gender determination.

AUTHOR CONTRIBUTIONS

Jessly Daniel: Study Design, Data collection, Data Analysis, manuscript writing

Yuvaraj Babu K: Study Concept, Data verification, Data Analysis, manuscript drafting and correction

ACKNOWLEDGEMENT

We acknowledge and thank all the participants for their cooperation in the study

CONFLICT OF INTEREST

The authors reported the conflict of interest while performing this study to be nil

FUNDING AGENCY

The present project is supported/funded/sponsored by

- Saveetha Institute of Medical and Technical Sciences
- SaveethaDental College and Hospitals.
- Saveetha University and
- Kuwait Oil Company

REFERENCE:

1. Sm K, Kazzazi SM, Kranioti EF. Odontometric analysis of sexual dimorphism in permanent maxillary and mandibular molars [Internet]. Vol. 5, Journal of Forensic Science & Criminology. 2017. Available from: http://dx.doi.org/10.15744/2348-9804.5.102

2. Kondo S, Townsend GC. Sexual dimorphism in crown units of mandibular deciduous and permanent molars in Australian Aborigines [Internet]. Vol. 55, HOMO. 2004. p. 53–64. Available from: http://dx.doi.org/10.1016/j.jchb.2003.10.001

3. Erratum: Sexual dimorphism in permanent maxillary and mandibular canines and intermolar arch width: Endemic study [Internet]. Vol. 27, Journal of Indian Academy of Oral Medicine and Radiology. 2015. p. 629. Available from: http://dx.doi.org/10.4103/0972-1363.188780

4. Shrestha B. Sexual Dimorphism in Permanent Maxillary and Mandibular Canine of Medical Students in Gandaki Medical College, Nepal [Internet]. Vol. 4, Birat Journal of Health Sciences. 2019. p. 654–9. Available from: http://dx.doi.org/10.3126/bjhs.v4i1.23941

5. M A-A, Al-Assaf M, Department of Oral Histology and Pathology, Faculty of Dentistry, Damascus University, Damascus, et al. Evaluation of Sexual Dimorphism in Maxillary Right First and Second Molars and Mandibular Left Canine in Syrians [Internet]. International Journal of Dentistry and Oral Science. 2020. p. 743–6. Available from: http://dx.doi.org/10.19070/2377-8075-20000146

6. Bajracharya M, Omar BK, Maharjan SK. Odontometric Analysis of Permanent Mandibular Canine to Determine Sexual Dimorphism: A Preliminary Study [Internet]. Vol. 1, Journal of Nepalese Prosthodontic Society. 2018. p. 80–5. Available from: http://dx.doi.org/10.3126/jnprossoc.v1i2.23861

7. Garg D, Goje S. Evaluation of mesiodistal inclination of permanent maxillary and mandibular first molars in different Angle's molar relation: A cephalometric study [Internet]. Vol. 6, Journal of Integrated Health Sciences. 2018. p. 8. Available from: http://dx.doi.org/10.4103/jihs.jihs_5_18

8. Sorenti M, Martinón-Torres M, Martín-Francés L, Perea-Pérez B. Sexual dimorphism of dental tissues in modern human mandibular molars [Internet]. Vol. 169, American Journal of Physical

Anthropology. 2019. p. 332–40. Available from: http://dx.doi.org/10.1002/ajpa.23822

9. Sekar D, Lakshmanan G, Mani P, Biruntha M. Methylation-dependent circulating microRNA 510 in preeclampsia patients. Hypertens Res. 2019 Oct;42(10):1647–8.

10. Princeton B, Santhakumar P, Prathap L. Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students. Eur J Dent. 2020 Dec;14(S 01):S105–9.

11. Logeshwari R, Rama Parvathy L. Generating logistic chaotic sequence using geometric pattern to decompose and recombine the pixel values. Multimed Tools Appl. 2020 Aug;79(31-32):22375–88.

12. Johnson J, Lakshmanan G, M B, R M V, Kalimuthu K, Sekar D. Computational identification of MiRNA-7110 from pulmonary arterial hypertension (PAH) ESTs: a new microRNA that links diabetes and PAH. Hypertens Res. 2020 Apr;43(4):360–2.

13. Paramasivam A, Priyadharsini JV, Raghunandhakumar S, Elumalai P. A novel COVID-19 and its effects on cardiovascular disease. Hypertens Res. 2020 Jul;43(7):729–30.

14. Pujari GRS, Subramanian V, Rao SR. Effects of Celastrus paniculatus Willd. and Sida cordifolia Linn. in Kainic Acid Induced Hippocampus Damage in Rats. Ind J Pharm Educ. 2019 Jul 3;53(3):537–44.

15. Rajkumar KV, Lakshmanan G, Sekar D. Identification of miR-802-5p and its involvement in type 2 diabetes mellitus. World J Diabetes. 2020 Dec 15;11(12):567–71.

16. Ravisankar R, Jayaprakash P, Eswaran P, Mohanraj K, Vinitha G, Pichumani M. Synthesis, growth, optical and third-order nonlinear optical properties of glycine sodium nitrate single crystal for photonic device applications. J Mater Sci: Mater Electron. 2020 Oct;31(20):17320–31.

17. Wu S, Rajeshkumar S, Madasamy M, Mahendran V. Green synthesis of copper nanoparticles using Cissus vitiginea and its antioxidant and antibacterial activity against urinary tract infection pathogens. Artif Cells Nanomed Biotechnol. 2020 Dec;48(1):1153–8.

18. Vikneshan M, Saravanakumar R, Mangaiyarkarasi R, Rajeshkumar S, Samuel SR, Suganya M, et al. Algal biomass as a source for novel oral nano-antimicrobial agent. Saudi J Biol Sci. 2020 Dec;27(12):3753–8.

19. Alharbi KS, Fuloria NK, Fuloria S, Rahman SB, Al-Malki WH, Javed Shaikh MA, et al. Nuclear factor-kappa B and its role in inflammatory lung disease. Chem Biol Interact. 2021 Aug 25;345:109568.

20. Rao SK, Kalai Priya A, Manjunath Kamath S, Karthick P, Renganathan B, Anuraj S, et al. Unequivocal evidence of enhanced room temperature sensing properties of clad modified Nd doped mullite Bi2Fe4O9 in fiber optic gas sensor [Internet]. Vol. 838, Journal of Alloys and

Compounds. 2020. p. 155603. Available from: http://dx.doi.org/10.1016/j.jallcom.2020.155603

21. Bhavikatti SK, Karobari MI, Zainuddin SLA, Marya A, Nadaf SJ, Sawant VJ, et al. Investigating the Antioxidant and Cytocompatibility of Mimusops elengi Linn Extract over Human Gingival Fibroblast Cells. Int J Environ Res Public Health [Internet]. 2021 Jul 4;18(13). Available from: http://dx.doi.org/10.3390/ijerph18137162

22. Marya A, Karobari MI, Selvaraj S, Adil AH, Assiry AA, Rabaan AA, et al. Risk Perception of SARS-CoV-2 Infection and Implementation of Various Protective Measures by Dentists Across Various Countries. Int J Environ Res Public Health [Internet]. 2021 May 29;18(11). Available from: http://dx.doi.org/10.3390/ijerph18115848

23. Barma MD, Muthupandiyan I, Samuel SR, Amaechi BT. Inhibition of Streptococcus mutans, antioxidant property and cytotoxicity of novel nano-zinc oxide varnish. Arch Oral Biol. 2021 Jun;126:105132.

24. Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. J Periodontol. 2019 Dec;90(12):1441–8.

25. Priyadharsini JV, Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico analysis of virulence genes in an emerging dental pathogen A. baumannii and related species [Internet]. Vol. 94, Archives of Oral Biology. 2018. p. 93–8. Available from: http://dx.doi.org/10.1016/j.archoralbio.2018.07.001

26. Uma Maheswari TN, Nivedhitha MS, Ramani P. Expression profile of salivary micro RNA-21 and 31 in oral potentially malignant disorders. Braz Oral Res. 2020 Feb 10;34:e002.

27. Gudipaneni RK, Alam MK, Patil SR, Karobari MI. Measurement of the Maximum Occlusal Bite Force and its Relation to the Caries Spectrum of First Permanent Molars in Early Permanent Dentition. J Clin Pediatr Dent. 2020 Dec 1;44(6):423–8.

28. Chaturvedula BB, Muthukrishnan A, Bhuvaraghan A, Sandler J, Thiruvenkatachari B. Dens invaginatus: a review and orthodontic implications. Br Dent J. 2021 Mar;230(6):345–50.

29. Thijeel AT. Gender Determination by Using Dimorphism in Permanent Maxillary and Mandibular Canines in Iraqi Adults [Internet]. Vol. 11, International Journal for Sciences and Technology. 2016. p. 24–8. Available from: http://dx.doi.org/10.12816/0023798

30. Paknahad M, Vossoughi M, Ahmadi Zeydabadi F. A radio-odontometric analysis of sexual dimorphism in deciduous dentition. J Forensic Leg Med. 2016 Nov;44:54–7.

31. Chandra A, Agnihotri A, Saran V, Mishra M. Sexual dimorphism by odontometric evaluation of permanent canine teeth: A study from three cities [Internet]. Vol. 3, International Journal of Forensic Odontology. 2018. p. 66. Available from: http://dx.doi.org/10.4103/ijfo.ijfo_24_18

32. Manjunatha B, Agrawal A, Dholia B, Althomali Y. Comparison of sexual dimorphism of

permanent mandibular canine with mandibular first molar by odontometrics [Internet]. Vol. 7, Journal of Forensic Dental Sciences. 2015. p. 238. Available from: http://dx.doi.org/10.4103/0975-1475.172449

33. Babu SS, Nair SS, Gopakumar D, Kurian N, Parameswar A, Baby TK. Linear Odontometric Analysis of Permanent Dentition as A Forensic Aid: A Retrospective Study. J Clin Diagn Res. 2016 May;10(5):ZC24–8.

34. Sharma S, Dinkar AD, Bedi S. Odontometric sexual dimorphism: a sibling correlation. J Clin Diagn Res. 2014 Mar;8(3):233–5.

35. Gupta S. Establishment of Sexual Dimorphism in North Indian Population by Odontometric Study of Permanent Maxillary Canine [Internet]. Vol. 05, Journal of Forensic Research. 2014. Available from: http://dx.doi.org/10.4172/2157-7145.1000224

36. Grewal DS. Morphometric Analysis of Odontometric Parameters for Gender Determination [Internet]. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH. 2017. Available from: http://dx.doi.org/10.7860/jcdr/2017/26680.10341

37. Grewal DS, Khangura RK, Sircar K, Tyagi KK, Kaur G, David S. Morphometric Analysis of Odontometric Parameters for Gender Determination. J Clin Diagn Res. 2017 Aug;11(8):ZC09–13.