

Permanent maxillary first molars: Role in gender determination (Morphometric analysis)

Determination of gender is one of the chief factor for identification of an individual in medico-legal investigation. Teeth, the most hard and stable human tissue, which is resistant to physical insults, serve as a valuable material for various investigations like anthropological, forensic, odontologic, and genetics. In forensic odontology, gender determination can be done either by comparing tooth dimensions (metric) or by comparing traits like cusp of carabelli's trait of upper first molar, deflecting wrinkles of the lower first molar, distal accessory ridge of upper and lower canines or shoveling of the upper central incisors (non-metric). In metric analysis, apart from mandibular canine, maxillary central incisors and maxillary first molar exhibit sexual dimorphism. Being early in eruption and less impacted when compared to mandibular canine, maxillary first molar (bucco-lingual (B-L) dimension) serve as a good odontometric tool.

Bucco-lingual dimensions of teeth: An aid in sex determination

Prathibha RM Rani, Mahima VG, Patil K

J Forensic Dent Sci 2009;1:88-92

Sexual dimorphism can be estimated using B-L dimension of permanent teeth, which is population specific. The study identified the sex of an individual based on B-L dimension of maxillary permanent teeth except third molar, in an adult population (19-30 years) of Mysore district, Karnataka.

The B-L measurements were made on 99 study casts (50 males and 49 females) using vernier caliper with resolution of 0.02 mm. The greatest distance between buccal and lingual surface of crown were estimated and analyzed.

The results showed males exhibit greater B-L dimensions when compared to females, with moderate magnitude

of dimorphism with accuracy rate of 78% in maxillary teeth. Among the B-L dimensions of posterior teeth, right maxillary first molar exhibited greater dimorphism.

In addition to other skeletal and odontometric measurements, B-L dimensions can also be used to determine the gender.

Crown and cusp dimensions of the maxillary first molar: A study of sexual dimorphism in Indian Sikhs

Agnihotri G, Sikri V

Dent Anthropol 2010;21:1-6

Evolutionary clues had been provided by human maxillary first molar, which have four main cusps namely paracone, protocone, metacone, and hypocone. In this study, the morphometric criterion for maxillary first molar has been emphasized in sexual dimorphism in Indian Jat Sikhs. The study population was selected based on the criteria:

- Healthy state of gingiva and periodontium
- Caries free teeth
- Normal overjet and overbite
- Absence of spacing in anterior teeth
- Normal molar and canine relationship
- Clearly distinguishable central pit of first maxillary molar.

The study group consists of 100 casts (50 males and 50 females) between the age group of 17-21 years and measurement of maxillary first molar was evaluated. The results showed a statistically significant sexual dimorphism for maxillary first molar with higher percentage for B-L dimension and also reported that hypocone exhibited greater dimorphism compared to other cusps. This was finally concluded that hypocone index and hypocone diameters are dimorphic parameters for Jat Sikh population.

Importance of maxillary first molar for sex determination

Rai B, Jain RK, Duhan J, Dutta S, Dhatarwal SK

Internet J Dent Sci 2007;4:2.E4

Teeth are hardest and chemically most stable tissue in the body; when selectively preserved and fossilized, they provide best records for evolutionary change.

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In the present study, sex determination from maxillary first molar was identified, and defined the morphometric criteria for maxillary first molar. The study group includes 102 patients with age group between 17-25 years. B-L diameter of maxillary first molar was measured both intra-orally as well as on the cast using vernier caliper.

The results showed, significant sexual dimorphism in maxillary first molar based on the criteria, when B-L diameter of either maxillary first molar is more than 10.7 mm, the probability of sex being male is 100%. While less than 10.7 mm, the sex could be 82% female.

Sex determination from tooth

Rai B, Dhatarwal SK, Anand SC

Medico legal update 2008;8

Gender determination is an important factor to establish identity. In this study, casts of 400 cases with age group 17-25 years has been included for measuring B-L and mesiodistal (M-D) diameter of maxillary molar and mandibular canine with vernier caliper.

The results showed that mandibular canine and maxillary first molar exhibit greater sexual dimorphism. M-D and B-L dimensions of maxillary and mandibular teeth were larger in males. Maxillary first molar (B-L dimensions) shows higher sexual dimorphism on right side when compared to left side.

Sexual dimorphism in the permanent maxillary first molar: A study of Haryana population (India)

Sonika V, Harshaminder K, Madhushankari GS, Sri Kennath JA

J Forensic Odontostomatol 2011;29:37-43

Determination of gender with immature skeleton found in young children is difficult when compared to mature and intact skeleton of adult. The maxillary first permanent molar erupts at the age of 6-7 years and less impacted used in sex determination at an early age.

The study done in Haryana comprised of 200 students (100 males and 100 females) with an age group of 17-25 years. Maxillary first molar is measured on both B-L and M-D dimension using digital vernier caliper with a resolution of 0.01 mm both intra-orally and on study casts.

M-D diameter is measured between the contact points of teeth on either side of jaw. The B-L diameter is measured between buccal and lingual surface.

The mean values of left side parameter are greater than the right side. B-L dimension of right maxillary first molar and left maxillary first molar exhibited greater sexual dimorphism among the intra-oral group and the study cast group, respectively.

Also, the B-L dimension exhibited greater dimorphism than M-D dimensions of teeth on comparing the linear measurements.

This study concludes that existence of significant sexual dimorphism in maxillary first molars.

Sexual dimorphism in permanent 1st molar: A forensic tool

Narang SR, Manchanda AS, Arora PC, Kaur G

Indian J Compr Dental Care 2012;2:224-227

Morphology of the tooth structure is similar in male and female when compared to the tooth size, which varies based on culture, environment, and genetic factors.

This study was done in Punjabi population estimating the sexual dimorphism based on B-L dimension of first maxillary and mandibular molar. A total of 150 individuals (75 males and 75 females) study cast was examined between age group 20-40 years under following criteria.

- Healthy state of periodontium.
- Caries free teeth.
- Presence of bilateral maxillary and mandibular first molar.

Measurements of B-L diameter on study cast were done using digital vernier of resolution 0.01 mm. The greatest distance between buccal and lingual surface of crown parallel to long axis of tooth was estimated.

The reliability of the measurements was tested by two observers and analyzed by using Student's *t*-test, which showed no significant difference between the two observers. Another unpaired *t*-test showed significant sexual dimorphism in both the genders.

Percentage of sexual dimorphism $[(X_m/X_f) - 1] \times 1000$

X_m = Mean male tooth dimension

X_f = Mean female tooth dimension

The result showed that the mean value of maxillary cast exhibited significant dimorphism compared to mandibular cast with an accuracy rate of 74% and 63% for right and left B-L dimension of maxillary first molar.

B-L dimension of maxillary first molar determined the sexual dimorphism among Punjabis, which proved to be population specific.

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