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Role of mandibular canines in sex determination in northern central region of India

Dilip kumar Sudele

Research Scholar, RKDF Medical College & hospital, SRK University Bhopal M.P.

Vivekanand Gajbhiye

Professor & Head of Department, RKDF Medical College & Hospital Bhopal M.P.

Abstract---Introduction:The gender is very important part of identification. Gender identification is very crucial for personal identification of an individual, because the age and stature determination is dependent on the gender of the individual. For gender identification we can use much other bone like mandible, skull and maxilla, gender identification can also done from tooth like canine most commonly we can use mandibular canine for gender identification. Aim and objective: Total 200 subjects were taken for the study purpose in which 100 are male and rest 100 are females in the department of RKDF medical collage & RKDF dental college Bhopal The complete procedure was explained to the subjects and there written consent was taken from the subjects. The age group of the subjects was vary form 20- 40 years. Results: In our study we found that the mean mesiodistal width of right mandibular canine was 6.98 mm in male and in female it was 6.66. The mean mesiodistal width of left mandibular canine was 7.21 mm in male and in female it was 6.76 mm the Inter-arch canine width of male is 27.19 mm and in female subjects is 26.22 mm.

Keywords---sexual dimorphism, forensic dentistry, victim identification, Mesiodistal width, Intercanine width.

Introduction

The gender is very important part of identification. Gender identification is very crucial for personal identification of an individual, because the age and stature determination is dependent on the gender of the individual.¹ For gender identification we can use much other bone like mandible, skull and maxilla,

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Corresponding author: Sudele, D.K.; Email: dr.dilipsudele@gmail.com

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gender identification can also done from tooth like canine most commonly we can use mandibular canine for gender identification.²

As changes in age take place there are difference in mandibular canine width and eruption changes as age changes it discriminated a high degree in gender discrimination due to change in skeletal dimension³. The canine is one of the most strongest and stable teeth among in oral cavity. Its strongest is due to its potion, structure length of root and shape both in mandible and maxilla. It is less prone to damage and less prone to cavity due its pointed curve. Due to these feature it has more forensically relevant and has its clinical important. Mostly tooth are resistant to decay that why it can be used as forensic tool as the identification of gender of individuals.

As the shape of the canines is curve and it does not contain any pit it has less chance to form cavity in it. Due to less prone to form cavity its very good for morphometric study because its shape and size is not change. Bodies that are putrefied or completely skeletonized body may lack evidences for identification. Hence, teeth can be effectively used as evidence. Studies conducted in last one decade, used the mandibular canine dimensions for sex determination.⁴

Materials

The present study was done in Dental department of RKDF Medical College and Dental Collage of RKDF medical college Bhopal M.P. Total 200 subjects were taken for the study purpose in which 100 are male and rest 100 are females in the department of The complete procedure was explained to the subjects and there written consent was taken from the subjects. The age group of the subjects was vary form 20- 40 years. Duration of study period was January 2021 to September 2021.

Methods

The subjects were seated on chair and making his/her comfortable. Tell subjects for opening cleaning, mouth for 1 min with 0.2% of chlorhexidine or Povidone iodine 2%w/v. After cleaning mouth we take mandibular canine impression with the help of alginate impression material this impression will help in dental impression. The alginate impressions were poured immediately for avoid any dimensional changes and distortion if any dimensional change than we have to take another sample for proper and right data collection. Dental stone was mixed according to the quantities recommended by the manufacturer for about 30 s and the casts were poured after manual tapping and we should try avoiding air bubbles. After 30 min we will separated it from casts as it got sufficient time for firming it. Any extra part will removed from bard parker knife. The casts were put in 2% glutaraldehyde for 2 h for disinfection. All the measurement was taken from digital Vernier caliper.

The following measurements were taken in all the casts:

1. The greatest mesiodistal width of the mandibular canine (both on the right

and left sides). The mean mandibular canine width was recorded for each subject (Figure 2).

2. The intercanine distance was measured as the linear distance between the cusp tips of the right and left mandibular canines.

Inclusion Criteria

1. Subjects in the age group of 20-40 years
2. Well-aligned lower dental arches
3. Healthy state of gingiva and periodontium
4. Normal molar and canine relationship.
5. Caries free canine teeth
6. Normal overjet and overbite (2–3 mm)

Exclusion Criteria

1. Crowding or spacing in the lower anterior arch segment
2. Developmental anomalies in relation to number, size, and structure of teeth
3. Partially erupted and ectopically erupted teeth
4. Patients with deleterious oral habits (such as bruxism).
5. Teeth showing physiologic or pathologic wear and tear (e.g., attrition, abrasion, erosion etc.)

The MCI (Mandibular canine index) was calculated for each subject by using the formula given by Rao et al.⁵

$$\text{MCI} = \frac{\text{Mean mesiodistal width of mandibular canine}}{\text{Intercanine mandibular arch width}}$$

The mean values for male MCI and female MCI were calculated. After this, the standard MCI value was obtained by applying the following formula:

$$\text{Standard MCI} = \frac{(\text{Mean male MCI} - \text{SD}) + (\text{Mean female MCI} + \text{SD})}{2}$$

Standard MCI value was 0.2661; values above this were considered as males and below this as females. The mean right canine width was significantly higher in male 7.61 mm compared to female 6.75 mm.

Observation & Result

In our current study we observed that the gender ratio is 50% of male and 50% of female in total 200 subject populations.

Table 1
Showing number of male and female in our study

| Male | Female |
|------|--------|
| 100 | 100 |

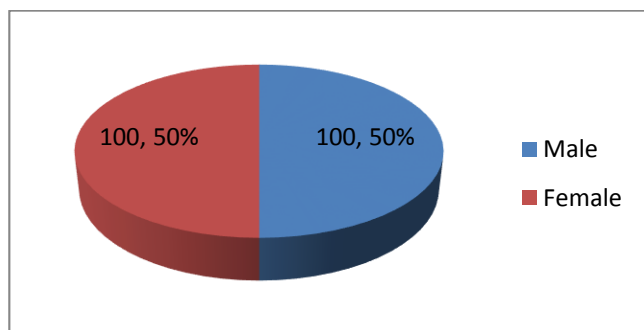


Figure 1. Showing the ratio of male and female subjects was 50%

Table 2
Showing mean age group of male and female subjects with std. mean follows with std. error mean

| | Mean | Std. Deviation | Std. Error Mean |
|--------|---------|----------------|-----------------|
| Male | 26.3500 | 7.40039 | 1.65478 |
| Female | 26.1500 | 5.41222 | 1.21021 |

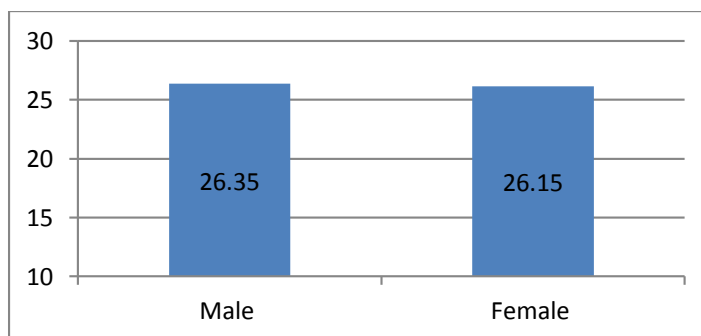


Figure 2. Showing mean age group of male and female subjects with std. mean follows with std. error mean

The bar chart graph 1st showing the mean variation of male and female subjects In our current study we found that the mean mesiodistal width of right mandibular canine was 6.98 mm in male and in female it was 6.66 mm which was describe in table no 3

Table 3
Showing mean mesiodistal width of right side mandibular canine in male and female subjects

| Group Statistics | | | |
|------------------|------|----------------|-----------------|
| Subjects | Mean | Std. Deviation | Std. Error Mean |
| Male | 6.87 | .70 | .15 |
| Female | 6.68 | .68 | .15 |

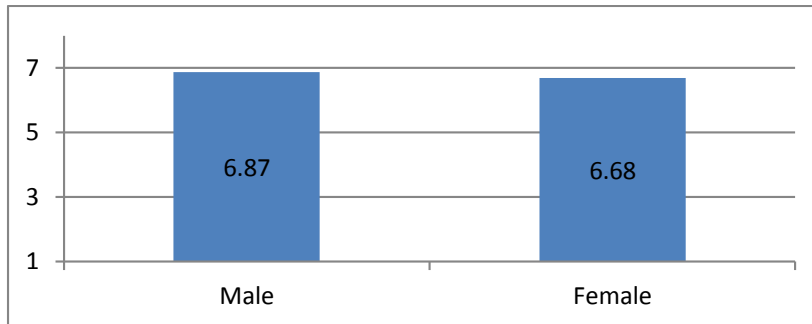


Figure 3. Showing mean mesiodistal width difference in right side mandibular canine in both male and female subjects

In our current study we found that the mean mesiodistal width of left mandibular canine was 7.21 mm in male and in female it was 6.76 mm which was describe in table no 4

Table 4
Showing mean mesiodistal width of right side mandibular canine in male and female subjects

| Group Statistics | | | |
|------------------|------|----------------|-----------------|
| Subjects | Mean | Std. Deviation | Std. Error Mean |
| Male | 7.21 | .80 | .16 |
| Female | 6.76 | .78 | .16 |

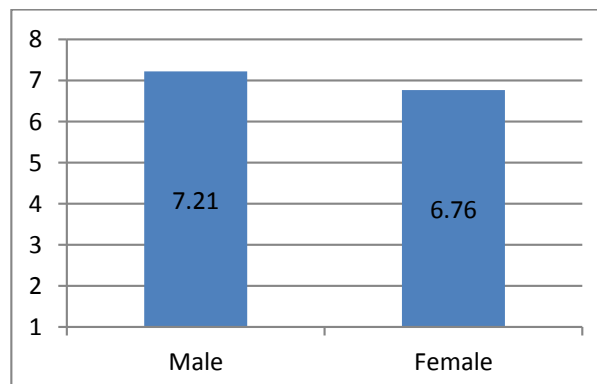


Figure 4. Showing mean mesiodistal width difference in left side mandibular canine in both male and female subjects

In our current study we found that the Inter-arch canine width of male is 27.19 mm and in female subjects is 26.22 mm as shown in table no 3

Table 5
Showing Inter-arch canine width in male

| Group Statistics | | | |
|------------------|-------|----------------|-----------------|
| Subjects | Mean | Std. Deviation | Std. Error Mean |
| Male | 27.19 | .69 | .12 |
| Female | 26.22 | .78 | .12 |

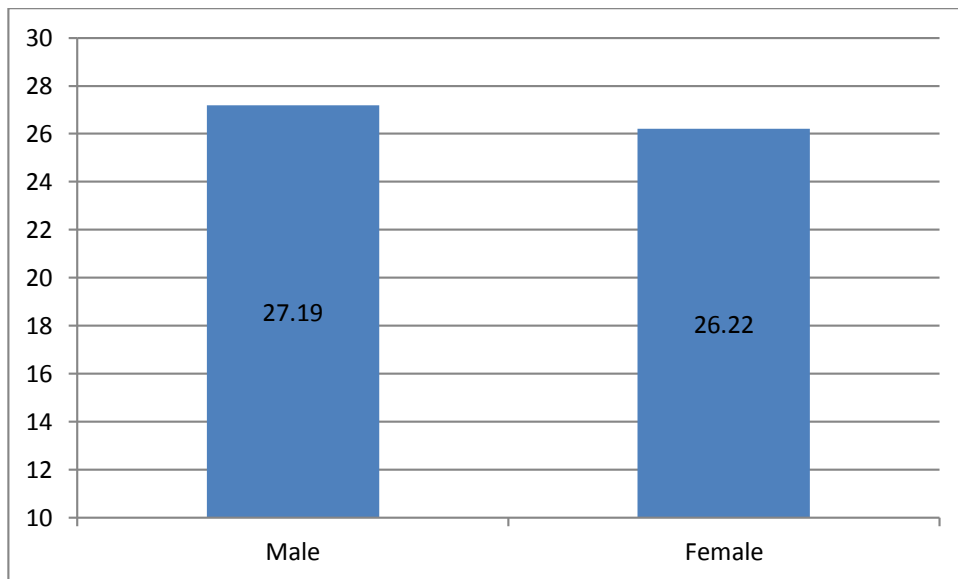


Figure 5. Showing mean the Inter-arch canine width canine in both male and female subjects

In our current study we found that the mandibular canine index between male is 0.29 and in female 0.27 which was show in table no 6

Table 6
Showing mean the Inter-arch canine width canine in both male and female

| Group Statistics | | | |
|------------------|----------|------|----------------|
| Parameter | Subjects | Mean | Std. Deviation |
| MCI | Male | 0.29 | .69 |
| | Female | 0.27 | .78 |

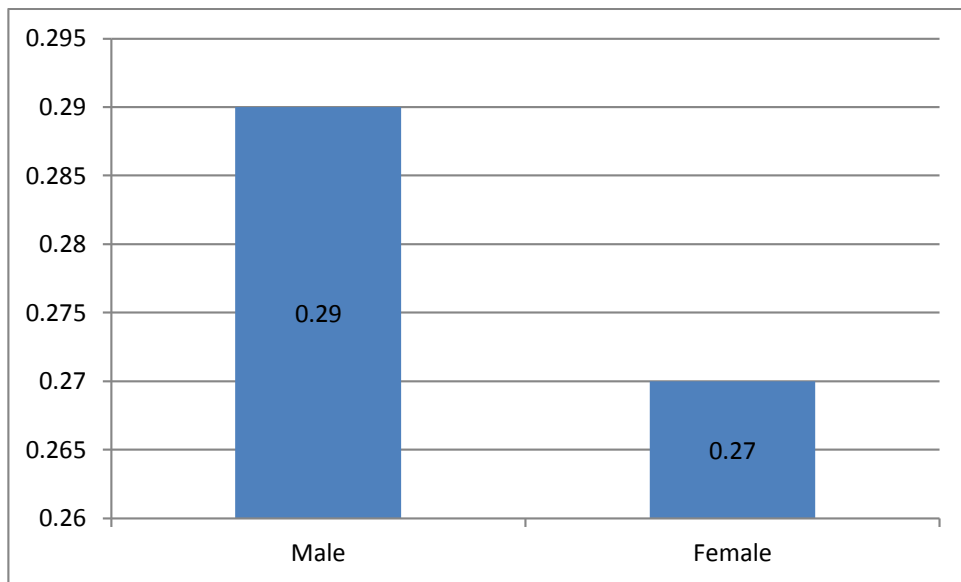


Figure 6. Showing mean the mandibular canine index both male and female subjects

In our current study the percentage accuracy of sex establishment by mandibular canine index method in male there was 80 in male were found and in female it was 78 in total 200 subjects we can find approx. 158 subject sex from MCI method approx. accuracy percentage is 78%.

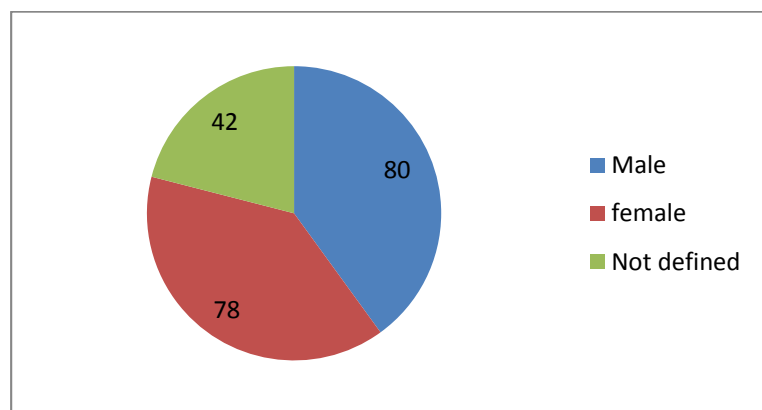


Figure 7. Showing accuracy of sex according to MCI method

Discussion

In our current study we found that the mean mesiodistal width of right mandibular canine was 6.98 mm in male and in female it was 6.66 mm. while on left side we found 7.21 mm in male and in female it was 6.76 mm. while comparing our study with Mehreen Latif et⁶, the finding was the mean mesiodistal width of right mandibular canine was 7.059 mm in male and in female it was 6.47 mm. while on left side we found 7.064 mm in male and in female it was 6.

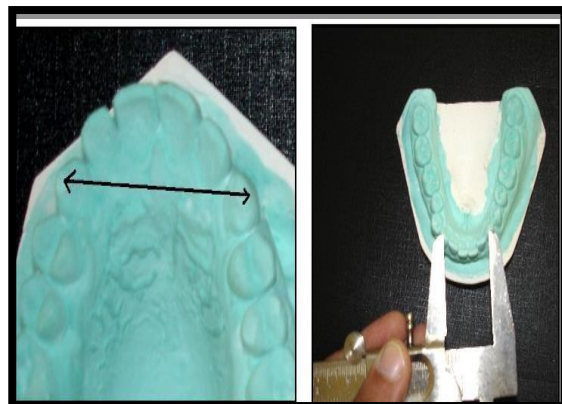
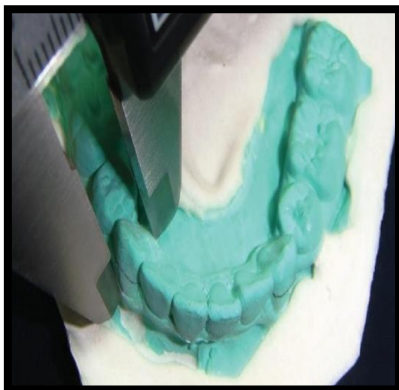
476mm. which was similar with our study. Our findings in males and females also similar with Kaushal et al.⁷ who have reported mean right canine width in males to be 7.229 ± 0.280 mm and in females to be 6.690 ± 0.256 mm and the left canine width in males to be 7.299 ± 0.292 mm and in females, it has been reported to be 6.693 ± 0.323 mm in their study on sixty subjects (males 30 and females 30). Agarwal et al.⁸ found also similar with our study there finding value for right side male was 7.42 ± 0.032 and in female was 6.08 ± 0.08 while on left canine in male 7.47 ± 0.34 and in female was 6.15 ± 0.012 as in our study. we found that male mesiodistal width is more than female.

In our current study we observed that the mean inter-canine difference in males is 27.19 mm and the value in females is 26.22mm. while comparing our study In Nair P et al⁹ there finding for the Inter-arch canine width of male is 28.14 mm and in female subjects is 25.94 mm which was similar with our study.

In our current study we found the percentage accuracy of sex establishment by mandibular canine index method in male there was 80 in male were found and in female it was 78 in total 200 subjects we can find approx. 158 subject sex from MCI method approx. accuracy percentage is 78% while comparing our study with Padmavati et al.¹⁰ they can predict sex to an accuracy of 76.66% (males 73.33%, females 80%) . another study of Kuwana et al¹¹, reported that, in Japanese population, they found a high degree of sexual dimorphism while compared to the mandibular canine. Another study of Garn et al¹². studied observed that sexual dimorphism by measuring mesiodistal width of canine teeth. And observed that it show a good sexual dimorphism varies among different ethnic groups.

Conclusion

The MCI parameter in the present study are reliable method for sexual identification and help for forensic medicine in crime investigation for identification of sex of an skeletal such type of study proved as a good date for investigation purpose more study will help to more accuracy.



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