

# Sex Determination by Means of Inter-Canine Width - A Study in Karnataka Population.

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## ABSTRACT

**Background:** Sex determination using dental features is primarily based upon the comparison of tooth dimensions in males and females. **Aims and Objectives:** To determine the role of inter-canine width in identification of sex of individuals. **Methods:** 50 subjects were included in the study. Impressions were taken with alginate and study models prepared. Inter canine width was measured in all the cases and findings tabulated. **Results:** Inter canine width for males were higher than females in both maxilla and mandible. **Conclusion:** Inter-canine widths can be used as a tool in sex determination.

**Keywords:** Maxillary arch, Mandibular arch, Inter-canine arch width, Inter-molar arch width, Gender, Medicolegal case.

## INTRODUCTION

The identification of sex is of significance in cases of mass fatality incidents where bodies are damaged beyond recognition. Teeth, being the hardest and chemically the most stable tissue in the body are an excellent material in living and non-living populations for anthropological, genetic, odontologic and forensic investigations. Tooth size standards based on odontometric investigations can be used in age and sex determination.<sup>[1, 2]</sup>

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Studies have proven that no two oral cavities are alike and similar to fingerprints, odontometric measurements are also unique and can be used for sex identification. The main rationale teeth are used in medico-legal cases is the fact that they are the hardest structures in human body and hence are resistant to various types of insults that may occur in mass disasters. Hence, teeth make up a valuable tool in various forensic studies. Odontometric studies have been used in the past for personal identification which include the age and sex of the individuals.<sup>[3,4]</sup>

Sexual dimorphism term denotes differentiating males and females by means of differences in size, stature and morphology of the individuals. Canines have been proven to have greatest sexual

dimorphism, making them very valuable. The various measurements used in previous studies for sexual identification by canines are mesio-distal width of canine, inter-canine width and mandibular canine index.<sup>[3-6]</sup>

Here we carried out a study for sex determination in Karnataka state population by using inter-canine widths.

### Aims and Objectives:

1. To find out the inter-canine arch width in the maxillary and mandibular arches.
2. To appraise the usefulness of inter-canine arch width in sex identification.

## MATERIALS AND METHODS

50 subjects were included in our study, out of which 25 were males and 25 females

### Inclusion Criteria:

1. Ages between 17 and 25
2. No spacing between teeth
3. No inclination, caries, missing of teeth

### Exclusion Criteria:

1. Patients with overjet and overbite
2. Patients with impacted canines
3. Patients with broken or attrited teeth
4. Patients with abnormal habits

Once the patients were selected for the study, they were explained orally regarding the study and after their voluntary approval, a written consent was taken from all of them. The patients were seated comfortably and following aseptic conditions and wearing gloves, upper and lower jaw impressions

were taken with alginate impression material using universal precautions for infection control. The study cast models of these impressions were prepared with dental stone and were used for analysis of odontometric values [Figure 1].



Figure 1: Armamentarium.

Vernier callipers was used to measure the following measurements on study models,

1. Inter-canine width - from cusp tip of canine of one side of arch to the cusp tip of canine on another side of Upper arch.
2. Inter-canine width - from cusp tip of canine of one side of arch to the cusp tip of canine on another side of Lower arch.

Finally all the measurements of each of 50 subjects i.e maxillary inter-canine width, and mandibular inter-canine width were carried out [Figure 2, 3].



Figure 2: Inter-canine distance in upper jaw.



Figure 3: Inter-canine distance in lower jaw.

**RESULTS**

We calculated arithmetic means for inter-canine width in both the arches (maxillary and mandibular) for males and females. To compare the means of the inter-canine in maxillary and mandibular arches for males and females, student ‘t’ test was used. We found the comparison values to be significant with ‘p’ value < 0.05.

The results are tabulated as follows:

Inter-canine width in maxillary arch for male and female subjects was found to be  $35.08 \pm 1.47$  and  $33.42 \pm 1.53$  respectively with ‘t’ value being 3.91 [Table 1].

**Table 1:** Statistical Significance of Inter-canine width in Maxilla.

Parameters	Sex	Mean	±S.D	‘t’ value	‘p’ value	Significance
Inter-Canine Width	M	35.08	1.47	3.91	0.00	Significant
	F	33.42	1.53			

3. Inter-canine width in mandibular arch for male and female subjects was found to be  $26.77 \pm 1.45$  and  $26.43 \pm 1.60$  respectively with ‘t’ value being 0.78 [Table 2].

**Table 2:** Statistical Significance of Inter-canine width in Mandible.

Parameters	Sex	Mean	±S.D	‘t’ value	‘p’ value	Significance
Inter-Canine Width	M	26.77	1.45	0.78	0.21	Significant
	F	26.43	1.60			

**DISCUSSION**

Sex determination is one of the prime factors employed to assist with the identification of an individual. The accuracy of sex determination using diverse parameters of the body such as craniofacial morphology and measurements on the pubis ranges from 96% to 100%. Correct sex identification limits the pool of missing persons to just one half of the population. In forensic contexts, however, it is not uncommon to recover partial remains, with fragmentary skull and pelvic bones. The teeth are one of the strongest human tissues

and are known to resist a variety of ante-mortem and post-mortem insults.<sup>[1,4, 5]</sup>

In mass disasters, forensic experts in many cases recover partial remains like fragmented skull, jaws and other bones of the body. It has been proved that teeth are one of the strongest tissues in human body that can resist a variety of ante-mortem and post-mortem insults and also teeth are one of the most frequently recovered remains. Many studies have used mesio-distal width of canine, inter-canine width and mandibular canine index (MCI) to establish sex of an individual.<sup>[1-4]</sup> But some recent studies by Acharya et al<sup>[5, 6]</sup>, and Boaz et al<sup>[7]</sup> have found that these dimensions do not reveal the gender differences precisely.

But in patients with missing canines, these measurements are not helpful. Hence, in such individuals, mesio-distal width of molars and inter-molar arch width can be used in sex identification.<sup>[8]</sup>

We found that the mean inter-canine width in maxilla was significantly higher in males than females. Our results are in accordance with other previous studies, which have also observed males have wider teeth and larger inter canine width than girls. This findings might be due to fact that dental arch width reflects the size of the basal bone and because males in general have larger basal bones than females, the same might be applicable to the basal bone of the jaws and the dental arches.<sup>[9- 11]</sup>

The mean mandibular inter-canine width between males and females in our study was statistically insignificant. Our results are in agreement with other earlier studies, This findings might be due to the crowding more common in mandibular anteriors, which is likely to decrease the anterior dental arch width. Our observations are in contrast to that of Hussein et al.<sup>[9]</sup>

When compared, the maxillary inter-canine arch width was found to have high 't' values, and was found to be rather helpful in identification of gender. This finding might be due to considerable variation in the arch width between both genders.<sup>[12-15]</sup>

## CONCLUSION

We carried out odontometric study in 50 subjects to identify gender. We conclude that inter-canine width can be used as a tool for identifying sex. We suggest that inter-molar arch width may also be helpful in determining the sex accurately, especially in cases where canines are absent.

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