# Relationship of Interalar and Intercommissural Distance with the Width of Maxillary Anterior Teeth

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## Abstract

**Introduction:** The anterior teeth are primarily selected to satisfy esthetics. Their selection requires the dentist's artistic skill and scientific knowledge. This clinical study was conducted to explore the relationship of interalar and intercommissural distance with the combined width of maxillary anterior teeth.

**Materials and Methods:** Measurements of the parameters was made using a Digital caliper. The patient was seated up right position and asked to look straight; the intercommisural and interalar width were measured between commissures and ala without applying pressure. The combined width of maxillary anteriors form the distal surface of left and right canines were measured with a dental floss, which was then sectioned and measured. Each parameter was measured three times and the average value was computed and recorded.

**Results:** Mean Interalar, intercommisural and intercanine distance were 34.72 mm, 48.9 mm and 49.61 mm respectively. Statistical analysis revealed a highly significant difference between the inter-alar width, intercommisural width and intercanine width of male and female respectively. Spearman's rho analysis showed a highly significant correlation between Inter canine and both inter alar width ($r=0.098$, $p<0.04$) and Intercommisural width ($r=0.234$, $p<0.05$). Similarly, Spearman's rho analysis in both sexes showed a highly significant correlation between intercanine and intercommisural width however such correlation was not seen between intercanine and inter alar width.

**Conclusions:** This study concluded that there is significant correlation between interalar and intercommissural width with the combined width of maxillary anterior teeth. The inter alar and inter commissural width may be a useful guideline for the selection and replacement of maxillary anterior artificial teeth.

**Key words:** Anterior teeth, Complete denture, Intercanine width, Intercanine width, Interalar width

## Introduction

Patients requiring complete prosthesis usually expect comfort, followed by harmonious appearance, and last, efficiency.[1] To compensate for traumatic bone loss, the effects of aging, loss of support from periodontal disease, tooth loss, or other similar conditions clinicians strive to change the anteroposterior and vertical components of facial relationships.[2]

Therefore, to determine this size we try to use facial landmarks to obtain suitable dimensions of the anterior teeth to reach a close to normal appearance. The esthetic rehabilitation of the edentulous patient has an important psychological effect. Once properly restored, patient self-esteem and self-confidence are often improved, which is also the goal of the oral rehabilitation treatment.[3] According to

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McArthur, patients' natural teeth are the best guide for selection of anterior teeth which include the size, shape and shade of the teeth.[4] There are some mathematical proportions for predicting the width of the maxillary anterior teeth: nasal width, intercommisural width, interpupillary width.[5]

This clinical study was conducted to determine relationship of interalar and intercommissural width with the combined width of maxillary anterior teeth in a population sample.

## Materials and Methods

It was a cross sectional analytic study conducted in Kantipur Dental College and Hospital with the permission of IRC KDC Ref No 10/21 in June 2021, for duration of a month. Verbal consent was taken from the study population of 18-40 years old Nepalese population who visited outpatient department of Kantipur Dental College and Hospital. Dentulous patients with no past history of extraction and orthodontic treatment, no artificial crown, gingival and periodontal diseases were included.

Measurements of the parameters were done using a Digital caliper that has a fine-pointed end that fit interdentally. The patient was seated up right and asked to look straight and the intercommisural width was measured between commissures. The interalar width was determined by measuring the external width of the ala of the nose at the widest point without applying a pressure. The combined width of maxillary anteriors from the distal surface of left and right canines were measured with a dental floss, which was then sectioned and measured. Each parameter was measured three times and the average value was computed and recorded.

Sample size (n) = $Z^2SD^2/e^2$

$= (1.96)^2 \times (0.4)^2/ (0.04)^2 = 384$

Where, n=sample size, Z = 1.96 at 95% CI, SD= 0.40, e = margin of error 40% (0.04)

However, we included 420 patients in this study.

## Results

In our study, 420 patients met the inclusion criteria and were assessed for analysis. Among them, 328 (78.1%) were female and 92 (21.9%) were male. They ranged from 18 to 40 years with a mean age of 22 years.

Measurement of various parameters made with a fine pointed digital caliper was shown in table 1.

Statistical analysis using student t-test revealed a highly significant difference between the inter- alar width, intercommissural width and intercanine width of male and female respectively (t-value = 6.53 and $p < 0.001$), (t-value = 3.77 and $p < 0.001$) and (t-value = 3.11 and $p < 0.001$).

Among total subjects, Spearman's rho analysis showed a highly significant correlation between Inter canine and both inter alar width ($r=0.098$, $p <0.04$) and Intercommissural width ($r=0.234$, $p <0.05$).

Similarly, Spearman's rho analysis in male group showed a highly significant correlation between intercanine and Intercommissural width ($r=0.273$, $p <0.05$). However, did not show statistically significant correlation between Inter canine and inter alar width ($r=0.139$, $p =0.185$).

However, Spearman's rho analysis in female group showed a highly significant correlation between Inter canine and intercommissural width ($r=0.184$, $p <0.05$). However, there was no statistically significant correlation between Inter canine and inter alar width ($r=0.015$, $p =0.784$) (Table 2).

**Table 1:** Facial measurement and combined width of maxillary anterior teeth(in millimeter mm)

| PARAMETERS | Total (N=420) | | | MALE (N=92) | | | FEMALE (N=328) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Mean (SD) | Minimum | Maximum | Mean (SD) | Minimum | Maximum | Mean (SD) |
| Interalar | 14.20 | 54.19 | 34.72 (3.6) | 14.20 | 43.10 | 36.79 (4.2) | 20.50 | 54.19 | 34.14 (4.2) |
| Intercommissural | 25 | 93.20 | 48.9 (5.6) | 25.00 | 93.20 | 50.81 (7.1) | 31.50 | 63.08 | 48.37 (7.1) |
| Intercanine | 26.1 | 60.02 | 49.61 (3.4) | 26.1 | 60.02 | 50.59 (4.3) | 37.93 | 58.84 | 49.33 (3.18) |

**Table 2:** Correlation between Intercanine distance and both Interalar and Intercommisural width

| STUDY POPULATION | WIDTH | INTERCANINE | INTERCOMMISURAL | INTERALAR |
|---|---|---|---|---|
| TOTAL (N=420) | INTERALAR | 0.098 | - | 1 |
| | INTERCOMMISSURAL | 0.234 | 1 | - |
| | INTERCANINE | 1 | 0.234 | 0.098 |
| | | | | |
| MALE (N=92) | INTERALAR | 0.139 | - | 1 |
| | INTERCOMMISSURAL | 0.273 | 1 | - |
| | INTERCANINE | 1 | 0.273 | 0.139 |
| | | | | |
| FEMALE (N=328) | INTERALAR | 0.015 | - | 1 |
| | INTERCOMMISSURAL | 0.184 | 1 | - |
| | INTERCANINE | 1 | 0.184 | 0.015 |

## Discussion

The relationship between various facial measurements and natural teeth could be used as a reliable guide to achieve an optimum esthetics.[6-9]Authors have suggested that the width of the nose serves as a guide for the selection of width of maxillary anterior teeth.[9,10,11]They stated that parallel lines extended from the lateral surface of the alae of the nose onto the labial surface of occlusal rim could be used to estimate the position of maxillary canine.[9] In the construction of complete dentures, the estimation of the combined width of maxillary six anterior teeth is an important clinical procedure when pre-extraction records are not available.[10]

The present study aimed to determine if proportional relationship exists between the widths of the maxillary frontal teeth, the interalar distance, and the intercommissural width in study population. The average intercanine distance in males was 50.81mm and in females was 49.33mm. This revealed that the intercanine distance was less in females by 1.48mm. This may be due to the differences in the size of the arch and teeth in the two genders as supported by Lieb et al.[12]

This study showed statistically significant correlation between Inter canine and both inter alar width and intercommissural widthsimilar to the study done by Mahmood Z which concluded that use of interalar width directly to determine the size of six maxillary anterior teeth can lead to selection of appropriately sized maxillary anterior artificial teeth.[6] The validity of use of interalar width in selection of maxillary anterior teeth and making of esthetically pleasing dentures can thus be reliably predicted.[10]The mean intercommissural measurement for males was 50.81mm and for females 48.37mm with a difference of 2.44mm. Lieb et al.in their study showed that the average distance through the commissures was 52.7 mm. In their study, the

variations in measurements can be attributed to ethnicity.[12] The distance between the distal surfaces of the canines was also greater in males by 0.173 cm (1.73 mm), indicating that males have wider arches than females.[12] Many are of the belief that the interalar width is comparatively similar to the intercanine distance and this decisive factor is one of the criteria for the selection and placement of the upper six anterior teeth. However, this standard approach is not always to be followed as a general rule because sometimes there is variance in the measurements between the variables compared in some individuals.[13]

Hoffman et al suggested multiplying the interalar width by a factor of 1.31 helps in estimating the width of the maxillary anterior teeth.[8] In our study, we found a multiplication factor of 1.43.

In our study we found positive correlation between between Inter canine and both inter alar width and Intercommissural width. Similar finding was revealed in study done by Maskey S et al.[14]

## Conclusions

The study concluded that inter alar width and intercommisural widths may be used as guidingfactorto determine the width of maxillary anterior teeth which can be used as a reference in edentulous patients for replacement of maxillary anterior artificial teeth.

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