THE ROLE OF INTERPUPILLARY DISTANCE IN THE SELECTION OF ANTERIOR TEETH

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ABSTRACT

The objective of the present study was to determine the correlation between the interpupillary distance and combined mesiodistal width of maxillary six-anterior teeth in the study. It was a cross sectional study and was carried out from May 2011 to November 2011.

Sampling: Non-probability purposive sampling.

A total of 159 dentate subjects with Angle’s class I molar and canine relationships were selected from the department of Prosthodontics, Lahore Medical and Dental College, Lahore. The exclusion criteria included the subjects with history of orthodontic treatment, extractions, drifting and attrition of the teeth. Subjects having any restoration in upper anterior segment, any facial deformity, crowding or spacing of anterior teeth were also excluded. The informed consent was taken.

The patients were seated in the upright position and were asked to look straight. The interpupillary distance was measured using the digital caliper. The measurement was made from the mid pupil of one eye to mid pupil of the other eye.

The intercanine width was measured from the casts of maxillary arches with the help of dental floss placed at the greatest curvature of the maxillary arch. The distal surfaces of both the maxillary canines were marked on each sides of the maxillary cast. The dental floss was sectioned at the markings and made straight. The distance was measured between the marks using digital caliper. Both the parameters were measured three times by the single person to ensure the accuracy and the mean was taken. The measurements were recorded in a predesigned Proforma.

The statistical results of this study showed that there was no correlation between the interpupillary distance and the combined mesiodistal width of maxillary anterior teeth. It was concluded that the interpupillary distance was not a reliable predictor to select maxillary anterior teeth width for edentulous patients in the study group.

Key words: Interpupillary distance, anterior teeth selection

INTRODUCTION

The concerns of the completely edentulous patient include the comfort, function and the esthetics. However restoring the esthetics of a completely edentulous patient successfully, poses many challenges. The teeth give each face a unique identity. When they are lost many individuals undergo some degree of depression and loss of self esteem.
The anterior teeth are primarily related to the esthetics. They also perform the functions of lip support, incision and phonetics. For a completely edentulous patient it is important that the size, form and the colour of the teeth must be in harmony with the surrounding facial environment. All these objectives are difficult to achieve when preextraction records are not available.

There is the scientific data in the dental literature that can be used as a guide for the selection of the size of the artificial teeth. Some authors have investigated the relationship between the anthropometric measurement of the face and mesiodistal width of maxillary anterior teeth. They have suggested a ratio between the facial size and the tooth size that could be used as a guide in selecting denture teeth. However, the soft tissue measurements are subjective to change.

The solution to this problem is the use of stable facial references and that are not subjective to change. One of such landmark is the interpupillary distance. The interpupillary distances is a facial landmark that is stable and does not modify after the age of fourteen.

The aim of the present study was to determine the correlation between the interpupillary distance and the combined mesiodistal width of the maxillary anterior teeth in study group. If any relation exists then this may be utilized to select the teeth for those completely edentulous patients who have no previous records. In this way the better esthetics results can be obtained for a complete denture patient.

METHODOLOGY

A total of 159 dentate subjects were selected from the department of Prosthodontics, Lahore Medical and Dental College, Lahore. Demographic information like age and sex was recorded. The age ranged from 18 to 30 years. The selection of the subjects was on the clinical basis. The individuals with Angle's class I molar and canine relationships were included. The exclusion criteria included the subjects with history of orthodontic treatment, extractions, drifting and attrition of the teeth. Subjects having any restoration (crowns, bridge, fillings and removable prosthesis) present in upper anterior segment were also not included in the study. None of the patient had any facial deformity, crowding or spacing of anterior teeth. The informed consent was taken from all the subjects for using their data in research.

For measuring the interpupillary distance participants were seated comfortably in an upright position and asked to look straight. The measurements were made from the mid pupil of one eye to mid pupil of other eye using a digital caliper.

For measurement of inter canine width artificial stone casts of maxillary arches were made from irreversible hydrocolloid impressions in perforated stock trays. Dental floss was placed at the greatest curvature of the maxillary cast and made fixed with adhesive tape; one mark on each side was placed at the distal surface of the canines. Dental floss was sectioned at the markings, made straight and the distance was measured between the marks using digital caliper.

Each parameter was measured three times and average value was computed and recorded in a predesigned Proforma.

The data was entered and analyzed in statistical software (SPSS version 11) a computer based software program. Quantitative variables interpupillary distance (IPD) and inter canine distance (ICW) were presented as mean and ± standard deviation. A qualitative variable like sex was presented as frequency and percentages. Pearson’s correlation coefficient was used to find out the correlation between interpupillary distance with intercanine distance. P-value ≤0.05 was considered for significance.

RESULTS

A total of 159 dentate subjects were included in this study to ascertain correlation interpupillary distance and combined mesiodistal width of maxillary six-anterior teeth. Histogram of the age distribution is presented in figure 1. The average age of the patients was 23.08±2.34 year (95%CI: 22.72 to 23.45). Out of 159 patients 80(50.3%) were male and 79(49.7) were female.

The average Inter canine width was 46.01±7.31 mm (95%CI: 44.96 to 47.25) similarly the average of the interpupillary distance is presented in table 1. Average Inter canine width and interpupillary distance were significantly higher in male than in female (p<0.01) shown in table 2.
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The relationship between the Inter canine width and interpupillary distance is presented in scatter plot which shows week relationship. The Pearson correlation coefficients (r) for the Inter canine width and interpupillary distance established a positive correlation (r=.15) as presented in figure 2. The relationship was very weak and not significant (P=007). Correlation was positive and not significant for male and for female figure 2.

DISCUSSION

Many attempts have been made to quantify the selection of the anterior teeth for the complete denture, but no universally accepted method currently exists for the selection of denture teeth. The methods based on the soft tissue references show age related variations. However the hard tissue reference such as the inter-pupillar distance is a stable and reproducible. The present study was an attempt to investigate the potential relationship between the combined mesio-distal width of maxillary anterior teeth and the interpupillary distance.

This study was carried out at the outpatient department of Lahore Medical and Dental College, for which 159 subjects were selected randomly. All these subjects
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were Pakistani Nationals. The population sample comprised of 80 (50.3%) male and 79 (49.7%) female. The subjects selected were in the age range of 18 to 30 years. Just similar to the present study Gomes VL et al\textsuperscript{11} conducted their study to find out the relationship of inter-pupillary and inter-canine distance, that could help in the selection of the denture teeth. They found out that the interpupillary distance could be used reliably for the selection of maxillary anterior teeth.

In the present study, the vernier caliper was used to measure the inter-canine distance on a stone cast and repeated three times by the same operator to avoid biasness of the results, as used in various studies.\textsuperscript{11,12,13,14,15}

The measurement of interpupillary distance was also recorded by using vernier caliper as done by Abdullah MA.\textsuperscript{16} When measured on the stone cast the intercanine distance showed a mean value of (46.01 ± 7.31 mm) to the total sample, and it is significantly high in male than female.

Similarly Al-Wazzan K et al\textsuperscript{8} found the intercanine distance mean value (45.16 ± 3.28 mm) that is nearly same as in the present study. They also suggested the difference of the values in gender (45.16 ± 3.52 mm) for male and (43.93 ± 3.22 mm) for female.

The value of the mean of the intercanine distance, higher than the present study was reported in other studies.\textsuperscript{11,22,20} However in the literature there are some studies available that have shown a low value of the mean of the intercanine distance.\textsuperscript{16,17,16,19}

Just similar to the present study the gender based variations were also reported in the literature,\textsuperscript{16,8,20} however in contrast to the results of the present study few studies have reported no gender based variations.\textsuperscript{17,11}

The mean interpupillary distance of the subjects in the present study was (65.26 ± 5.41 mm) for the total sample, ranging between (81.29 mm and 44.41 mm). Cescrio and Latta\textsuperscript{6} showed a mean value of the (59.16 mm) after measuring 100 subjects of United States army. Latta, Weaver and Conkin\textsuperscript{21} found in 109 edentulous patients a mean of (63.51 mm) and a range from (38.00 to 73.00 mm).

The value of the mean of the interpupillary distance lower than the present study was reported in some studies.\textsuperscript{9,8,6} However high value of the mean was also reported.\textsuperscript{11}

The variation in the values of the mean in various studies may be due to the ethnic and racial differences. However the results of some studies are in agreement with the results of the present study.\textsuperscript{20,23}

The present sample of 159 subjects also revealed an increased inter-pupillary distance values for male than female. These gender based variations similar to the present study were also reported.\textsuperscript{8,11,20}

There is a weak correlation between intercanine distance and interpupillary distance in the present study and is not significant P=0.007. Correlation was positive and is not significant for female and male. The results of the present study are in agreement with the results of the study done by Abdullah MA et al.\textsuperscript{17} They also found no relationship between measurement of interpupillary distance and intercanine distance in their respective study and no correlation was found when population was divided according to the gender. They have reported a negative and an insignificant correlation value for the interpupillary distance and intercanine distance. However in contrast to the present study Gomes et al\textsuperscript{11} concluded that interpupillary distance could be used reliably in the selection of maxillary anterior teeth for Prosthodontics.\textsuperscript{11} In the study by al-el-Sheikh HM et al\textsuperscript{20} an increased significant correlation value was noted (r=0.2134 and P < 0.001). They however found correlation between interpupillary distance and intercanine distance in female while no correlation in male. Gomes VL\textsuperscript{11} in contrast found significantly correlation. They have also reported that interpupillary distance is a reliable parameter for the selection of anterior teeth. The variations in the results of the above mentioned studies showed the strong ethical correlation between the interpupillary and intercanine distances of the maxillary arch.

No assessment was made regarding skeletal relationships and ethnic variations. Further studies must necessarily be carried out to determine if this correlation leads to different results.

CONCLUSION

From the results of this study, the following conclusions were drawn;
1 This study showed that the interpupillary distance is not accurate for the selection of the artificial teeth in the study group.

2 The measurement of the interpupillary distance showed the gender-based difference.

REFERENCES


