

## Comparison of Mesiodistal Diameters of Front Teeth Within Bosnian and Herzegovinian Population

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### Summary

Facial aesthetics can be observed with three basic points of view: the entire face, the ratio between facial and teeth structures and teeth and smile separately. The most important element in observing is the composition of the face and it affects the patient's perception of a nice smile.

The main goal of this research was to analyze the ratio of mesiodistal diameters of the permanent frontal teeth, of the left and right side, in relation to gender and different skeletal classes in the Bosnian-Herzegovinian population. The study covered 300 patients, who had permanent teeth still present, from the central incisor to the first molar in each quadrant and also who were orthodontically treated. The measurements were made on gypsum models, with usage of a digital caliper of a precision of 0.01 mm. Skeletal class was determined by the relationship of the upper and lower jaw to the base of the skull, by using Steiner's analysis performed on X-ray images. The results of this study show that there are no statistically significant differences between the mesiodistal diameters of the permanent frontal teeth of left and right sides. The differences are present in relation to gender; male respondents had larger teeth than female respondents, and the largest teeth were in male subjects in the III skeletal class.

This research could serve as a useful parameter in cases of prosthetic or prosthetic implantology hypodontia therapy.

**Keywords:** Mesiodistal parameter; Maxillary front teeth; Mandibular front teeth; Steiner's analysis; Facial aesthetics

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### Introduction

Aesthetics is the science of art and the science of beauty, and it seeks to find the characteristics of beautiful in everything. Aiming for the beautiful, the aesthetic dentistry itself is developing, whose role is not only treatment, but also the creation of a smile [1]. Since the aesthetic appearance of the patient does not only concern about the covering of hard dental tissues with some kind of material, for the purpose of improving the appearance, but also implies correction of the position and shape of soft tissues, aesthetic dental medicine

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requires an interdisciplinary approach to all branches of dentistry [2]. In order to satisfy the aesthetic demands of the patient, it is necessary to be familiar with the dimensions of the natural teeth in order to carry out appropriate therapeutic procedures for the purpose of reconstruction of the shape of the teeth or the compensation of the lost one.

The knowledge of the size of teeth in the human population is very important in anatomy, anthropology, forensic medicine, and above all in clinical dentistry. The size of the tooth is inherited, although there are authors who believe that the size of the tooth depends on local and general etiological factors [3-6]. The aim of this study was to analyze the relation between the mesiodistal diameter of the permanent frontal teeth, on the left and the right side, in relation to the sex and the different skeletal classes in the Bosnian-Herzegovinian population.

### Materials and Methods

The study was conducted at the Faculty of Dental Medicine, University of Sarajevo, and department of Orthodontics. The study covered 300 respondents, 118 males and 182 females who were in orthodontic treatment. All subjects were taken the prints of teeth with alginate mass and molded gypsum models, after the X-ray images were previously made. Only the models that met the following criteria were taken into consideration:

- The teeth of permanent dentition present
- The possession of an appropriate X-ray photograph, based on which Steiner’s analysis of a skeleton class may have been determined.
- The teeth that grew to the occlusal level

The study excluded models with the following characteristics:

- The teeth of atypical shape or size
- Cavity or restorative grip on the aproximal surfaces of the teeth.
- The teeth which, due to their position, prevent measurements

The largest mesiodistal teeth diameters were measured by using a digital precision gauge of 0.01 mm. All measurements were made by the same author under the natural light. During the one day, not more than 10 models were measured. Skeletal class was determined on the basis of cephalometric analysis. Cephalometric analysis was performed on the AxCEph software system, and digital profiled X-ray images were analyzed, on which the points A, B, S, N were determined, and calibration was performed to obtain data on SNA, SNB and ANB angles. A Steiner analysis was used to determine the value of the previously mentioned angles [7,8]. The reliability of measurements was tested on a sample of 20% of respondents, where the measurements were repeated on the models and X-ray images. A Pearson correlation was done that proves the reliability of the results. Statistical data processing was performed by using IBM SPSS Statistics v.21. The results of the research are shown in the table.

### Results

Students’ t - Independence test and ANOVA did not show statistically significant differences in the mesiodistal diameters of permanent frontal teeth on the left and right sides, but the existence of a significant difference in tooth diameter in persons of different sexes was established. The male examinees have a higher mesiodistal diameter of the permanent frontal teeth in all three skeletal classes.

Tooth	13	12	11	21	22	23
Male	8,10	6,92	8,96	8,95	6,92	8,12
Female	7,72	6,7	8,60	8,56	6,71	7,71

**Table 1:** The average value of maxillary permanent frontal teeth in male and female respondents.

Tooth	13	12	11	21	22	23
I class	7,95	6,90	8,86	8,82	6,83	8,18
II class	8,08	6,99	8,97	8,95	7,00	8,02
III class	8,27	6,89	9,07	9,10	6,95	8,18

**Table 2:** The average value of maxillary permanent frontal teeth in male respondents in different skeletal classes.

Tooth	13	12	11	21	22	23
I class	7,75	6,71	8,60	8,60	6,72	7,76
II class	7,74	6,76	8,60	8,57	6,78	7,72
III class	7,69	6,63	8,61	8,52	6,64	7,65

**Table 3:** The average value of maxillary permanent frontal teeth in female respondents in different skeletal classes.

Tooth	33	32	31	41	42	43
Male	7,13	6,12	5,61	5,64	6,10	7,07
Female	6,66	5,91	5,40	5,40	5,88	6,72

**Table 4:** The average value of mandibular permanent frontal teeth in male and female respondents.

Tooth	33	32	31	41	42	43
I class	7,06	6,04	5,57	5,69	6,04	7,07
II class	7,10	6,14	5,63	5,61	6,10	7,04
III class	7,23	6,20	5,63	5,62	6,17	7,12

**Table 5:** The average value of mandibular permanent frontal teeth in male respondents in different skeletal classes.

Tooth	33	32	31	41	42	43
I class	6,72	5,93	5,42	5,43	5,92	6,89
II class	6,65	5,90	5,38	5,38	5,84	6,65
III class	6,62	5,90	5,40	5,41	5,89	6,63

**Table 6:** The average value of mandibular permanent frontal teeth in female respondents in different skeletal classes.

### Discussion

This study was done on a sample of 300 respondents, 118 males and 182 females. The division of the sample into skeletal classes was carried out on the basis of Angle’s principles of occlusion. Out of a total of 118 male respondents, the largest percentage of them (50.8%) had I skeletal class, while 31,4% had II skeletal class, and only 17,8% had III skeletal class. In female respondents, the highest number was in I skeletal class (45.1%), 38.5% had II skeletal class and 16.5% had III skeletal class.

The aim of this study was to measure the mesiodistal diameters of maxillary and mandibular permanent front natural teeth. In 1969 Krajceck emphasized in his work that from two dimensions of teeth, width and length, the priority is tooth width [9].

For the standard average mesiodistal value of a permanent maxillary central incisor, a value of 8.5 mm or 8.6 mm is considered, although the literature suggests variations ranging from 8.36 to 9.33 mm [10-16]. The average value of the above mentioned tooth in this research, in male respondents is 8.96 mm, and in female 8.58, and there are no statistically significant differences in the tooth dimensions of the left and right sides. For the standard average mesiodistal value of the permanent maxillary lateral incisor, a value of 6.5 mm and 6.6 mm is taken into consideration [10,11]. The literature cited variations in male respondents are ranging from 6.32 mm to 7.61 mm, and in female respondents ranging from 6.45 mm to 6.95 mm [12-18]. The average value of the above mentioned tooth in this research in male respondents is 6,92 mm, and in female 6,70, and there are no statistically significant differences in the tooth dimensions of the left and right sides.

For the standard average mesiodistal value of the permanent maxillary canine, a value of 7.5 mm and 7.6 mm is taken into consideration, and the literature mentions variances are ranging from 7.53 to 8.32 mm [14,18,19]. The average value of the above mentioned tooth in this research in male respondents is 8,11 mm, and in female 7,72, and there are no statistically significant differences in the tooth dimensions of the left and right sides.

For the standard average mesiodistal value of the permanent mandibular central incisor, a value of 5.0 mm and 5.3 mm is taken into consideration [10,11]. The literature cited variations in male respondents are ranging from 5.39 mm to 5.83 mm, and in female respondents are ranging from 5.32 mm to 6.07 mm [12,14, 18]. The average value of the above mentioned tooth in this research in male respondents is 5,62 mm, and in female 5,40 mm, and there are no statistically significant differences in the tooth dimensions of the left and right sides.

For the standard average mesiodistal value of the permanent mandibular lateral incisor, a value of 5.5 mm and 5.7 mm is taken into consideration [10,11]. The literature mentions variations in male respondents ranging from 6.00 mm to 6.59 mm, and in female respondents ranging from 5.86 mm to 6.49 mm [12,14,18]. The average value of the above mentioned tooth in this research in male respondents is 6,11 mm, and in female 5,90 mm, and there are no statistically significant differences in the tooth dimensions of the left and right sides.

For the standard average mesiodistal value of the permanent mandibular canine, a value of 6.8 mm and 7.0 mm is taken into consideration [10,11]. The literature mentions variations in male respondents ranging from 6,75 mm to 7,20 mm, and in female respondents ranging from 6,58 mm to 7,41 mm [14,18]. The average value of the above mentioned tooth in this research in male respondents is 7,10 mm, and in female 6,69 mm, and there are no statistically significant differences in the tooth dimensions of the left and right sides. Numerous studies have shown that males have larger teeth than females [12,20-25]. In this study, it was also concluded that the mesiodistal diameter of the frontal teeth is higher in male subjects, and the largest difference is present on the canine teeth.

### Conclusion

- In male respondents, the measurements showed higher mesiodistal diameters of maxillary and mandibular permanent frontal teeth compared to the female respondents
- The most noticeable difference in teeth dimensions in persons of different sexes is present on the mandibular canines
- There is no statistically significant difference in the mesiodistal diameters of the frontal teeth of the left and right sides.

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