Anthropometric differences between males and females in face dimensions and dimensions of central maxillary incisors

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ABSTRACT

The aim of this study was to assess if there was a significant difference between males and females for some dimensions of face and central maxillary incisors. For this purpose two thousand individuals in the age from 18 to 24, with intact frontal teeth were measured by a precise calliper. There were 920 males and 1,080 females. According to the statistical analysis it was concluded: 1. In the population studied the central incisor’s width was smaller than in Anglo-Saxon Caucasians, in black race or yellow race; 2. Men had larger face and central maxillary incisors’ dimensions than women (p<0.01), except for the maxillary central incisor’s cervical width (p>0.05); 3. Dimensions of the face length did not exceed ± 6% between gender, dimensions of the face width did not exceed ± 5%, dimensions of the maxillary central incisor width at the contact point level did not exceed ± 3% and dimensions of the maxillary central incisor width at the incisal edge did not exceed ± 4% between men and women.

Key words: dimensions of the face and central maxillary incisor, gender

INTRODUCTION

Mouth and eyes are the most visible structures of a human face (1, 2) and they have significant importance in formation of someone’s personality. Some authors consider mouth to be even more important than the eyes (3, 4).

During manufacturing of complete dentures, appropriate artificial teeth have to be chosen and set in a denture. Artificial teeth have to fulfil some criteria such as appropriate colour, shape and dimension for each person. First theories on artificial teeth choice included the theory of temperaments (5-7) which correlated dimensions and form of frontal maxillary teeth to someone’s character.

In that way decisive and determined people had emphasized canines; gentle people had small teeth, etc. However, that theory has been rejected as a non scientific theory.

At the other hand, even nowadays the question has to be raised: “Are there any teeth form or dimensions that make a certain tooth shape more suitable for different gender”. Some textbooks and studies teach that men have more prominent canines, and women have relatively narrower lateral maxillary incisors than men (8-12).

Growth and development of a human being depend not only on hereditary factors (genetic determinants) but also on environmental factors. Environmental factors may influence hormonal and metabolic activities during harmonious growth (13-15). Men usually have less fat tissue; they have stronger and wider bones, more muscular mass, etc. in comparison to women (16).

The aim of this study was to find out if there were any differences in dimensions of central maxillary incisors and face dimensions between men and women for the population of Zenica in Bosnia and Herzegovina.

MATERIALS AND METHODS

Two thousand individuals participated in this study. They were in the age from 17 to 24 years. The growth of cranio-facial system and the growth of the teeth had to be completed for each individual. The sample consisted of 920 males and 1,080 females.

Individuals with occlusal and orthodontic anomalies, individuals who showed any asymmetries of the face
and individuals with fillings on the frontal teeth were excluded from the study. None of the participants had a fixed prosthetic appliance in the upper or the lower jaw.

The measurements were made using a precise calliper (MEBA, Zagreb) with a precision of 0.1 mm and the possibility to measure a range between 0 and 200 mm.

All the measurements were made by one dentist directly on the participants. During the measurement they were sitting comfortably in a dental chair in an upright position.

The same measurement had been completed 3 times in a 10 days interval in 10 participants to test the reproducibility of the measurements. The Kendall-W test was used to test the significance between the 3 measurements. Kendall W test is a non-parametric test which compares the significance of the differences between several dependent variables (measurements of the same variables on the same patient 3 times). The Kendall coefficient of concordance was calculated and for all the measured variables there was no significant difference between the 3 measurements (p>0.05). The coefficient varied between 0.67 and 0.91.

Obviously, there was no significant difference between the 3 measurements (p>0.05) and it was decided that all other participants should be measured in the same way. The following variables were measured for each participant: frontotemporal-frontotemporal width, Gonion-Gonion width, Zygion-Zygion, Thrichion-Gnathion length, upper left incisor length, upper right incisor length, cervical width of the left incisor, cervical width of the right incisor; width of the upper right incisor (URI) at the contact point; width of the upper left incisor (ULI) at the contact point; width of URI at the incisor edge and width of ULI at the incisor edge.

All the collected data were statistically analysed by using the statistical package SPSS 1998 for Windows (Chicago, Illinois, USA). Standard univariate and bivariate analysis were performed. The mean values (x) and standard deviation (SD) were calculated. Descriptive statistics was made for all 2,000 participants and then separately for the males and the females. To test the difference between males and females bivariate analysis was used for all the measured variables (Kolmogorov two sample test).
RESULTS

Mean values and standard deviations of the measured variables are presented in the Table 1.

The face width and length for males and females are shown in the Figure 1.

The width and the length of the central maxillary incisors in males and females are shown in the Figure 2.

It is obvious that all the variables measured on the upper central incisors had higher dimensions in men than in women (Table 2; \( p<0.01 \)), except for the cervical width, which was of similar dimensions for both genders (Table 2, \( p>0.05 \)).

Table 2 Significance of the difference between men and women for the variables measured on face and on teeth

<table>
<thead>
<tr>
<th>VARIABLE (mm)</th>
<th>Z value</th>
<th>Significance (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft-Ft</td>
<td>8.236</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>Go-Go</td>
<td>7.125</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>Zyg-Zyg</td>
<td>8.333</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>Length of the face: Tr-Gn</td>
<td>10.646</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>Length of URI</td>
<td>3.122</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>Length of ULI</td>
<td>3.167</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>CW-R</td>
<td>0.797</td>
<td>(&gt; 0.05) NS</td>
</tr>
<tr>
<td>CW-L</td>
<td>0.754</td>
<td>(&gt; 0.05) NS</td>
</tr>
<tr>
<td>CPW-R</td>
<td>2.116</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>CPW-L</td>
<td>1.848</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>IW-R</td>
<td>2.215</td>
<td>(&lt; 0.01**)</td>
</tr>
<tr>
<td>IW-L</td>
<td>1.836</td>
<td>(&lt; 0.01**)</td>
</tr>
</tbody>
</table>

Results of the significance of the difference between men and women tested by the Kolmogorov two way test are presented in Table 2. Statistical analysis of this test has shown that males had all facial and teeth dimensions significantly larger than females (\( p<0.01 \)) except for the cervical width of the upper central incisors (\( p>0.05 \)).

DISCUSSION

The average length of central maxillary incisors was 8.46 mm for the right central incisor and 8.47 mm for the left central incisor. The average width of maxillary central maxillary incisor at the cervical level was 3.99 mm for the right incisor and 4.01 mm for the left incisor. The average width of central maxillary incisors at the contact point level was 6.97 mm for the right incisor and 6.98 mm for the left incisor. The average width of central maxillary incisors at the incisal edge was 6.84 mm on the right side and 6.85 mm on the left side.

The average values from the study of Brand and Isselhard (17) and Berkovitz et al. (18) for the length and the width of central maxillary incisors were 10.5 mm and 8.5 mm and were higher than in the observed population (8.5 mm and 6.9 mm). Keng and Foong (19) found out that the average width in Chinese population was 8.5 mm for maxillary central incisor, and the most frequent value (62%) was from 8.5 to 9.5 mm. Keng and Foong described the values together for both genders. They explained that to the fact that the difference between gender did not exceed \( \pm 3\% \) according to Garn’s studies (20). In the studied population the length and the width of the central maxillary incisors at the contact point level and at the incisor edge were significantly higher in men than in women (\( p<0.01 \)), but the width of central maxillary incisors at the cervical level was not significantly different between genders (\( p>0.05 \)). Although the difference between gender was statistically significant, it did not exceed 0.5 mm on average for any of the measured maxillary central incisor’s variable, which is, expressed in percentage, similar to the Garn’s results (20). According to Garn (20), average width of central maxillary incisors in white males was 8.84 mm, and according to Lavell (21) 8.79 mm. According to Mack (22) both males and females of the black ethnic group had average width of 9.9 mm, and British men and women 8.8 mm; according to McArthur, (23) the average width in white race was 8.86, in male Malaises it was 8.83, and in Chinese living in Singapore 8.85 mm. In the studied population the average value for the width of central maxillary incisors was approximately 7 mm both, at the contact point level and at the incisal edge. The measured values are lower than the values of the other authors (20-24). In the studied population the most frequent teeth width varied between 6 and 8 mm (in approximately 95% of the examined individuals). Keng and Foong observed that teeth wider than 9 mm had approximately 40% of Chinese population. Results of the dimensions of the teeth measured in 2,000 individuals of the population from Zenica showed smaller values than other authors, either for the white, black or yellow race, but the measured dimensions fit in the
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dimensions of the artificial teeth manufacturers (24).
Woodhead (24) found that the most manufacturers
did not produce artificial teeth wider than 9 mm, and
McArthur found out that the average width of True-
byte artificial central maxillary incisors was 8 mm. The
difference between the results for our population and
the results of the other authors could be explained with
genetically smaller central maxillary incisor’s dimen-
sions in the studied population. All other authors also
had a smaller sample.

Narrower central incisor’s dimensions in women than
in men are in accordance with Owens (25) who found
out that women had significantly narrower maxillary
central incisors in three out of 6 examined races than
men. The results are also in accordance with Hasan-
reisoglu (26) who observed that the maxillary central
incisor and canine dimensions of men were greater than
those of women in the Turkish population with the can-
nines showing the greatest gender variation.

The difference between the genders was significant for
all the central maxillary incisor’s dimensions (p<0.01)
except for the cervical width in this study. According to
Garn, the width did not exceed ± 3% between the gen-
ders (20), but the author did not explain where exactly
he had made measurements of the incisor’s width. In the
studied population the difference for the length of the
central maxillary incisor between men and women did
not exceed ± 5%. The difference for the cervical width
of the central maxillary incisor between the genders
was not greater than ± 1.5%, for contact point width ±
3% and for incisor’s width at the incisal edge ± 4%.

The difference for the face length between males and
females did not exceed 6%, and for all widths measured
on the face the difference did not exceed 4%.

Men did not differ significantly from women only for
the cervical central maxillary incisor’s width. Men had
significantly larger dimensions of the contact point and
incisor edge width from women. Expressed in percent-
ages, the difference was not greater than 6%. Den-
tal technicians doing waxing up of artificial gingiva
around tooth neck should emphasise the gender dif-
fences. Larger teeth should be chosen for the males
but cervical parts should be «narrowed» in males more
than in females. Finally, conclusions upon the results
of this study would be: tooth dimensions were smaller
in the population of Central Bosnia than tooth dimen-
sions of Anglo-Saxon Caucasians, black or yellow race.

Men had significantly higher face dimensions and the
dimensions of central maxillary incisors than women
(p<0.01), except for the cervical tooth width (p>0.05).
Dimensions of the face length did not exceed 6%,
dimensions of the face width did not exceed 5%, di-
mensions of the maxillary central incisor width at the
contact point did not surpass 3% and dimensions of the
maxillary central incisor width at the incisor edge did
not exceed 4% between men and women.

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