Determination and Comparing of the Combined Mesio-distal Width of the Permanent Mandibular Incisors and that of the Maxillary and Mandibular Canines and Premolars in a Group of Egyptian Children in Port-Said Governorate: A Cross-Sectional Study

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ABSTRACT

Aim: This study evaluated and compared the combined mesio-distal width of the permanent mandibular incisors and the width of the maxillary and mandibular canines, as well as premolars of Egyptian children (males versus females) in PortSaid governorate. In addition to finding the correct relationship of the total mesiodistal width of the teeth under study. **Materials and Methods:** This study was conducted on 384 patients between the ages of 12-15 years in PortSaid Governorate. Subjects were chosen to be free of any systemic disease, and their teeth were neither carious nor crowded. Impressions were made for the upper and lower arches. Each impression was instantly poured into the stone plaster. The mesiodistal widths of mandibular incisors and maxillary and mandibular canines, as well as, premolars, were measured from the study models using digital caliper. **Results:** In this study, there was no significant difference reported between the mean mesiodistal width of all teeth between males (209) and females (175). Also, there was a statistically significant difference in the mean of mesiodistal tooth width between the right and left sides for almost all teeth under study. Moreover, a positive correlation exists between the sum of the mesiodistal width of the upper right canine and premolars & the sum of the mesiodistal width of the lower incisors among both genders combined. **Conclusion:** The mesiodistal width of the upper and lower canines, as well as the premolars, can be predicted by measuring the mesiodistal width of the lower incisors due to the positive correlation between them.

Introduction:The size of teeth is one of the crucial factors affecting the formation of occlusion, and lack of information about its size will lead to an increased incidence of orthodontic problems, and therefore difficulty of providing an

appropriate diagnosis and treatment plan[1]Space problem management continues to play a major role in dental practice. Understanding dental development in the primary and mixed dentitions, will help to decide when and how to intercept the malocclusion if crowding is detected. Space maintenance in the developing dentition, can prevent nonessential loss in arch length [2]The size of teeth issues data is useful for comparative studies of tooth size. Determination of teeth size is of great importance to general dentists as well as to pedodontics and orthodontists, in diagnosing and planning treatment of space problems. This data may also be useful in forensic dentistry[3]Harmony in the mesio-distal widths of maxillary and mandibular teeth is a major factor in achieving proper inter-digitation, overbite and overjet in centric occlusion. A notable variation in tooth size can lead to occlusal disharmony and malocclusion. Crowding and spacing are widespread forms of malocclusion that are commonly associated with the discrepancies in tooth size and bony bases[4]In permanent dentition the odontometric measurements are straight forward. However, in the mixed dentition analysis, it is a great provocation to accurately determine the mesiodistal tooth-widths of unerupted permanent canines and premolars. Different methods have been suggested and utlized in different ethnic groups. They fall into three main techniques; radiographic method, use of regression or prediction equations and a combination of radiographic method and regression equations[5]Mixed dentition is a transition period of occlusion that own both primary and permanent teeth, commonly lasts from six to tweleve years, in which is associated with most of the orthodontic problems because of the insufficiency of space for erupting permanent teeth. An early assessment of available space may allow early intervention or minimize the developing malocclusion[6]Tooth size is an etiologic factor for malocclusions in different occlusion categories and different racial groups. Disproportionate tooth size makes the treatment process difficult and prevents formation of a precise occlusion. Large teeth do not always develop malocclusion, because the available space may be enough for them. Moreover, small teeth also do not develop serious problems, unless they cause spacing in the arches[7]It was conducted in many countries to intiate their normative data on mesio-distal teeth widths, but the difference between races leads to inability to interchange those diagnostic criteria. Standard measurements of a certain population cannot be considered conventional for any other population. Therefore, races must have their own measurements and treated according to their own characteristics[8]Early intervention of space discrepancies can prevent a potential dental irregularity from progressing into a more severe form, thus, preventing future malocclusions in children. One of the pre-requisites for diagnosing these discrepancies is mixed dentition analysis (MDA), which ideally should own the character to precisely predict the dimensions of the unerupted permanent teeth[9]After reviewing multiple different literature, it was found that there is a significant lack of data regarding the mesio-distal crown

dimensions of individual permanent teeth of Egyptian children. Consequently, this study was conducted as a part of a project implemented in most Egyptian governorates to collect data on the mesiodistal width of permanent mandibular incisors, maxillary and mandibular canines, and premolars in a group of Egyptian children in **PortSaid** governorate.

Materials and Methods

I.Study design:

This study is a cross-sectional study performed on a sample of Egyptian adolescent from PortSaid governorate.

II. Sample size calculation:

Statistical analysis was done using statistical package for social sciences, version21.0 (SPSS, IBM) For Windows. Continuous variables was analyzed as mean values ± standard deviation (SD) or median (range) as appropriate. Percentages will be calculated for categorical data. It was found that a minimum sample size of 384 will be satisfactory to achieve 95 % confidence interval.

III. Study sampling:

The sample was collected from four different places in PortSaid governorate; the first place was Al-Salam Hospital, the second place was Al-Mabarah Hospital, the third place was El-Tadamon Hospital while the fourth place was Al-Zohour Hospital. The sample of the study are 384 Egyptian adolescents (209 boys and 175 girls), between the ages of 12 and 15. All participants were randomly selected and most of them were accompanying patients seeking dental treatment.

Eligibility criteria:

Inclusion criteria:

1. The age of the patient between 12-15 years.

2. A complete set of permanent Dentition from the left first permanent molar to the right first permanent molar.

3. Their dentitions are free from any apparent orthodontics problem.

4. Their teeth were free from proximal caries.

5. Patients who do not have any systemic disease which may affect tooth development.

6. Acceptance of patient's parent / guardian to participate in the study.

Exclusion criteria:

1. Any sensitivity or negative reactions to any of the materials used.

2. The patient is unable to give informed consent.

Ethical consideration:

The Ethics Committee of the Faculty of Oral and Dental medicine, Cairo University approved the current study. The permission letter explaining the purpose of the study was submitted to the bureau of the Ministry of Health in

PortSaid governorate. Informed consent was obtained from all volunteers and their parents.

1. Equipment and Materials:

- Dental chair.
- Full diagnostic instruments.
- Perforated plastic stock trays (disposable) size 2 or 3, depending on the arch size.
- Irreversible hydrocolloid impression material (Zhermack hydrogum alginate, Zhermack Fast Set, Germany).
- Rubber bowl and spatula.
- Water.
- Full infection control kit (napkins, over-gloves, latex gloves, face shield, alcohol based disinfectant spray (Unisepta Plus, Switzerland) and a plastic bag for every impression).
- Dental stone type III (elite dental stones, Italy).
- Electronic digital caliper. A vernier gauge* calibrated with digital micrometer with accuracy of ±0.02 mm. The measuring beaks were sharpened to facilitate proper fit in the dental embrasures and tightly contacted teeth to measure the M-D widths of each tooth correctly. The display can be switched from 'mm' to 'inches' and has the function of zeroing the display at the beginning or anywhere along the slide. The slide of the digital caliper may also be locked using a lever or thumb screw.

IV.Clinical examination:

It was carried out on dental chair and sterilized examination sets were used: Dental mirror and Explorer no. 23. Upper and lower impressions were taken with suitable perforated plastic trays with high flanges and the alginate impression material was mixed according to the manufacturer's instructions. Each impression was poured immediately in stone plaster, which was mixed according to manufacturer's instructions. Then trimmed in the dental lab. A vernier gauge calibrated with digital micrometer with accuracy of ±0.02 mm whose measuring beaks were sharpened to facilitate proper fit in the dental embrasures and tightly contacted teeth to correctly measure the M-D widths of each tooth.

The data were recorded:

1. Mesiodistal width of four mandibular incisors, mandibular canines and premolars.

2. Mesiodistal width of maxillary canine and premolars. The procedures for measuring the mesiodistal tooth width were performed as described by Hunter and Priest 1960 using digital display caliper as the sliding caliper was adjusted to the greatest mesiodistal diameter of the teeth, parallel to the occlusal surface, and perpendicular to the long axis with the digital caliper entering the interproximal area.

All measurements were taken independently three different times by the same operator and average of three values was taken into consideration to rule out the individual measurement error.

V.Statistical methods:

- Data management and analysis were performed using the Statistical Package for Social Sciences software, and the same program was used to detect the degree of accuracy of Tanaka and Johnston's equation and newly formed equations by applying the newly formed equations and Tanaka and Johnston's equation to the studied samples.

- The figures and graphs of the data obtained were then generated using Microsoft Excel.

- Numerical data were summarized using means and standard deviations or averages and ranges. Categorical data were summarized as percentages. Data for normality were explored using the Kolmogrov- Smirnov test and the Shapiro-Wilk test. Exploration of the data revealed that the collected values were normally distributed.

- Gender comparisons were made using the Student's t-test. To assess the degree of association between the different measurements, the Pearson's correlation coefficient was calculated. All p-values were two-sided. p-values< 0.05 were considered significant.

Results

Gender distribution over each age range:

The number of female subjects who were 12>13 ,13>14, 14>15, 15>16 years old were 44, 40, 48 and 43, respectively.

The number of male subjects who were 12>13 ,13>14, 14>15, 15>16 years old were 40, 57, 158, 54 respectively.

The age distribution of participants included in the present study:

The number of subjects who were between 12 and 13 years old were 82, the number of subjects who were between 13 and 14 years old were 97, the number of subjects who were between 14 and 15 years old were 104, and the number and of subjects who were between 15 and 16 years old were 97

The gender distribution of participants included in the present study:

The number and percentage of female subjects were 175 (45 %), while the number and percentage of male subjects were 209 (55 %).

The mean mesiodistal widths of the studied teeth (mandibular incisors and maxillary and mandibular canines and premolars) for females:

Student's t-test was used to compare the mean mesiodistal between the right and left side within each type of tooth measured in this study. Lower right centrals were found to have a significantly higher mean mesiodistal compared to the lower left centrals in female patients participating in this study($P<0.001$), the same finding was found for the lower lateral and second premolar (p value 0.008,0.026 respectively). There was no statistically significant difference in the mean mesiodistal width of lower right and left canine and first premolar for the female patients participating in the current study.

Regarding the maxillary teeth, a statically significant difference was found in all teeth measured between the right and the left side, left canines were found to be presented in **Table (1).**

bigger ($p<0.001$), where right first and second premolars were found to be significantly larger ($P<0.001$). As

Table (1): The mean mesiodistal widths in mms for all teeth under study for females

	Female				**p-value**
	Right side		**Left side**		
Teeth	**Mean**	**±SD**	**Mean**	**±SD**	
$\overline{1}$	5.13	0.65	4.98	0.48	<0.001*
$\overline{2}$	5.30	0.55	5.26	0.62	0.008*
$\overline{3}$	6.75	0.63	6.72	0.46	0.4
$\overline{4}$	6.91	0.56	6.86	0.72	0.38
$\overline{5}$	7.14	0.49	7.21	0.70	0.026*
3	7.26	0.71	7.44	0.71	<0.001*
4	7.52	0.46	7.34	0.44	<0.001*
5	7.14	0.55	6.98	0.46	<0.001*

The mean mesiodistal widths of the studied teeth (mandibular incisors and maxillary and mandibular canines and premolars) for males:

Among male subjects, the mean mesiodistal tooth width and standard deviation values of lower right 1, 2, 3, 4 and 5 were 5.08± 0.59 mm, 5.34 ± 0.60 mm, 6.74 ± 0.58 mm, 6.88 ± 0.52 mm and 7.13 ± 0.45 mm, respectively; the mean of mesiodistal tooth width standard deviation of upper right 3, 4 and 5 were 7.24 ± 0.75 mm, 7.51 ± 0.51 mm and 7.17 ± 0.52 mm, respectively. Also, the mean mesiodistal tooth width and standard deviation values of lower left 1, 2, 3, 4 and 5 were 4.99 ± 0.44 mm, 5.24 ± 0.62 mm, 6.81 ± 0.51 mm, 6.90 ± 0.63 mm and 7.07 ± 0.66 mm, respectively; The mean of mesiodistal tooth width standard deviation of upper left 3, 4 and 5 were 7.44 ± 0.79 mm, 7.33 ± 0.49 mm and 6.98 ± 0.47 mm, respectively. As presented in **Table (2)**.

Table (2): The mean mesiodistal widths in mms for all teeth under study for males:

	Male				p-value
	Right side		Left side		
Teeth	Mean	±SD	Mean	±SD	
$\overline{1}$	5.08	0.59	4.99	0.44	0.001*
$\overline{2}$	5.34	0.60	5.24	0.62	<0.001*
$\overline{3}$	6.74	0.58	6.81	0.51	0.018*
$\overline{4}$	6.88	0.52	6.90	0.63	0.75
$\overline{5}$	7.13	0.45	7.07	0.66	0.08
3 $\overline{\quad}$	7.24	0.75	7.44	0.79	<0.001*
4 $\overline{\quad}$	7.51	0.51	7.33	0.49	<0.001*
5 $\overline{\quad}$	7.17	0.52	6.98	0.47	<0.001*

The mean mesiodistal widths of the studied teeth (mandibular incisors and maxillary and mandibular canines and premolars) for both genders:

The mean mesiodistal tooth width and standard deviation values of lower right in females1, 2, 3, 4 and 5 were 5.13 ± 0.65 mm, 5.30 ± 0.55mm, 6.75 ± 0.63mm, 6.91 ± 0.56 mm and 7.14 ± 0.49 mm, respectively; the mean mesiodistal tooth width standard values of upper right 3, 4 and 5 were 7.26 ± 0.71mm, 7.52 ± 0.46 mm and 7.14 ± 0.55 mm, respectively. AS presented in (Table 3).

The mean mesiodistal tooth width and standard deviation deviation values of lower left 1, 2, 3, 4 and 5 were 4.98 ± 0.48 mm, 5.26 ± zero point 62 mm, 6.72 ± 0.46 mm, 6.86 ± 0.72 mm and 7.21 ± 0.70 mm, respectively; The mean mesiodistal tooth width standard deviation values of upper left 3, 4 and 5 were 7.44 ± 0.71 mm, 7.34 ± 0.44 mm and 6.98 ± 0.46 mm, respectively.

The mean mesiodistal tooth width and standard deviation values of lower right in females1, 2, 3, 4 and 5 were 5.08 ± 0.59 mm, 5.34 ± 0.60mm, 6.74 ± 0.58 mm, 6.88 ± 0.52 mm and 7.13 ± 0.45 mm, respectively; the mean mesiodistal tooth width standard deviation values of upper right 3, 4 and 5 were 7.24 ± 0.75 mm, 7.51± 0.51 mm and 7.17 ± 0.52 mm, respectively. The mean mesiodistal tooth width and standard deviation values of lower left 1, 2, 3, 4 and 5 were 4.99 ± 0.44 mm, 5.24 ± 0.62 mm, 6.81 ± 0.51 mm,

6.90 ± 0.63 mm and 7.07 ± 0.66 mm, respectively; The mean mesiodistal tooth width standard deviation values of upper left 3, 4 and 5 were 7.44 ± 0.79 mm, 7.33 ± 0.49 mm, and 6.98 ± 0.47 mm, respectively.

Comparison between the mean mesiodistal dimension of the teeth measured in this study in the right and left side for both males and females showed that only the lower second premolar showed a statically significant difference between the right and left side (p 0.04) while the rest of the teeth did not show any significant difference between the right and the left side.

Also, no significant difference was reported between the mean mesiodistal width of all teeth between males and females regarding each side.

Table (3): The mean mesiodistal widths in mms for all teeth under study for males and females.

	Right side				P1	Left side				P2
	Female		Male			Female		Male		
Teeth	Mean	±SD	Mean	±SD		Mean	±SD	Mean	±SD	
$\overline{1}$	5.13	0.65	5.08	0.59	0.44	4.98	0.48	4.99	0.44	0.85
$\overline{2}$	5.30	0.55	5.34	0.60	0.52	5.26	0.62	5.24	0.62	0.81
$\overline{3}$	6.75	0.63	6.74	0.58	0.86	6.72	0.46	6.81	0.51	0.1
$\overline{4}$	6.91	0.56	6.88	0.52	0.6	6.86	0.72	6.90	0.63	0.62
$\overline{5}$	7.14	0.49	7.13	0.45	0.81	7.21	0.70	7.07	0.66	0.04*
$\underline{3}$	7.26	0.71	7.24	0.75	0.77	7.44	0.71	7.44	0.79	0.96
$\underline{4}$	7.52	0.46	7.51	0.51	0.76	7.34	0.44	7.33	0.49	0.76
$\underline{5}$	7.14	0.55	7.17	0.52	0.57	6.98	0.46	6.98	0.47	0.98

Correlations:

1. Among males:

A) Results showed a statically significant positive correlation between the sum of the mesiodistal width of upper right canine and premolars & the sum of the

mesiodistal width of the lower incisors at r 0.603, p value 0.001

B) Results showed a statically significant positive correlation between the sum of the mesiodistal width of upper left canine and premolars & the sum of the mesiodistal width of the lower incisors among males at r 0.63, p-value 0.001

C) Results showed a statically significant positive correlation between the sum of the mesiodistal width of lower right canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.80, p value <0.001

D) Results showed a statically significant positive correlation between the sum of the mesiodistal width of lower left canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.74, p value <0.001.

2. Among Females:

A) Results showed a statically significant positive correlation between the sum of the mesiodistal width of upper right canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.658, p value <0.001.

B) Results showed a statically significant positive correlation between the sum of the mesiodistal width of upper left canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.66, p value <0.001.

C) Results showed a statically significant positive correlation between the sum of the mesiodistal width of lower right canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.84, p value<0.001.

D) Results showed a statically significant positive correlation between the sum of the mesiodistal width of lower left canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.87, p value <0.001.

3. For both genders combined:

A) Results showed positive correlation between the sum of the mesiodistal width of upper right canine and premolars & the sum of the mesiodistal width of the lower incisors for both genders combined at r 0.63 p value <0.001.

B) Results showed a positive correlation between the sum of the mesiodistal width of upper left canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.65, p value <0.001.

C) Results showed a positive correlation between the sum of the mesiodistal width of lower right canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.83, p value <0.001.

D) Results showed a positive correlation between the sum of the mesiodistal width of lower left canine and premolars & the sum of the mesiodistal width of the lower incisors at r 0.81, p value<0.001.

Regression equation for prediction of mesiodistal width of permanent canine and premolars to the studied samples.

Calculation of this prediction equation was based on the correlations between the sums of the mandibular incisors and the sums of canine and premolars in both arches as similar to Ling & Wong, 2006

the proposed prediction equation in the form of Y=A+B (X), where B= 0.5, and X= Combined mesiodistal width of the four lower incisors, Y= sum of mesiodistal widths of canine and premolars and A is a constant The constant (A) for maxillary arch is 12.48 for male and 12.82 for female, and for mandibular arch is 10.6 for male and 8.8 for female as shown in Table.

The new regression equations for mesio-distal widths prediction for males and females:

	Males	**Females**
Maxillary Arch	Y=12.48+0.45*x	Y=12.82+0.44*x
Mandibular Arch	Y=10.6 +0.49*x	Y=8.8+0.58*x

Degree of accuracy of Tanaka and Johnston's equation: Tanaka and Johnston's equations were applied to the studied samples, and their equations were successfully applicable inmaxillary arch for only 26% and 30% of the cases for males and females, respectively and successfully applicable in mandibular arch for 61% and 76% of the cases for males and females, respectively.

Degree of accuracy of Tanaka and Johnston's equation and newly formed equation.

	Males	**Females**
Maxillary	26%	30%
Mandibular	61%	76%
Maxillary	40%	45%
Mandibular	68%	81%

Discussion

Information concerning tooth size and arch dimensions in humans is of great importance to clinicians in diagnosing as well as treatment of malocclusion. Moreover, it is of interest to anthropologist and other researchers of human biology, a close review of the literature reveals the diversity of tooth size among different races and different sexes. Despite the considerable odontometric data on several population have been reported in the literature, there were few reports on dentition of the Egyptian population.

This study was designed with the purpose of generating normative data regarding the mesiodistal tooth width of a sample of children in **Port said** governorate, which will be helpful to overcome obstacles which may be faced in different fields of dentistry (Orthodontics, Pediatric dentistry, Prosthodontics and Oral surgery).

The age range chosen was from 12 to 15 years to ensure that all teeth included in the study had erupted, and to minimize the possibility of alterations in the dimensions of the mesio-distal teeth due to factors, such as; attrition, proximal restoration or caries. This age was also selected by other authorsThis age was also selected by other authors like Al Sulaimani & Afify, 2006, Hussein et al., 2009, Uysal et al., 2009, Paredes et al., 2011, Manjula 2013, Durgekar & Naik, 2013; Asiry et al., 2014**.** [10][3][11][12][13][14][15].

Other authors focused on older ages and wider age ranges like Suazo et al., 2008 who focused on age group from 18 to 24[2]. Alam et al., 2014 who chose the age group range from 16 to 35[4]. Sherpa J ,2015 selected a total of 130 subjects aged 16-21 years[16]. Mesiodistal tooth width was measured using Digital calipers

The sample was selected according to Angle's class I occlusion without crowding. It was demonstrated that clinically significant measurement errors can occur on casts with more than 3mm crowding**.** Only subjects with no proximal caries or restorations were included for the present study. Which would possibly underestimate

the actual tooth sizes of the population [18].

The procedures for measuring the mesiodistal tooth width were performed as described by Hunter and Priest[19]. The sliding caliper was adjusted to the largest mesiodistal diameter of the teeth, parallel to the occlusal surface, and perpendicular to the long axis with the digital caliper entering the interproximal area and then the distance between the contact points on proximal surfaces was measured. This method of measurement was adapted by many researchers like Gamal et al. [20]**.** All the measurements were performed by single examiner to eliminate inter-operator error [21][22].

The width of the mesiodistal crown was measured with the help of digital sharp caliper due to its ease of use, as it does not require a professional expert [23]. The caliper with a digital display used in the present study has greatly reduced eye fatigue and reading error, so that the method error of the present study was found to be smaller or comparable with that determined by other authors who used a non-digital boleys gauge like Hixon and Oldfather, 1958 [24]. It was confirmed that there are unavoidable systematic and experimental errors when measuring the mesiodistal tooth width by manual Boley gauge caliper, these errors were attributed to the difficulty in placing the caliper tip points at the same exact place each time [25].

The measuring beaks of the caliper used in the present study were sharpened to facilitate proper fit in the dental embrasures and tightly contacted teeth [23][25].

Hunter and Priest mentioned that there are significant advantages in the measuring teeth over dental cast rather than measuring them directly from the mouth [19]. Dental casts reveal fine details and have high strength properties. The measurement of the mesio-distal width of the teeth on the study casts is more convenient and accurate than the intraoral measurement [26]. Nevertheless, other authors measured teeth directly in patient's mouths [27]

The results of this study showed that there were no statistically significant differences between boys and girls in maxillary and mandibular teeth except for the lower second premolar showed a statically significant difference in the right and left side, while the rest of the teeth did not show any significant difference in the right and the left side. This was supported by previously published studies on the sizes of teeth in different populations as Yuen et al., 1997 [28]. Kaddah, 1998, Nie and Lin, 1999 and Al-Janabi, 2005 their findings concluded that sexual dimorphism for teeth size did not exist. The differences may be due to genetic variation between individuals as genetically the populations are different [29][30][31].

The results of the present study showed a positive correlation between the total mesiodistal width of canine

and premolars, as well as the total of the mesiodistal width of the lower incisors among males, females and both genders combined These findings were in line with Tanaka & Johnston, 1974; Moyers, 1988; Bishara et al., 1989; Hammad and Abdellatif, 2010; Hamdy, 2015[32][33][34][22].

Tanaka and Johnston's prediction equation was applied to the studied samples, and it was applied successfully to only 26% and 30% for the maxillary arch of the male and female cases, respectively and 61% and 76% for the maxillary arch of the male and female, respectively. This was similar with the findings of Bishara, 1989; Zaid et al., 2008 [34][36].

The results of this study showed that there was a positive correlation between the sum of the mesiodistal width of canine and premolars & the sum of the mesiodistal width of the lower incisors among males, females and both genders combined and this was in accordance with Tanaka & Johnston, Moyers, 1988; this was supported by Hamdy, 2015; [32][33][22].

Due to the low educational level of the candidates in the chosen places, many children were excluded because of the high incidence of proximal decay which interfer with the measurement of the mesiodistal width

of the teeth. Many of the children were relatives, which may indicate that the genetic background played the upper hand of the results of the study.

Conclusion

From the results of the current study, the following conclusions were made:

1) The mesiodistal width of the upper and lower canines as well as the premolars can be predicted by measuring the mesiodistal width of the lower incisors due to the positive correlation between them.

2) No sexual dimorphism between boys and girls except for only the lower second premolar showed a statically significant difference between the right and left side.

3) statistically significant differences between the right and left sides in females and males.

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