

# AVERAGE TOOTH SIZE IN SOUTH JORDANIAN POPULATION

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## ABSTRACT

*The aim of this study was to establish the mesiodistal tooth width of permanent teeth among South Jordanian population and to compare it with previous studies in the region. 621 patients were examined, 543 patients fulfilled the requirement used in the studies with average age  $14.01 \pm 0.97$ . Alginate impressions were taken for all patients and were poured in the same day by an orthodontic technician. All teeth were measured by electronic digital caliper and descriptive statistics were used to analyse the data.*

*Upper maxillary permanent lateral incisors and mandibular permanent central incisors showed greatest variations in the mesiodistal width. On the contrary permanent canines and maxillary 1st premolars showed most stability in the mesiodistal width.*

*This study will help in orthodontic research, diagnosis and analysis of spaces during orthodontic assessment in addition to the uses in anthropology and forensic dentistry.*

**Key Words:** South Jordan, Tooth size.

## INTRODUCTION

Success of orthodontic treatment is based on proper diagnosis, correct interpretation of all the orthodontic findings, established treatment plan, stable interdigitation and achieving better prediction of orthodontic treatment outcomes.<sup>1-4</sup> The knowledge of the average mesiodistal width will help to determine and guide for reshaping and recontouring of the teeth especially anterior teeth and smile design in different malocclusions and gender to obtain the satisfactory results.<sup>5-7</sup> The size of teeth can vary between different races and gender.<sup>4,8-9</sup> This can affect the treatment process and may complicate the case in the end. As a result, majority of research has been done with the aim of understanding the relation between types of malocclusion and the size of the teeth and to compare it to the jaw size.<sup>10</sup> Wide range of patients might be seeking higher level of orthodontic treatment.<sup>11</sup>

The aim of this study was to establish a mean mesiodistal measurement of teeth in south Jordanian population and to compare it to previous studies done in Middle of Jordan and in the same region and also to find out which teeth were mostly affected.

Since tooth size discrepancies among different sexes and racial groups is important in orthodontic planning, it is therefore important to know the optimum tooth size among men and women so that we can identify disproportion between the lower and the upper teeth in different orthodontic treatment stages which will produce better treatment and diagnostic results.<sup>12</sup>

## METHODOLOGY

The study was conducted at the beginning of the year 2015 and received approval from Royal Medical Services Ethical Committee. The study employed a cross sectional study method that targeted population in South of Jordan in Aqaba, Tafela and Karak cities. 621 students formed the study group who have been selected from different public and private schools in the cities. Alginate impressions were taken for all participants with full photographs. All impressions were poured by orthodontic technician the same day. The selection criteria used were; South Jordanians with Jordanians ancestry, with full erupted permanent teeth only measured, with no mesiodistal restoration,

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TABLE 1: FREQUENCY AND AGE OF PARTICIPANTS

Gender	Frequency n= participant	Percentage		Age	
		Total %	Included %	Average (year)	SD
Male	130	20.9%	23.9%	14.9	0.89
Female	413	66.5%	76.1%	13.7	0.81
Total (included)	543	87.4%	100%	14.0	0.97
Excluded	78	12.6%			
Total	621	100.0%			

TABLE 2: MAXILLARY MEANS, STANDER DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF THE INDIVIDUAL TOOTH WIDTH FOR BOTH SEXES (VALUES IN MILLIMETERS), COEFFICIENT OF VARIATION OF INDIVIDUAL TOOTH WIDTH (COV)

Tooth		n	Mean	SD	Min	Max	CoV %
UR	I1	543	8.14	0.56	5.5	10.0	6.88%
	I2	537	6.37	0.67	4.0	8.5	10.52%
	C	434	7.34	0.41	6.0	8.5	5.59%
	P1	507	6.91	0.40	5.0	8.0	5.79%
	P2	455	6.86	0.41	5.0	9.0	5.98%
	M1	539	10.27	0.70	7.0	13.0	6.82%
	M2	301	9.72	0.70	8.0	11.0	7.20%
UL	I1	542	8.14	0.57	6.5	10.0	7.00%
	I2	537	6.37	0.68	3.5	8.5	10.68%
	C	434	7.36	0.41	6.0	9.0	5.57%
	P1	507	6.90	0.38	5.5	8.0	5.51%
	P2	453	6.85	0.42	5.0	9.0	6.13%
	M1	532	10.28	0.72	7.0	13.0	7.00%
	M2	289	9.72	0.68	7.5	11.5	7.00%

TABLE 3: MANDIBULAR MEANS, STANDER DEVIATIONS, MINIMUM AND MAXIMUM VALUES OF THE INDIVIDUAL TOOTH WIDTH FOR BOTH SEXES (VALUES IN MILLIMETERS), COEFFICIENT OF VARIATION OF INDIVIDUAL TOOTH WIDTH (COV)

Tooth		n	Mean	SD	Min	Max	CoV %
LR	I1	535	5.38	0.53	4.0	7.0	9.85%
	I2	540	5.56	0.53	4.0	7.0	9.53%
	C	518	6.83	0.40	5.5	8.0	5.86%
	P1	511	6.56	0.45	5.0	8.0	6.86%
	P2	436	6.59	0.55	5.0	11.0	8.35%
	M1	530	10.81	0.76	6.5	12.5	7.03%
	M2	377	10.15	0.73	8.0	12.0	7.19%
LL	I1	538	5.38	0.53	4.0	7.0	9.85%
	I2	541	5.55	0.52	4.0	7.0	9.37%
	C	513	6.83	0.37	5.0	8.5	5.42%
	P1	513	6.51	0.43	5.0	8.0	6.61%
	P2	441	6.53	0.48	5.0	8.5	7.35%
	M1	532	10.84	0.75	6.0	12.5	6.92%
	M2	370	10.07	0.68	8.0	12.0	6.75%

with no proximal caries, abrasion or restorations and a participant who have no ongoing or previous orthodontic treatment and has no abnormal tooth morphology.<sup>13</sup>

Only 543 subjects met the inclusion criteria who were included in the study. Among the 543 selected participants for the study, there were 130 males and 413 females. The participants mean age was  $14.01 \pm 0.97$  year. An electric digital caliper (Mitutoyo, Japan) was used in this study to measure the participants' mesiodistal tooth widths to the nearest 0.01 mm.<sup>14-15</sup> All the measurements were carried out by one examiner for a span of one month during which 25 casts were randomly chosen in order to eliminate measurements error. Data were entered and coded using statistical package for the social sciences software (SPSS version 17.0, Chicago, IL, USA) program for data processing and analysis. Chi square test for assisting the association between variable with P value set  $<0.05$  to be considered as statistical significant.

## RESULTS

Table 1 show the total sample used in the study. 621 participants (476 female and 145 male). The final sample that met the inclusion criteria was 543 among whom 413 were female (76.1%) and 130 were male (23.9%) with average age  $14.02 \pm 0.97$ .

Table 2 demonstrates mean mesiodistal width of all maxillary teeth for both sexes, the result showed that the value in the right and left side were symmetrical or very close. Coefficient of variation (CoV) of individual tooth width in upper arch showed the most upper permanent lateral incisor (upper left permanent lateral incisor), and least in upper 1st premolar (upper left 1st premolar) followed by upper permanent canines.

Table 3 demonstrates mean mesiodistal width of all mandibular teeth for both sexes, the result showed that the value in the right and left side were very close. Coefficient of variation (CoV) of individual tooth width in lower arch showed greatest with lower permanent central incisors, and least in lower permanent canine (lower left permanent canine).

The Coefficient of variation (CoV) of individual tooth width in both arches was least in canines but it increased in upper permanent lateral incisors followed by lower permanent central incisors in incisors group, and increased in lower 2nd premolar in premolar group. But not much difference was noted among molar groups.

## DISCUSSION

Reports indicate that the best period of obtaining accurate tooth size measurement is in the early adulthood dentition since during this period the individual has less attrition and fewer dental damages.<sup>16</sup> As a

result, the average ages included in this study were individuals between the age of 12 and 16 years so as to minimize the influence of attrition, damages and other factors on the actual size of the tooth.<sup>2</sup>

Measurements of mesiodistal width of the teeth could be one of the difficulty which may face the researchers. This is due to adjacent and tight contact between the teeth and lack of accessibility even using caliper or divider. Maximum convexity some time could not be co-incidence with distance from contact point from distal side to the mesial side. The distance between these two surfaces could be defined as width<sup>17</sup> or diameter<sup>18-19</sup> or breadth<sup>20-21</sup> Moorrees<sup>19</sup> used term crown length as synonymous with mesiodistal teeth diameter, length nor breadth can be used as term for description mesiodistal distance due to possibility of misleading. Two way for taking measurement direct and indirect method, some authors (Hunter and Priest) found that there is an exaggerated measurement with an average of 0.1 mm larger than actual tooth size.<sup>22</sup> On the other hand other author (Lundstrom) applied two methods (direct and indirect) on measurement of anterior teeth and found no significant difference but he did not apply it on posterior teeth.

For that measuring direct on the cast considered one of the best reliable method to have easiest and most accurate measurement of teeth, taking alginate impressions with appropriate manufactural mixing instructions and examine the impressions for any defect then pour it directly to minimize shrinkage and distortion which could happen during setting of stone. Mean of tooth size of teeth of south Jordanian population was found smaller in size of all teeth with exception of upper 2nd premolar in upper arch compared with Middle of Jordan -Al-Omari et al.<sup>23</sup> Also smaller with exception of upper 2nd premolar in upper arch and lower permanent canine in lower arch in comparable to Saudi population values in study by Murshid et al (upper 2nd molar was not included).<sup>13</sup>

The variability in size of the teeth was studied by the means of coefficient of variation (CoV) which ranged between 5.42% for the mean mesiodistal tooth width of mandibular left canine to 10.68 maxillary left lateral incisor. This is disagreed by Murshid et al<sup>13</sup> which showed greatest in lower right permanent central incisors and maxillary right lateral incisors and least in maxillary left 1st molars. Maxillary lateral incisors and mandibular permanent central incisors showed the greatest variation. This is agreed with Lundstrom<sup>24</sup>, Lunt<sup>25</sup> Barrett et al<sup>26</sup>, Axelsson and Kirveskari<sup>27</sup>, most stable size with permanent canines and upper 1st premolar who disagreed with previous studies.<sup>24-27</sup> However, no significant statistical difference was noted between different malocclusion classes.<sup>28</sup>

Al Omari showed statistically significant relation between gender and mean tooth size of most of teeth, but no statistical significance in the relation to both sides.<sup>23</sup>

## CONCLUSION

The results obtained in this study provide useful clinical information for orthodontic practice since they provides the mean mesiodistal tooth size width which help in diagnosis and treatment planning and thus help in achieving good results in orthodontic treatment, in addition to it's usefulness in forensic dentistry and anthropology.

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