

Mesiodistal crown dimension and tooth size ratio of the permanent dentition in Cl. I malocclusion sample with spacing in the upper and lower jaws

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Abstract:

A proper relationship of the total mesiodistal width of the maxillary dentition to that of the mandibular dentition will favor an optimal post treatment occlusion, the purpose of this study is to obtain information of the mesiodistal crown dentition and tooth size discrepancy in subject with Cl. I Angle malocclusion with spacing in the upper and lower arches. 30 pairs of dental casts were obtained (15 males, 15 females) were measured and analyzed, the results indicates no significant difference between right and left sides, and non significant regarding tooth size analysis (Bolton ratio) between males and females, sexual dimorphism was found regarding mesiodistal crown dimension with greater mean values for males.

Keywords:

Total mesiodistal width of maxillary and Mandibular dentition, Cl I Angle malocclusion.

Introduction:

The mesiodistal dimensions of permanent teeth are of great importance in space analysis, treatment planning and eventually the end result of the orthodontic treatment⁽¹⁾.

The crown size of the teeth especially the mesiodistal is one of the significant attribute of the normal occlusion and it is important to study the dental characteristics of the population so as to trace the on going process of evolutionary trend⁽²⁾.

The Bolton analysis^(3,4) based on the ratios between the mesiodistal tooth diameter sums of the mandibular and the maxillary dentitions, remains the most recognized and widely used method for detecting interarch tooth size discrepancies^(5,6).

Treatment plane should always take into consideration a discrepancy of the tooth size ratios and should include compensating esthetic procedures such as composite bonding and prosthetic reconstruction and stripping and crown rebuilding⁽⁷⁾.

This study is done to compare mesiodistal crown diameter between both genders and both sides of the arches, and comparison of anterior and overall ratio (Bolton ratio) between both genders in Cl.I malocclusion with spacing in the upper and lower anterior teeth.

Materials and method:

The data for this study was obtained from dental cast measurement, the sample of this study consisted of 30 patients (15 males and 15 females) with

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CI.I malocclusion complaining of spacing in the upper and lower anterior teeth. They were selected from patients attending the orthodontic clinic in the college of dentistry, University of Baghdad all the patients were Iraqi adult patients with an age range of 18-25 years old. They have full complement of permanent dentition excluding the third molars and they have bilateral CI.I molar and canine classification. Measurements were made directly on the dental casts, which were taken using alginate impression materials and poured with plaster of Paris. The greatest mesiodistal measurement were taken from the greatest mesiodistal width of the teeth from the anatomic mesial contact area to the anatomic distal

contact area to the nearest 0.1 mm by mean of sharp end vernier with sharpened peaks parallel to the long axis of the crown.

Bolton tooth size ratios were applied as follow.

Overall ratio = $\frac{\text{Sum mandibular "12"}}{\text{Sum maxillary "12"} \times 100}$

Anterior ratio = $\frac{\text{Sum mandibular "6"}}{\text{Sum maxillary "6"} \times 100}$

Statistical analysis was done using SPSS program with t-test.

Results:

Our study shows that there is a non-significant difference between the left and right side of maxillary and mandibular teeth in male and female and total sample (table-1).

Table (1): Comparison between the left and right sides.

Tooth	mean		S.D.		T-value	p-value
	right	left	right	left		
U1	8.563	8.607	0.472	0.453	0.36	0.72(NS)
U2	6.687	6.667	0.502	0.446	0.16	0.87(NS)
U3	7.707	7.650	0.556	0.543	0.40	0.69(NS)
U4	7.007	7.00	0.265	0.267	0.10	0.92(NS)
U5	6.947	7.017	0.311	0.282	0.26	0.80(NS)
U6	10.393	10.387	0.377	0.384	0.07	0.95(NS)
L1	5.483	5.477	0.368	0.356	0.07	0.94(NS)
L2	6.050	6.043	0.415	0.378	0.07	0.95(NS)
L3	6.817	6.760	0.326	0.416	0.59	0.56(NS)
L4	7.027	7.013	0.300	0.283	0.18	0.86(NS)
L5	7.137	7.147	0.359	0.344	0.11	0.91(NS)
L6	10.760	10.870	0.94	0.481	0.57	0.57(NS)

U=upper , L= lower , NS= not significant

Table-2 shows that males have significantly greater mesiodistal width in

most of the teeth in the upper and lower jaws.

Table (2): Comparison of the left and right sides between males and females

Tooth	side	mean		S.D.		T-value	p-value
		male	female	male	Female		
U1	R	8.700	8.427	0.477	0.442	1.63	0.11(NS)
	L	8.713	8.500	0.475	0.417	1.31	0.20(NS)
U2	R	6.953	6.420	.304	0.527	3.40	0.0026*
	L	6.927	6.407	0.308	0.415	3.90	0.0006*
U3	R	8.080	7.333	0.428	0.389	4.94	0.0001*
	L	8.013	7.287	0.452	0.350	4.92	0.0001*
U4	R	7.087	6.927	0.314	0.183	1.71	0.10(NS)
	L	7.093	6.907	0.279	0.225	2.02	0.054*
U5	R	7.193	6.800	0.225	0.259	4.44	0.0001*
	L	7.173	6.86	0.228	0.244	3.63	0.0012*
U6	R	10.613	10.173	0.236	0.367	3.90	0.0007*
	L	10.607	10.167	0.281	0.350	3.80	0.0008*
L1	R	5.660	5.307	0.350	0.301	2.96	0.0063*
	L	5.64	5.313	0.331	0.309	2.79	0.0095*
L2	R	6.193	5.907	0.356	0.432	1.99	0.057*
	L	6.180	5.907	0.336	0.379	2.09	0.046*
L3	R	6.980	6.653	0.234	0.329	3.13	0.0044*
	L	6.987	6.533	0.261	0.424	3.53	0.0018*
L4	R	7.147	6.907	0.295	0.263	2.35	0.026*
	L	7.133	6.893	0.269	0.249	2.53	0.017*
L5	R	7.180	7.093	0.371	0.353	0.66	0.52(NS)
	L	7.173	7.120	0.339	0.359	0.42	0.68(NS)
L6	R	10.83	10.693	1.26	0.489	0.38	0.71(NS)
	L	11.120	10.620	0.310	0.499	3.30	0.0031*

U=upper , L= lower , NS= not significant , *= Statistically significant

Table-3 shows that there was non-significant difference in both males and females, when Bolton ratios were

used regarding the anterior and overall ratios.

Table (3): Comparison of overall and anterior ratios between males and females.

Tooth ratio	male		female		T-value	p-value
	mean	S.D.	mean	S.D.		
Overall ratio	90.70	2.93	92.12	2.06	1.51	0.15(NS)
Anterior ratio	79.38	4.07	80.26	1.91	0.74	0.47(NS)

U=upper , L= lower , NS= not significant

Discussion:

There was non-significant difference between the left and right side which may be due to the presence of the same genetic and environmental factors the affect a tooth will affect its antimeres⁽⁸⁾, which agrees with other studies^(9,10).

Some authors⁽¹¹⁾ believed that the inheritance of mesiodistal diameter and dental occlusion is according to polygenic system where the action of many genes together with environmental factors will give the final result (phenotype) of the dental trait.

The findings in this study indicated the presence of sexual dimorphism, generally males' possess a greater mean values than that of females, the exact reason laying behind this is not well understood however sex-linked inheritance and sex-hormonal influences were suggested⁽¹²⁾ which comes in agreement with other results^(13,14).

Sexual dimorphism for the tooth size ratios does not exist which agree with⁽¹⁵⁾ and this may be due to the fact that not all the teeth revealed significant difference between males and females.

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