Research article

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Comparing the mesiodistal crown size of permanent teeth in male and female orthodontics patients

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Abstract

Background and objective: In orthodontics, reconstructive and aesthetic dentistry, knowing about size of teeth can help in better reconstruction. Tooth size is mainly affected by two factors of genetic and environment. The aim of this study is determination of mesiodistal size of casts prepared from permanent teeth in both sides of jaw in male and female patients.

Materials and methods: A descriptive-analytical study was conducted on 250 diagnostic alginate casts prepared from orthodontics patients. The biggest mesiodistal size, from medially anatomic contact point to distally anatomical contact point, was recorded with a digital caliper. One person did the measurements and accuracy was calculated as 0.01.

Results and conclusion: In maxillary teeth, higher size was recorded than mandibular teeth. Mesiodistal size of right canine teeth (in both jaws) and mesiodistal size of the mandibular second premolar (in both sides) in men was significantly higher than women. Total mesiodistal size of maxillary and mandibular teeth at both right and left sides in men and women was same. The results can be useful in reconstructive purposes when a natural size is required by dentists.

Keyword: Crown size, mandibular teeth, maxillary teeth, permanent teeth, sexual dimorphism

1. Introduction

Malocclusion is related to morphology and growth pattern of soft tissue and skeletal system [1]. It may be occurred as a result of abnormal teeth size, jaw disorder, and disproportionate size of teeth and jaws together. Teeth irregularity is increased by increasing their size. Knowing about normal size and shape of the teeth in both sexes helps in regulating them in curing the disorders [2]. In addition, size of teeth and eruption of third molar or wisdom teeth affect each other [3]. Importantly, finding these parameters, which are

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affected by both genetic and environmental factors, are conductive especially in reconstructive and aesthetic dentistry through which good diagnosis and appropriate treatment are feasible [4,5,6].

Several research has reported that men have bigger teeth than women that is more significant for canine teeth [7,8]. In agreement, Bishara et al. observed the most difference in canine and molar teeth [9]. Moreover, the difference is more significant in permanent teeth than deciduous teeth [10]. The sex-dependent dental size is a function of teeth enamel that is thicker in men, hormonal changes through maturation, and the X chromosome [11]. With regard to the importance of genetic and environment, researchers studied several nationalities and reported that tooth size of Jordanian is similar to Iraqi people, and bigger than those observed in other Arab nations and the Chinese [12,13].

As reported, there is no significant difference between size of the teeth at right and left sides of jaws. The most differences are observed in maxillary rather than mandible teeth especially maxillary lateral and maxillary first molar teeth, while the least difference is observed in mandibular incisor [12,14,15].

To the best of our knowledge, there is no study about teeth size of the inhabitants in Tabriz (northwest of Iran). Therefore, this study aimed to determine mesiodistal size of permanent teeth in the orthodontics patients (male and female) and compare the size in both sides of jaw.

2. Material and methods

2.1. Samples

Guideline of STROBE Checklist was used at this descriptive-analytical study [16]. Two hundred and fifty numbers of type 3 stone cast of orthodontics patients in Faculty of Dentistry of Tabriz University of Medical Sciences were evaluated. The participants were selected among inhabitants of Tabriz and aged from 13 to 25 years. Inclusion criteria of the study was complete growth of incisors, canines, premolars and first permanent molars in both jaws. The patients that were not available or had tooth caries, tooth reconstruction, proximal wearing or breakage, morphological anomalies, and distorted or improper casting were excluded.

2.2. Sample size

Sample size was calculated by Eq. 1. By considering mean difference of 0.3 between men and women, standard deviation of 0.69 in men and 0.75 in women, $\alpha = 0.05$, and power = 80%, total number of 250 was achieved [12].

$$n = \left(\frac{Z\delta}{E}\right)^2 \quad \text{Eq. 1}$$

where, n = sample size, Z = 1.96 for 95% confidence interval, δ = standard deviation, and E = desired margin of errors.

2.3. Measurement of teeth size

Determination of teeth' size in cast is more accurate than mouth directly. Therefore, we analyzed the bubble-free casts (made of alginate) prepared from the patients. Our analysis was based on measuring the biggest mesiodistal size from medial anatomical contact point to distal anatomical contact point with a digital caliper by accuracy of 0.01 [9]. The caliper was parallel to the occlusal surface. In total, maxillary and mandibular incisors, canines, premolars and first molars teeth of both sides were analyzed (n = 24).

2.4. Statistical analysis

The analyses were performed using SPSS software ver. 20. Data was analyzed by independent T-test and differences were significant at $p \leq 0.05$. The results are presented as mean ±standard deviation (SD).

3. Results and discussion

Out of 250 patients, 19.2% were male and 80.8% were female. Distribution data of the samples is presented at Table 1. As observed, data followed normal distribution.

Table 1- Statistical parameters of total mesiodistal size in orthodontics patients of Tabriz

	Maxillary right	Maxillary left	Mandibular right	Mandibular left	Right	Left	Maxilla	Mandible
Number	250	250	250	250	250	250	250	250
Kolmogorov Simonov	0.411	0.463	0.670	0.653	0.615	0.563	0.452	0.458
Significance level	0.996	0.983	0.761	0.787	0.844	0.909	0.987	0.985

Mesiodistal sizes of maxillary canine, premolar, and first molar in both sides had significant difference ($p < 0.05$). In mandibular teeth, first right and left premolar showed significant difference ($p < 0.05$), while no significant differences were observed between the others.

Comparison of the teeth at two sides of jaw showed that total mesiodistal size of the teeth at right side (89.07 mm) was similar to the amount observed at left side (89.03 mm) ($p = 0.683$) (Table 2).

Table 2- Mesiodistal size of maxillary and mandibular teeth at both sides of jaw in orthodontics patients of Tabriz

		Right side		Left side			Total	
		Mean (mm)	SD	Mean (mm)	SD	P-value	Mean (mm)	SD
Maxilla	Central	8.61	0.57	8.59	0.56	0.486	8.60	0.53
	Lateral	6.74	0.63	6.76	0.63	0.468	6.75	0.60
	Canine	7.68	0.51	7.63	0.5	0.005	7.66	0.48
	First premolar	6.91	0.49	6.96	0.49	0.018	6.93	0.46
	Second premolar	6.68	0.49	6.61	0.48	0.007	6.65	0.45
	First molar	9.98	0.53	10.05	0.55	0.005	10.01	0.51
Mandible	Central	5.32	0.44	5.33	0.44	0.763	5.32	0.40
	Lateral	5.82	0.41	5.86	0.39	0.083	5.84	0.37
	Canine	6.61	0.45	6.64	0.48	0.217	6.62	0.44
	First premolar	6.99	0.5	6.91	0.52	0.003	6.95	0.47
	Second premolar	7.03	0.52	7.05	0.55	0.548	7.04	0.49
	First molar	10.7	0.63	10.66	0.61	0.132	10.68	0.58
Total		89.07	4.35	89.03	4.33	0.683	92.05	5.78

Mesiodistal size of maxillary right canine and mandibular right canine, mandibular right second premolar and mandibular left second premolar in men was significantly more than women ($p < 0.05$). However, no significant difference was observed in total mesiodistal size of both maxillary and mandibular teeth in male and female patients at both sides (Table 3 and Figure 1). In agreement to our results, Zarringhalam did not observe significant difference in total mesiodistal size of teeth at both sides of jaw [17]. In comparison, Bishara et al. observed small difference in total mesiodistal size of both sides in Mexican and American population [9].

Furthermore, Shah et al. reported low asymmetry in left and right teeth of orthodontics patients [18]. According to Togoo et al., almost all mesiodistal size in patients of Saudi Arabia did not show significant difference between males and females except for right first permanent premolars that were significantly larger in females than males [19].

Table 3- Mesiodistal size of teeth in female and male orthodontics patients of Tabriz

		Female		Male		
		Mean (mm)	**SD**	**Mean (mm)**	**SD**	**P-value**
Maxillary Right	Central	8.58	0.57	8.75	0.52	0.055
	Lateral	6.71	0.63	6.87	0.63	0.101
	Canine	7.65	0.51	7.83	0.49	0.026
	First premolar	6.90	0.50	6.92	0.44	0.852
	Second premolar	6.66	0.50	6.75	0.43	0.241
	First molar	9.95	0.53	10.08	0.54	0.14
Maxillary left	Central	8.59	0.57	8.61	0.52	0.812
	Lateral	6.72	0.64	6.89	0.58	0.099
	Canine	7.61	0.51	7.72	0.47	0.163
	First premolar	6.96	0.48	6.96	0.50	0.963
	Second premolar	6.59	0.49	6.71	0.44	0.122
	First molar	10.03	0.56	10.14	0.52	0.203
Mandibular Left	Central	5.32	0.43	5.33	0.48	0.939
	Lateral	5.85	0.39	5.87	0.41	0.767
	Canine	6.61	0.46	6.76	0.56	0.055
	First premolar	6.88	0.53	7.03	0.46	0.077
	Second premolar	7.01	0.54	7.20	0.56	0.031
	First molar	10.63	0.62	10.77	0.56	0.157
Mandibular Right	Central	5.32	0.44	5.31	0.41	0.883
	Lateral	5.82	0.41	5.84	0.40	0.747
	Canine	6.57	0.43	6.79	0.50	0.002
	First premolar	6.97	0.50	7.08	0.48	0.147
	Second premolar	7.00	0.51	7.20	0.51	0.016
	First molar	10.70	0.65	10.73	0.55	0.732

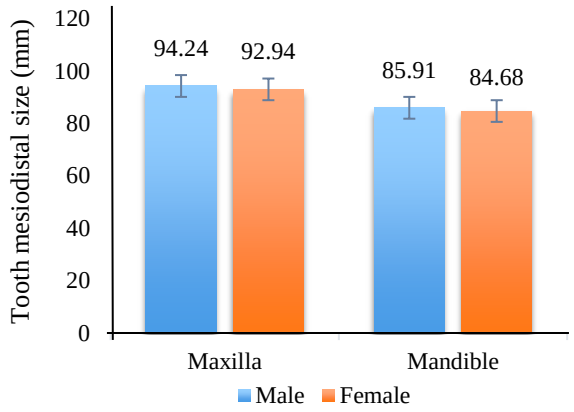

Figure 1- Comparison of total mesiodistal size of teeth at each jaw in male and female orthodontics patients of Tabriz

As reported in our results, mesiodistal size of right canine at both jaws of men was significantly higher than women. Same results were reported by Karaman [8] and Ingaleshwar et al. [20]. Kaushal et al. introduced mandibular canine as the most important tooth in sexual prognosis of Indian [21], and Iscan and Kedici introduced maxillary and mandibular canines in sexual prognosis of Turkish people [22]. To the contrary, Godousi and Fadavinia showed that sex-related differences are appropriately obse-rved in maxillary canine, mandibular canine, maxillary second premolar, and mandibular second molar, respectively [23].

Compared to our results of different mesiodistal size of both mandibular second premolars in men and women, Ghodoosy et al. did not find any difference in mesiodistal size of premolars' crown between male and female patients [24]. Doris et al. showed that despite men have bigger teeth than women, the difference is not statistically significant [25]. In agreement, Sadeghi et al. did not find any correlation between sex and teeth size [26]. However, opposite results were reported by Hattab et al. [13], Zarringhalam [17], Lombardo et al. [27], Zilberman and Smith [28], Harris and Hicks [29],

and Saunders et al. [30]. Different results of the studies might be due to the different approaches used in size determination including radiology, casts analysis or direct measurement by mechanical dissection. In addition, limitation of our study was the number of patients at each group (48 men versus 202 women) which might lead to significant results between groups especially in canines and second premolar teeth.

4. Conclusion

Our findings suggest that maxillary teeth is larger than mandibular teeth in men and women while teeth of right and left sides were similar in size. In addition, mesiodistal size of right canine at both jaws and mandibular second premolars are significantly higher in men than women.

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6. Conflict of interest

The authors declare that there is no conflicts of interest.

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