FACTA UNIVERSITATIS
Series: **Medicine and Biology** Vol.13, No 1, 2006, pp. 36 - 43 UC 616.314.3-089.23

INFLUENCE OF THE SIZE OF INCISORS ON THE OCCURRENCE OF CROWDING

Mirjana Janošević[1], Gordana Filipović[1], Saša Stanković[2], Olivera Tričković Janjić[3]

[1]Clinic of Dentistry, Faculty of Medicine, Department of Orthodontics, Niš, Serbia
[2]Clinic of Dentistry, Faculty of Medicine, Department of Prosthetics, Niš, Serbia
[3]Clinic of Dentistry, Faculty of Medicine, Department of Preventive and Pediatric Dentistry Niš, Serbia

Summary. *The size of teeth is one of the crucial factors affecting occlusion formation. In the occurrence of the crowding of dental strings, the size of teeth has a significant role. The aim of the study was to determine the influence of the size of permanent frontal teeth (bicuspids) on the appearance of the crowding of the frontal segment of dental strings. The study included 140 subjects, aged 15-20 years. All the examinees were divided into two groups. The first group comprised 90 subjects (39 males and 51 females) who had marked symptoms of crowding, especially in the frontal segment. The second group comprised 50 subjects (20 males and 30 females) with normal occlusion. The measurement was performed using a digital nonius, 0.01mm of accuracy. The following parameters were examined: mesiodistal (MD) and vestibulolingual (VL) diameter of the maxillary and mandibular incisors. The index of the crown of the tooth was calculated using the formula MD-VL × 100. The results of the study show that males have significantly wider teeth both in the upper and the lower jaw. The same results were obtained for subjects with crowding and subjects with normal occlusion. The vestibulolingual diameter of the maxillary and mandibular incisors in subjects with normal occlusion is greater in males. The vestibulolingual diameter of permanent incisors in subjects with crowding shows a sex-related dimorphism only with lateral incisors in the upper jaw. A statistically significant difference at a lower level of significance of the tooth crown index for upper incisors was observed in females, while the index of the crown of lateral incisors in the lower jaw did not show significant sex-related differences.*

Key words: *Tooth size, incisors, crowding*

Introduction

The size of teeth is one of the crucial factors affecting occlusion formation. It differs among individuals, varies with different races, peoples, and ethnic groups (1-5).

The size of teeth is subject to individual variations. It may vary within the framework of some groups of teeth with possible various combinations. In particular, the maxillary lateral incisor shows greater divergences in size in different populations (6).

Numerous authors agree that the size of teeth, as well as the amount, shape and morphology of teeth, is genetically determined (7-9), although there are attitudes that determining the size of teeth is multifactorial, the role of environment being an important factor (10,11).

The size of milk teeth and permanent teeth is inherited separately, so one cannot estimate the size of permanent teeth on the basis of the size of milk teeth.

A number of researchers have confirmed in their studies the existence of gender differences in teeth size. Thus, numerous studies confirm that persons of male sex have bigger teeth compared to persons of female sex (12-18).

Members of various races, peoples and ethnic groups show differences in teeth size. Persons of black race have bigger teeth than persons of white race (1-5), while in persons of the yellow race the size of teeth is slightly smaller compared to members of the white race (16). While determining teeth size, ethnic variations must be considered as well (3,12,19).

Concerning the size of teeth in various orthodontic anomalies, differences in opinion are frequently met. Some studies have demonstrated that mandibular teeth are bigger in subjects with malocclusion of class III (12, 20-22), while the maxillary ones are bigger in subjects with malocclusion of class II (20,23,24). Other studies have not found significant differences in the size of teeth that are depending on the present orthodontic anomaly (25,26).

The crowding of dental strings is lack of space for regular distribution of teeth into dental arches. Numerous authors who have analyzed the relationship between the size of teeth and dental arches, on one side, and the degree of crowding, on the other, report that the size of teeth is important for the appearance of crowding (10, 27-32). However, there are those who claim that it is not the size of teeth that affects the appearance of crowding but the size of dental arches (33-35).

Aim

The aim of the paper was to determine the influence of the size of permanent incisors on the appearance of the crowding of the frontal segment of dental strings.

Patients and Method

The study was conducted at the Department of Jaw Orthopedics, Dental Clinic, Nis. It included 140 subjects between 15-20 years of age. All the examinees were divided into two groups. The first group comprised subjects with marked symptoms of crowding, who had not been previously treated orthodontically. We selected patients with primary crowding that was evident in both arches of the frontal segment. In total, there were 90 subjects (39 males and 51 females) included in the research. The second group comprised 50 subjects (20 males and 30 females) with normal occlusion. During selection of persons with normal occlusion, we followed these criteria: a complete dental string; the relationship of jaws in neutro-occlusion; overlap of the middle parts of the upper and lower incisors; absence of a marked anomaly in groups of teeth or single tooth; absence of significant caries lesions, especially the approximal ones; and more than two to three well-done fillings. Precise impressions were taken from all patients, on the basis of which the study models were obtained. The following measurements were done on the study models: the mesiodistal diameter of teeth was measured using a digital nonius, 0.01 mm of precision. Slim forks of the measuring instrument were placed parallel to the longitudinal axis of teeth in the region of contact points.

The vestibulolingual diameter of teeth was also measured using a nonius by placing the fork of the instrument parallel to the longitudinal axis adjacent to the gingival edge. The error of measurement was determined by repeated measurements of ten models chosen randomly and measured ten days after the first measurement.

Significant differences in the diameter of the teeth of the left and the right side were not found, so this was not taken into consideration in the course of the analysis.

The index of the crown was calculated for all teeth of the upper and lower jaws using the formula $MD/FL \times 100$.

The obtained results were processed on a computer by applying the basic statistical parameters: mean value ($\bar{x}$), standard deviation (SD) and span of minimum and maximum values. Differences between sexes and the examined groups (crowding and normal occlusions) were tested using a t-test.

Results

Normal occlusion

Mesiodistal diameter of the upper incisors (Table 1). The mean value of the mesiodistal diameter of the upper central incisors is 8.42 mm in males and 8.38 mm in females. There is a significant sex-related difference (t-test 2.43, $p < 0.05$). The mean value of the mesiodistal diameter of the upper lateral incisors is 6.76 mm in males and 6.61 mm in females. This difference is statistically insignificant.

Mesiodistal diameter of the lower incisors (Table 1). The mean value of the mesiodistal diameter of the lower central incisors is 5.30 mm in males and 5.14 mm in females. There is a significant gender difference (t-test 2.43 $p < 0.05$). The mean value of the mesiodistal diameter of the lower lateral incisors is 6.03 mm in males and 5.71 mm in females. This difference is statistically insignificant (t-test 4.01m, $p < 0.001$).

Vestibulolingual diameter of the upper incisors (Table 2). The mean value of the vestibulolingual diameter of the upper central incisors is 7.59 mm in males and 7.04 mm in females. There is a highly significant gender difference (t-test 6.19, $p < 0.001$). The mean value of the vestibulolingual diameter of the upper lateral incisors is 6.77 mm in males and 6.31 mm in females. There is a significant gender difference (t-test 3.50, $p < 0.01$).

Vestibulolingual diameter of the lower incisors (Table 2). The mean value of the vestibulolingual diameter of the lower central incisors is 6.4 mm in males and 5.20 mm in females. There is a highly significant difference (t-test 4.64, $p < 0.001$). The mean value of the lower lateral incisors is 6.56 mm in males and 6.32 mm in females. There are gender differences (t-test 2.07, $p < 0.05$).

Index of the crown of the upper incisors (Table 3). The mean value of the index of the crown of the upper central incisors is 115.03 in males and 119.24 in females. There is a significant difference in favor of female subjects (t-test 2.18) at the level of significance $p < 0.05$. The mean value of the index of the crown of the upper lateral incisors is 100.21 in male subjects and 104.95 in females. There is a gender difference (t-test 2.26 $p < 0.05$) in favor of female subjects.

Index of crown of the lower incisors (Table 3). The mean value of the index of the crown of the lower central incisors is 82.76 in males and 86.82 in females. There is a significant difference in favor of female subjects (t-test 2.78) at the level of significance $p < 0.05$. The mean value of the index of the crown of the lower lateral incisors is 92.10 males and 90.78 in females. There is no gender dimorphism.

Crowding

Mesiodistal diameter of the upper incisors (Table 4). The mean value of the mesiodistal diameter of the upper central incisors is 9.19 mm in males with crowding and 8.94 mm in female subjects. There is a gender dimorphism (t-test 2.74) at the level of significance $p < 0.05$. The mean value of the mesiodistal diameter of the upper lateral incisors in males with crowding is 7.19 mm, while its values is 7.05 mm in females. This difference is statistically insignificant.

Table 1. Sex-related differences in MD size of the upper and lower permanent incisors in normal occlusion

Tooth	Sex	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Male	20	8.42	0.58	6.64	7.7 –10.0	2.43 *
	Female	30	8.38	0.40	4.76	8.0 – 9.2	
J_2	Male	20	6.76	0.32	4.69	6.2 – 7.2	1.23
	Female	30	6.61	0.48	7.30	6.0 – 7.5	
i_1	Male	20	5.30	0.26	4.85	5.0 – 5.8	2.43 *
	Female	30	5.14	0.22	4.19	4.8 – 5.6	
i_2	Male	20	6.03	0.30	4.92	5.4 – 6.6	4.01 ***
	Female	30	5.71	0.26	4.60	5.3 – 6.5	

Table 2. Sex-related differences in VL size of the upper and lower permanent incisors in normal occlusion

Tooth	Sex	N	$\bar{x}$	SD	CV	min-max	t-test
J1	Male	20	7.59	0.30	3.96	7.0 – 8.2	6.19 **
	Female	30	7.04	0.31	4.38	6.3 – 7.6	
J2	Male	20	6.77	0.51	7.55	5.8 – 7.5	3.50 **
	Female	30	6.31	0.41	6.46	5.7 – 7.2	
i1	Male	20	6.43	0.44	6.85	6.0 – 7.3	4.64 ***
	Female	30	5.93	0.33	5.49	5.2 – 6.8	
i2	Male	20	6.56	0.29	4.38	6.2 – 7.0	2.07 *
	Female	30	6.32	0.46	7.28	5.4 – 7.0	

Table 3. Sex-related differences in the index of the upper and lower permanent incisors in normal occlusion

Tooth	Sex	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Male	20	115.03	7.15	6.22	98.72 –125.00	–2.18 *
	Female	30	119.24	6.37	5.34	108.11–133.33	
J_2	Male	20	100.21	6.01	6.00	90.67 –113.70	–2.26 *
	Female	30	104.95	7.99	7.62	88.24 –122.81	
i_1	Male	20	82.76	6.21	7.51	68.49 –92.06	–2.78 **
	Female	30	86.82	4.10	4.73	80.65 –98.08	
i_2	Male	20	92.10	5.02	5.46	82.86 –100.00	0.77
	Female	30	90.78	6.48	7.14	79.71 –103.45	

Mesiodistal diameter of the lower incisors (Table 4). The mean value of the mesiodistal diameter of the lower central incisors in males with crowding amounts to 5.63mm and is 5.50 mm in females. There is a significant gender difference (t-test 2.13) at the level of significance $p < 0.05$. The mean value of the mesiodistal diameter of the lower lateral incisors is 6.32 mm in males with crowding and 6.15 mm in females. This difference is statistically significant (t-test 2.06, $p < 0.05$).

Vestibulolingual diameter of the upper incisors (Table 5). The mean value of the vestibulolingual diameter of the upper central incisors in males with crowding is 7.29 mm, and in females 7.13 mm. There are no significant gender differences. The mean value of the vestibulolingual diameter of the upper lateral incisors is 6.73 mm in males with crowding and 6.32 mm in female subjects. There is a marked gender dimorphism in favor of male subjects (t-test 3.52, $p < 0.01$).

Vestibulolingual diameter of the lower incisors (Table 5). The mean value of the vestibulolingual diameter of the lower central incisors is 6.12 mm in male subjects with crowding and 6.06 mm in females. There are no significant gender differences. The mean value of the vestibulolingual diameter of the lower lateral incisors is 6.33 mm in males and 6.24 mm in females. There is no marked gender dimorphism.

Index of crown of the upper incisors (Table 6)**.** The mean value of the index of the crown of the upper central incisors is 126.59 in males with crowding and 126.11 in females. Differences between sexes are minimal so there is no statistical significance. The mean value of the index of the crown of the upper lateral incisors is 107.54 in males and 112.19 in females. There is a statistical significance (t-test 2.31, $p<0.05$) in favor of the subjects of female sex.

The index of the crown of the lower incisors (Table 6). The mean value of the index of the crown of the lower central incisors is 92.46 in males with crowding and 91.00 in females. The differences between sexes are minimal so there is no statistical significance (t-test 1.13). The mean value of the index of the crown of the lower lateral incisors is 100.20 in males and 98.99 in females. The value of t-test is 0.70, which indicates that there are no significant gender differences.

Table 4. Sex-related differences in MD size of the upper and lower permanent incisors in crowding

Tooth	Sex	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Male	39	9.19	0.45	4.90	8.0 –10.0	2.74 **
	Female	51	8.94	0.39	4.32	8.0 – 9.8	
J_2	Male	39	7.19	0.50	6.89	6.0 – 8.3	1.45
	Female	51	7.05	0.40	5.64	6.0 – 8.0	
i_1	Male	39	5.63	0.31	5.43	5.0 – 6.3	2.13 *
	Female	51	5.50	0.24	4.41	5.0 – 6.0	
i_2	Male	39	6.32	0.42	6.72	5.4 – 7.3	2.06 *
	Female	51	6.15	0.29	4.66	5.6 – 6.9	

Table 5. Sex-related differences in VL size of the upper and lower permanent incisors in crowding

Tooth	Sex	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Male	39	7.29	0.49	6.79	6.4 – 8.7	1.44
	Female	51	7.13	0.54	7.60	6.0 – 8.0	
J_2	Male	39	6.73	0.59	8.73	5.0 – 7.8	3.59 **
	Female	50	6.32	0.46	7.33	5.5 – 7.2	
i_1	Male	39	6.12	0.47	7.69	5.0 – 7.0	0.61
	Female	51	6.06	0.34	5.57	5.4 – 7.0	
i_2	Male	39	6.33	0.43	6.82	5.2 – 7.2	0.94
	Female	51	6.24	0.44	7.08	5.2 – 7.6	

Table 6. Sex-related differences in the index of the upper and lower permanent incisors in crowding

Tooth	Sex	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Male	39	126.59	9.59	7.57	109.2 –151.56	0.23
	Female	51	126.11	10.45	8.29	106.25–154.10	
J_2	Male	39	107.54	9.30	8.64	92.11 –134.62	2.31 *
	Female	50	112.19	9.70	8.65	92.86 –130.36	
i_1	Male	39	92.46	6.76	7.31	78.57 –108.62	1.13
	Female	51	91.00	5.04	5.54	79.37 –107.41	
i_2	Male	39	100.20	8.94	8.92	87.1 –120.37	0.70
	Female	51	98.99	7.09	7.16	78.95 –115.38	

Comparative analysis of normal occlusion and crowding

As the tables provided present all individual values by sex both in subjects with normal occlusion and subjects with crowding, and since gender differences were also been found, the differences between the groups will be shown separately for males and females.

The mesiodistal diameter of the upper central and lateral incisors shows significantly higher values in patients with crowding compared to those with normal occlusion (J1 t-test 2.94, $p < 0.01$; J2 t-test 4.30, $p < 0.001$) (Table 7).

The mesiodistal diameter of the upper incisors in female subjects also shows significantly higher values in patients with crowding (J1, t-tests 6.2, $p < 0.001$ and J2 t-test 4.4, $p < 0.001$) (Table 8).

The mesiodistal diameter of the lower incisors in male subjects is significantly greater in persons with crowding compared to normal occlusions (j1 t-test 4.28, $p < 0.001$, j2 t-test 3.22, $p < 0.01$) (Table 9).

The mesiodistal diameter of the lower incisors in female subjects also shows a high level of significance of differences in favor of subjects with crowding (j1 t-test 7.20 $p < 0.001$; j2, t-test 7.30, $p < 0001$) (Table 10).

The vestibulolingual diameter of the upper incisors in male subjects is greater in those with normal occlusion, although there is a significant difference only at J1 t-test 3.00; $p < 0.01$ (Table 11).

The vestibulolingual diameter of the upper incisors in female subjects shows higher values in patients with crowding, without a statistically significant difference (Table 12).

The vestibulolingual diameter of the lower incisors in males is significantly greater in subjects with normal occlusion (j1 t-test 2.38, $p < 0.05$; and j2 t-test 2.55; $p < 0.05$) (Table 13).

The vestibulolingual diameter of the lower incisors in females is not indicative of significant differences between the examined groups (Table 14).

The index of the crown of the upper incisors in males shows significantly higher values in subjects with crowding compared to subjects with normal occlusion (J1 t-test 5.21; $p < 0.001$, J2 t-test 3.66; $p < 0.01$) (Table 15).

The index of the crown of the upper incisors in females also shows significantly higher values in subjects with crowding compared to subjects with normal occlusion (J1 t-test 3.67; $p < 0.01$ and J2 t-test 3.62; $p < 0.01$) (Table 16).

The index of the crown of the lower incisors in male subjects is significantly higher in persons with crowding

compared to normal occlusions (j1 t-test 5.51; $p < 0.001$ and j2 t-test 4.45; $p < 0.001$ (Table 17).

The index of the crown of the lower incisors in females is also significantly higher in subjects with crowding compared to normal occlusions (j1 t-test 4.06; $p < 0.001$ and j2 t-test 5.33; $p < 0.001$) (Table 18).

Table 7. Differences in MD size of the upper permanent incisors in males with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	39	9.19	0.45	4.90	8.0 –10.0	2.94 **
	Normal occlusion	20	8.72	0.58	6.64	7.7 –10.0	
J_2	Crowding	39	7.19	0.50	6.89	6.0 – 8.3	4.30 ***
	Normal occlusion	20	6.76	0.32	4.69	6.2 – 7.2	

Table 8. Differences in MD size of the upper permanent incisors in females with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	51	8.94	0.39	4.32	8.0 – 9.8	6.2 ***
	Normal occlusion	30	8.38	0.40	4.76	8.0 – 9.2	
J_2	Crowding	51	7.05	0.40	5.64	6.0 – 8.0	4.4 ***
	Normal occlusion	30	6.61	0.48	7.30	6.0 – 7.5	

Table 9. Differences in MD size of the lower permanent incisors in males with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	39	5.63	0.31	5.43	5.0 – 6.3	4.28 **
	Normal occlusion	20	5.30	0.26	4.85	5.0 – 5.8	
J_2	Crowding	39	6.32	0.42	6.72	5.4 – 7.3	3.22 **
	Normal occlusion	20	6.03	0.30	4.92	5.34 – 6.6	

Table 10. Differences in MD size of the lower permanent incisors in females with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	51	5.50	0.24	4.41	5.0 – 6.0	7.20 ***
	Normal occlusion	30	5.14	0.22	4.19	4.8 – 5.6	
J_2	Crowding	51	6.15	0.29	4.66	5.6 – 6.9	7.30 ***
	Normal occlusion	30	5.71	0.26	4.60	5.3 – 6.5	

Table 11. Differences in VL size of the upper permanent incisors in males with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	39	7.29	0.49	6.79	6.4 – 8.7	–3.00 **
	Normal occlusion	20	7.59	0.30	3.96	7.0 – 8.2	
J_2	Crowding	39	6.73	0.59	8.73	5.0 – 7.8	–0.28
	Normal occlusion	20	6.77	0.51	7.55	5.8 – 7.5	

Table 12. Differences in VL size of the upper permanent incisors in females with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	51	7.13	0.54	7.60	6.0 – 8.0	1.00
	Normal occlusion	30	7.04	0.31	4.38	6.3 – 7.6	
J_2	Crowding	50	6.32	0.46	7.33	5.5 – 7.2	0.10
	Normal occlusion	30	6.31	0.41	6.46	5.7 – 7.2	

Table 13. Differences in VL size of the lower permanent incisors in males with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	39	6.12	0.47	7.69	5.0 – 7.0	–2.38 *
	Normal occlusion	20	6.43	0.44	6.85	6.0 – 7.3	
J_2	Crowding	39	6.33	0.43	6.82	5.2 – 7.2	–2.55 *
	Normal occlusion	20	6.56	0.29	4.38	6.2 – 7.0	

Table 14. Differences in VL size of the lower permanent incisors in females with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	51	6.06	0.34	5.57	5.4 – 7.0	1.62
	Normal occlusion	30	5.93	0.33	5.49	5.2 – 6.8	
J_2	Crowding	50	6.24	0.44	7.08	5.2 – 7.6	–0.80
	Normal occlusion	30	6.32	0.46	7.28	5.4 – 7.0	

Table 15. Differences in the index of the upper permanent incisors in males with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	39	126.59	9.59	7.57	109.2 –151.56	5.21 ***
	Normal occlusion	20	115.03	7.15	6.22	98.72 –125.00	
J_2	Crowding	39	107.54	9.30	8.64	92.11 –134.62	3.66 **
	Normal occlusion	20	100.21	6.01	6.00	90.67 –113.79	

Table 16. Differences in the index of the upper permanent incisors in females with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	51	126.11	10.45	8.29	106.25–154.10	3.67 **
	Normal occlusion	30	119.24	6.37	5.34	108.11–133.33	
J_2	Crowding	50	112.19	9.70	8.65	92.86 –130.36	3.62 **
	Normal occlusion	30	104.94	7.99	7.62	88.24 –122.81	

Table 17. Differences in the index of the lower permanent incisors in males with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	39	92.46	6.76	7.31	78.57 –108.62	5.51 ***
	Normal occlusion	20	82.76	6.21	7.51	68.49 – 92.06	
J_2	Crowding	39	100.20	8.94	8.92	87.1 –120.37	4.45 ***
	Normal occlusion	20	92.10	5.02	5.46	82.86 –100.00	

Table18. Differences in the index of the lower permanent incisors in females with normal occlusions and crowding

Tooth	Group	N	$\bar{x}$	SD	CV	min-max	t-test
J_1	Crowding	51	91.00	5.04	5.54	79.37 –107.41	4.06 ***
	Normal occlusion	30	86.82	4.10	4.73	80.65 – 98.08	
J_2	Crowding	51	98.99	7.09	7.16	78.95 –115.38	5.33 ***
	Normal occlusion	30	90.78	6.48	7.14	79.71 –103.45	

Discussion

The first data on the influence of teeth size on occlusion in dental literature date back to the twenties of the previous century when, for the first time and in different publications (36-38), the existence of proportion between the upper and lower teeth was presented.

Since then, teeth size has been a subject of much research, because it differs among individuals, races, peoples and ethnic groups (1-5). The size of teeth differs depending on a particular orthodontic anomaly, and its influence on the appearance of crowding is especially important (6,18-21,37).

There is gender dimorphism in teeth size, so numerous authors claim that persons of male sex are characterized by larger teeth (7-12). This coincides with the results of our study which indicates that persons with normal occlusion exhibit a gender dimorphism with respect to the mesiodistal diameter of the upper and lower incisors in favor of male subjects, except for the upper lateral incisor. These results coincide with the findings of previous researchers (39,40).

The vestibulolingual diameter of the upper and lower central incisors in persons with normal occlusion is greater among males and is at the high level of statistical significance of $p < 0.001$. The gender dimorphism, related to both upper and lower lateral incisors, is at the lower level of statistical significance (J2 $p < 001$ and j2 $p < 0.05$, respectively).

The values of the index of teeth crown depend on the mesiodistal and vestibulolingual diameter of teeth. In case the width of the teeth is greater, the obtained index values will be higher. In case the vestibulolingual diameter is greater, the index will be lower.

The mean values of the index of the crown of the upper and lower central and lateral incisors in persons with normal occlusion show differences in favor of female subjects and are at the low level of statistical significance of $p < 0.05$.

The mesiodistal diameter of the upper and lower central incisors in persons with crowding is greater among males, showing the level of significance of $p < 0.05$. The mean values of the lateral upper incisors do not show a gender dimorphism, while in the case of the lower lateral incisors, the difference is statistically highly significant ($p < 0.001$) in favor male subjects.

The findings of our study coincide with the findings of a large group of authors who have observed a relation between the size of teeth, the size of dental arches, and the degree of crowding, and whose standpoint is that the size of teeth is of importance for crowding occurrence (10,27-32).

The vestibulolingual diameter of the upper and lower central incisors, as well as the lower lateral incisors, does not show significant gender differences. Gender dimorphism is present only in the upper lateral incisors at the level $p < 0.01$ in favor of persons of male sex.

The index of the crown of the upper central incisors in males and females with crowding shows minimal differences, so there is no statistical significance, while the index of the crown of the upper lateral incisors shows a low level of statistical significance in favor of female subjects, $p < 0.05$. The index of the crown of the lower incisors does not show statistically significant differences, either.

The results of comparative analyses show that persons of both sexes with crowding have a significantly bigger mesiodistal diameter of the upper and lower incisors, when compared with persons with normal occlusion. The findings of our study coincide with the findings of a large group of authors who have observed a relationship between the size of teeth, the size of dental arches and the degree of crowding, which indicates that the size of teeth is of importance for the appearance of crowding (10,27-32).

Male subjects with normal occlusion have a significantly bigger vestibulolingual diameter of the upper and lower incisors, compared to males with crowding ($p < 0.01$). In females from both examined groups, the vestibulolingual diameter of teeth shows approximately the mean value, so we may say that there are no essential differences in the values of this parameter.

Examining the mandibular incisal crowding and dimensions of the incisors, some authors assume that there is no significant interrelation between the facio-lingual diameter of teeth and crowding (40), which coincides with the findings we obtained for female subjects.

Considering the significantly higher values of the mesiodistal diameter of the upper incisors in persons with crowding, the finding of a significantly higher value of the index of the crown of the upper and lower incisors in both males and females with crowding, compared to persons with normal occlusion, seems logical. Our findings suggest higher values of the index of teeth crown in patients with crowding, which is the consequence of a greater mesiodistal diameter of teeth. These results coincide with the findings of other authors (40).

Conclusion

Based on the results of examining the size of incisors in patients with crowding and persons with normal occlusion, we can make the following conclusions:

1. The results of our research work show that size of teeth is one of major factors in the occurrence of crowding of dental strings.
2. In persons with normal occlusion, the mesiodistal diameter of the upper and lower incisors is significantly greater in males with the exception of lateral upper incisors.
3. In persons with normal occlusion, the vestibulolingual diameter of the upper and lower incisors is significantly greater than in male subjects.
4. In persons with normal occlusion, the index of the crown of incisors is significantly higher in female subjects with the exception of lower lateral incisors.
5. In persons with crowding, the mesiodistal diameter of the upper and lower incisors is also significantly greater in male subjects with the exception of lateral upper incisors.
6. In persons with crowding, the vestibulolingual diameter of the upper and lower incisors is greater in females, with a single significant difference in lateral upper incisors.
7. In persons with crowding, there is no significant difference in the index of the crown of the upper and lower incisors with the exception of the index of the crown of the upper lateral incisor, which is significantly higher in females.
8. Persons of both sexes with crowding are characterized by a greater mesiodistal diameter of all upper and lower incisors.
9. The vestibulolingual diameter of the upper incisors in males is greater in subjects with normal occlusion, although there is a significant difference only in the central incisor. The vestibulolingual diameter of the upper incisors in females is greater in patients with crowding, without a statistically significant difference.
10. The vestibulolingual diameter of the lower incisors in males is significantly greater in persons with normal occlusion, while the vestibulolingual diameter of the lower incisors in females does not show significant differences between the examined groups.
11. In both males and females, the index of the crown of the upper and lower incisors is significantly higher in persons with crowding compared to normal occlusion.

References

1. Keene HJ. Mesiodistal crown diameters of permanent teeth in male American Negroes. Am J Ortho 1979; 76: 95-99.
2. Richardson ER, Malhotra SK. Mesiodistal crown dimension of the permanent dentition of American Negroes. Am J Orthod 1975; 68: 157–164.
3. Bishara SE, Jakobsen JR, Abdallah EM, Garcia AF. Comparisons of mesiodistal and buccolingual crown dimensions of the permanent teeth in three populations from Egypt, Mexico and the United States. Am J Orthod Dentofac Orthop 1989; 96: 416-422.
4. Merz ML, Isaacson RJ, Germane N, Rubenstein LK. Tooth diameters and arch perimeters in a black and a white population. Am J Orthod Dentofacial Orthop 1991; 100: 53–58.
5. Smith SS, Buschang PH, Watanabe E. Interarch tooth size relationships of 3 populations: "Does Bolton's analysis apply?". Am J Orthod Dentofacial Orthop 2000; 117: 169–174.
6. Heusdens M, Dermaut L, Verbeeck R: The efect of tooth size discrepancy on occlusion: An experimental study. Am J Orthod Dentofacial Orthop 2000; 117: 184-91.
7. Osborne RH, Horowitz SL, DeGeorge FV. Genetic variation in tooth dimensions: a twin study of permanent anterior teeth. Am J Hum Genet 1959; 30:350–356.
8. Kolakowski D, Bailit HL. A differential environmental effect on human anterior tooth size. Am J Phys Anthropol 1981; 54(3): 377-81.

9. Baydas B, Oktay H, Metin Dagsuyu I. The effect of heritability on Bolton tooth-size discrepancy. Eur J Orthod 2005; 27(1): 98-102.
10. Doris JM, Bernard BW, Kuftinec MM, Stom D. A biometric study of tooth size and dental crowding. Am J Ortho 1981; 79: 326–336.
11. Stewart RE, Prescott GH. Oral facial genetics. CV Mosby Co, St. Louis, 1979: 105–123.
12. Lavelle CLB. Maxillary and mandibular tooth size in different racial groups and in different occlusion categories. Am J Orthod 1972; 6: 29-37.
13. Potter R. Univariate versus multivariate differences in tooth size according to sex. J Dent Res 1972; 51: 716–722.
14. Arja BS, Savara BS, Thomas D, et al. Relation of sex and occlusion to mesiodistal tooth size. Am J Orthod 1974; 66: 479-86.
15. Adeyemita Ta, Isiekwe MC. Comparing permanent tooth size (mesio-distal)of males and females in a Nigerian population. West Afr J Med 2003; 27(3): 219-21.
16. Lew KK, Keng SB. Anterior crown dimensions and relationship in an ethnic Chinese population with normal occlusions. Aust Orthod J 1991; 12(20): 105-9.
17. Bernabe E, Major P, Flores-Mir C. Tooth width ratio discrepancies in a sample of Peruvian adolescents. Am J Orthod Dentofacial Orthop. 2004; 125(3): 361-365.
18. Schwartz GT, Dean MC. Sexual dimorphism in modern human permanent teeth. Am J Phys Anthropol 2005;128(2): 312-7.
19. Nourallah WA, Splieth HC, Schwahn C, Khurdaji M. Standardizing interarch tooth size harmony in a Syrian population. Angle Orthod 2004; 75(6): 790-93.
20. Sperry TP, Worms FW, Isaacson RJ, et al. Tooth size discrepancy in mandibular prognathism. Am J Orthod. 1977; 72: 183-90.
21. Sassouni V. A classification of skeletal facial types. Am J Orthod 1969; 55: 109–123.
22. Nie Q, Lin J. Comparison of intermaxillary tooth size discrepancies among different malocclusion groups. Am J Orthod Dentofacial Orthop 1999; 116(5): 539-44.
23. Alkofide E, Hashim H. Intermaxillary tooth size discrepancies among different malocclusion classes: a comparative study. J Clin Pediatr Dent 2002; 26(4): 383-387.
24. Ta TA, Ling JYK, Hagg U. Tooth size discrepancies among different occlusion groups of southern Chinese children. Am J Orthod Dentofacial Orthop 2001; 120 (5): 556-55825.
25. Crosby DR, Alexander CG. The occurrence of tooth size discrepancies among different malocclusion groups. Am J Orthod Dentofacial Orthop 1989; 95(6): 457-46126.
26. Laino A., Quaremba G, Paduano S, Stanzione S. Prevalence of tooth-size discrepancy among different malocclusion groups. Prog Orthod 2003; 4: 37-44.
27. Lundström A. Intermaxillary tooth width ratio and tooth alignment and occlusion. Acta Odontol Scand 1954; 12: 265–292.
28. Fastlicht J. Crowding of mandibular incisor. Am J Orthod 1970; 2: 156-163.
29. Norderval K, Wisth JP, Boe EO. Mandibular anterior crowding in relation to tooth size and craniofacial morfology. Scand J Dent Res 1975; 83: 267-273.
30. Berg R. Crowding of the dental arches: a longitudinal study of the age period between 6 and 12 years. Eur J Orthod 1986; 8: 43-49.
31. Forsberg CM. Tooth size, spacing and crowding in relation to eruption or impaction of third molars. Am J Orthod Dentofacial Orthop 1988; 94: 1: 57-62.
32. Tijanić Lj, Janošević M. Meziodistalni promer stalnih zuba kod osoba sa normalnom okluzijom I teskobom. Acta Stomatologica Naissi 1991; 16: 69-79.
33. Mills LF. Arch width, arch length and tooth size in young adult males. Angle Orthod 1964; 34: 124-129.
34. Mc Keown M. The diagnosis of incipient arch crowding in children. NZ Dent J 1981; 77: 93-96.
35. Howe PR, McNamara, O Connor AK. In an examination of dental crowding and its relationship to tooth size and arch dimension. Am J Orthod 1983; 5: 363-372.
36. Gilpatric WH. Arch predetermination – is it practical? J Am Dent Assoc 1923; 10: 553–572.
37. Bolton WA. The clinical application of a tooth size analysis. Am J Orthod 1962; 7: 504-529.
38. Stanton FL. Engineering in orthodontic diagnosis. J Am Dent Assoc 1928; 15: 825–832.
39. Fastlicht J. Crowding of mandibular incisor. Am J Orthod 1970; 2: 156-163.
40. Little RM. The Irregularity Index: A quantitative score of mandibular anterior alignment. Am J Orthod 1975; 68(5): 554-563.

UTICAJ VELIČINE SEKUTIĆA NA NASTANAK TESKOBE

Mirjana Janošević[1], Gordana Filipović[1], Saša Stanković[2], Olivera Tričković Janjić[3]

Stomatološka klinika, Medicinski fakultet, Niš
[1]Odeljenje za ortopediju vilica, [2]Odeljenje za protetiku, [3]Odeljenje za dečju i preventivnu stomatologiju,

Kratak sadržaj: *Veličina zuba je jedan od bitnih faktora koji utiče na formiranje okluzije. U nastanku teskobe zubnih nizova veličina zuba ima značajnu ulogu. Cilj ispitivanja je bio da se utvrdi uticaj veličine stalnih sekutića na nastanak teskobe frontalnog segmenta zubnih nizova. Ispitivanjem je obuhvaćeno 140 osoba starosti od 15-20 godina. Svi ispitanici su podeljeni u dve grupe. Prva grupa obuhvata 90 osoba (39 muškog i 51 ženskog pola) sa izraženim simptomima teskobe naročito u frontalnom segmentu. Druga grupa obuhvata 50 osoba (20 muškog i 30 ženskog pola) sa normalnom okluzijom. Merenja su obavljena pomoću digitalnog nonijusa sa preciznošću 0,01 mm. Ispitivani su sledeći parametri: meziodistalni (MD) i vestibulolingvalni (VL) promer maksilarnih i mandibularnih sekutića. Indeks krune zuba izračunat je formulom MD-VL × 100. Rezultati ispitivanja pokazuju da osobe muškog pola imaju šire zube na visokom nivou značajnosti i u gornjoj i u donjoj vilici, kako kod osoba sa teskobom tako i kod osoba sa normalnom okluzijom. Vestibulolingvalni promer maksilarnih i mandibularnih sekutića kod osoba sa normalnom okluzijom veći je kod osoba muškog pola. Vestibulolingvalni promer stalnih sekutića kod osoba sa teskobom pokazuje polni dimorfizam samo kod lateralnih sekutića u gornjoj vilici u korist osoba muškog pola. Postoji statistički značajna razlika na niskom nivou značajnosti indeksa krune gornjih sekutića u korist osoba ženskog pola dok indeks krune donjih lateralnih sekutića ne pokazuje značajne polne razlike.*

Ključne reči: *Veličina zuba, sekutići, teskoba, normalna okluzija*