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## EVALUACIJA PRIMENLJIVOSTI PONTOVOG INDEKSA U SRPSKOJ POPULACIJI

## EVALUATION OF APPLICABILITY OF PONT'S INDEX IN SERBIAN POPULATION

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### Sažetak

**Uvod:** Primena Pontovog indeksa u ortodontskoj dijagnostici koristi se za predviđanje idealne širine zubnog luka, neophodne za smeštaj zuba bez teskobe, pravilnu okluziju i postizanje stabilnih rezultata terapije.

**Cilj :** ove studije bio je utvrditi primenljivost Pontovog indeksa u srpskoj populaciji i uporediti dobijene rezultate sa rezultatima ispitivanja u drugim populacijama.

**Materijal i metode:** Analizirano je 200 studijskih modela osoba srpskog porekla (100 osoba muškog pola i 100 osoba ženskog pola). Svi ispitanici su bili sa klasom I po Angleu, bez prethodnog ortodontskog tretmana. Merenje je izvršeno pomoću digitalnog nonijusa (preciznost od 0,01 mm). Izmerene su meziodistalna širina maksilarnih stalnih sekutića, kao i interpremolarna i intermolarna širina maksilarnog luka. T-testom je upoređena vrednost standardnog Pontovog indeksa i Pontovog indeksa dobijenog u istraživanju, kao i razlike dobijenih vrednosti između polova. Određen je Pearsonov koeficijent korelacije između izmerenih i vrednosti širine zubnih lukova dobijenih korišćenjem Pontove formule.

**Rezultati:** Rezultati ispitivanja pokazali su da su vrednosti za interpremolarnu i za intermolarnu širinu luka, izmerene na studijskim modelima pacijenata kod oba pola, manje nego vrednosti koje su dobijene primenom Pontove formule ( $p < 0,001$ ). Pearsonov koeficijent korelacije između izmerenih vrednosti širine luka i vrednosti širine luka prema Pontovoj formuli pored visoke korelacije pokazuje statistički značajnu razliku ( $p < 0,001$ ).

**Zaključak:** Dobijeni rezultati ukazuju da Pontov indeks nije primenljiv u srpskoj populaciji, te da su potrebni prilagođeni populaciono specifični standardi za ovu dijagnostičku metodu.

**Ključne reči:** ortodoncija, Pontov indeks, srpska populacija

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### Abstract

**Introduction:** The applicability of Pont's Index to orthodontic patients may guide clinicians in predicting an ideal arch width, necessary to accommodate the dentition, unloose crowding and to produce more stable final results.

**The aim:** of this study was to establish the applicability of Pont's Index to Serbian population and compare the results with those acquired from studies conducted on different ethnic subjects.

**Materials and methods:** Dental casts of 200 Serbian subjects (100 males and 100 females) were used in this study. All subjects had normal Class I occlusion, with no history of orthodontic treatment. Measurements were taken by a digital caliper (precision of 0.01 mm). The mesiodistal widths of the maxillary permanent incisors, as well as interpremolar and intermolar maxillary arch widths, were measured. Using t-test Pont's Index ratios between this study and Pont's study and between genders were compared. Pearson correlation coefficients between measured and arch width values according to Pont's formulae were determined.

**Results:** Although correlations determined between the calculated arch width and corresponding values calculated using Pont's Index were high in all cases for both genders, a statistically significant difference was observed ( $p < 0.001$ ). Calculated Pearson coefficient between real and measured arch width are found to be high and statistically significant.

**Conclusion:** Our results suggest that the Pont's Index was not applicable to Serbian population and specific standards for this population might be needed.

**Key words:** orthodontic, Pont's index, Serbian population

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## Uvod

Karakteristike ljudskih vilica, zajedno sa zubima, mogu pružiti jake dokaze o postojanju polnog i etničkog dimorfizma<sup>1,2</sup>. Genetski, epigenetski i filogenetski aspekti imaju značajan uticaj na razvoj ovih karakteristika koje mogu imati odlučujuću ulogu kako u forenzičkoj identifikaciji, tako i u ortodontskoj dijagnozi i terapiji<sup>3</sup>. Brojna ispitivanja pokazala su da veličina zuba zavisi od pola<sup>1,4-7</sup> kao i da postoji korelacija između veličine zuba i etničkog porekla<sup>8,9</sup>.

U planiranju terapije ortodonti se često suočavaju sa izazovom da predvide idealnu širinu zubnog luka potrebnu za pravilan smeštaj zuba. Podaci dobijeni analizom studijskog modela imaju ključnu ulogu u postavljanju dijagnoze, planiranju terapije i prognozi terapije<sup>10</sup>. Malokluzije praćene teskobom mogu se rešavati širenjem zubnih nizova ili redukcijom zubnog materijala (ekstrakcionom terapijom). Slučajevi rešavani neekstrakcionom terapijom zahtevaju širenje zubnog luka, pa se u ortodontskoj praksi primenjuje nekoliko indeksa i metoda kojima se može predvideti idealna širina zubnog luka, koja omogućava zadovoljavajuće i stabilne rezultate ortodontske terapije. Iako se zasniva na pretpostavci da se odstupanja od normalne okluzije mogu precizno izmeriti i da se ortodontska dijagnoza može zasnivati na matematičkim kalkulacijama, mogućnost predviđanja širine zubnog luka je korisno dijagnostičko sredstvo. Brojne analize koje se koriste u svakodnevnoj kliničkoj praksi imaju za cilj da omoguće stabilne rezultate predviđanjem idealne širine zubnih lukova<sup>11,12</sup>.

Prema Pontu<sup>13</sup> idealna širina zubnog luka neophodna za pravilnu okluziju i odsustvo teskobe predstavlja konstantni odnos između zbira meziodistalnih promera stalnih maksilarnih inciziva (SI) i interpremolarne i intermolarne širine zubnog luka.

$$IPŠ = SI/0,80$$

$$IMŠ = SI/0,64$$

IPŠ – interpremolarna širina luka

IMŠ – intermolarna širina luka

SI - suma incizivi, zbir meziodistalnih promera maksilarnih stalnih sekutića.

Vrednosti za Pontov indeks (PI) dobijene su na osnovu ispitivanja veličine zuba i vilica na francuskoj populaciji. Uzimajući u obzir da postoje razlike u veličini zuba između etničkih grupa postavlja se pitanje primene ovog indeksa na drugim populacijama<sup>14</sup>. Nalazi nekih istraživača podržavaju upotrebu PI u predviđanju idealne širine zubnog luka<sup>15,16</sup>,

## Introduction

Human dental bone characteristics, alongside with teeth, can provide strong evidence about sexual and ethnic dimorphism<sup>1,2</sup>. Genetic, epigenetic and phylogenetic aspects have a significant influence on the development of these characteristics, which could play the decisive role in the forensic identification, orthodontic diagnosis and treatment<sup>3</sup>. As previously established by numerous investigations, tooth size is gender-dependant<sup>1,4-7</sup>, and the correlation between tooth size and ethnic origin was confirmed<sup>8,9</sup>.

In the treatment planning, the orthodontists are frequently challenged to predict the ideal arch width necessary for normal occlusion. Information collected from the dental casts provide a crucial part in the diagnosis, treatment planning and clinical prognosis<sup>10</sup>. Malocclusion with crowding can be resolved by the expansion of dental arch or by the extraction therapy. In some cases where it is uncertain which therapy would be the best, many formulas, indexes and tables can be used to calculate the ideal width of the dental arch. Although based on the assumption that the deviation of normal occlusion can be mathematically determined, the assessment of the ideal width of the dental arch is a useful diagnostic tool. In order to produce more stable results and to predict the ideal arch width, different analysis were conducted in everyday clinical practice<sup>11,12</sup>.

Pont<sup>13</sup> described an ideal arch width, required to accommodate the dentition and facilitate crowding, that can be calculated using the following formula:

$$\text{Interpremolar arch width (IPW)} = SI/0.80$$

$$\text{Intermolar arch width (IMW)} = SI/0.64$$

SI- suma incisivu, the sum of mesiodistal diameter of maxillary permanent incisors.

However, the applicability of Pont's Index is controversial<sup>14</sup>, since Pont's study was conducted on the French population, and considering that the differences between ethnic groups may exist, it is reasonable to test the Pont's Index on other populations as well<sup>14</sup>. The findings of some investigations support the use of Pont's Index in assessment of ideal arch widths<sup>15,16</sup>, while others believe that the Pont's Index is not universally valid and its use should be adjusted to the different ethnic groups<sup>16,17-20</sup>.

dok drugi smatraju da on nije validan i da se ne može upotrebljavati u kliničkoj praksi<sup>16,17-20</sup>.

Ovo je prvo ispitivanje sprovedeno sa ciljem da uporedi dobijene vrednosti sa vrednostima iz literature i da proceni primenu Pontovog indeksa kod ortodontskih pacijenata u srpskoj populaciji.

### ***Materijal i metode***

Ispitano je 200 studijskih modela (100 muškaraca i 100 žena), pacijenata srpskog porekla, sa okluzijom I klase, bez prethodnog ortodontskog tretmana starosti od 13 do 16 godina ( $14,35 \pm 1,14$ ). Kriterijumi za izbor pacijenata bili su: prisustvo svih stalnih zuba u oba luka (isključujući druge i treće molare) dovoljno izniklih da omoguće premeravanja meziodistalnog promera, dobar kvalitet studijskih modela, odsustvo abrazije zuba, karijesnih lezija, plombi II klase, odsustvo protetskih ili kompozitnih nadoknada, odsustvo anomalija u obliku, strukturi i razvoju zuba.

Premeravanja su vršena digitalnim nonijusom japanske proizvodnje (Model No. CD6 GS, Mitoyoto, Tokyo) sa preciznošću od 0,01 mm. Sva merenja su izvršena od strane jednog ispitivača sa velikim iskustvom u merenju. Meren je meziodistalni promer četiri maksilarna inciziva i maksilarno interpremolaro (najdublja tačka centralne fisure prvih premolara) i intermolaro rastojanje (najdublja tačka centralne fisure prvih molara). Greška premeravanja određena je poređenjem vrednosti ponovnog merenja deset modela izabranih slučajno, deset dana nakon prvog premeravanja Wilcoxon statističkim testom. Rezultati nisu pokazali statistički signifikantnu razliku između dva premeravanja.

### ***Statistička analiza***

Statistički softver IBM SPSS 20 korišćen je za analizu podataka. Prosečne vrednosti, standardna devijacija i koeficijent varijacije su izračunati za muški i ženski pol odvojeno. Širina luka izračunata je za svakog pacijenta prema Pontovoj formuli i određen je koeficijent korelacije između izmerenih i izračunatih vrednosti.

To the best of our knowledge, up to now, no study was undertaken to investigate the application of Pont's Index in Serbian population. Thus, this study was initiated in order to estimate the applicability of Pont's Index to the Serbian population.

### ***Materials and methods***

For the present study, 200 dental casts (100 males and 100 females) were selected. All the subjects were homogeneous Serbs, 13 to 16 years old ( $14.35 \pm 1.14$ ), with normal class I occlusion and without history of previous orthodontic treatment. The inclusion and exclusion criteria implied: the presence of permanent dentition (excluding second and third molars) with adequately erupted teeth to allow measurements of the mesiodistal crown dimensions; regularly poured study models; the nonexistence of mesiodistal and occlusal abrasion, caries lesions and Class II fillings; the casts without any prosthetic or composite restorations and any tooth anomalies.

The dental casts processing was performed out using a digital caliper with precision of 0.01 mm (Model No. CD6 GS, Mitoyoto Co, Tokyo-Japan). Ten models were randomly selected to be measured twice at an interval of ten days and measured by an experienced examiner (GF). In order to calculate the true interpremolar and intermolar widths - IPW(t) and IMW(t), as well as Pont's estimation for interpremolar and intermolar widths - IPW(e) and IMW(e), mesiodistal crown diameters of the four maxillary incisors, maxillary interpremolar width, maxillary first premolars distal pits and maxillary intermolar width and maxillary first molars central fossae, were measured.

### ***Statistical analysis***

Statistical software IBM SPSS 20 was used for data analysis. Average values, standard deviation and variation coefficient were calculated separately for male and female gender. Using Pont's formulae, incisal and arch widths were estimated and Pearson correlation coefficients between the values of calculated and measured arch width were determined. The independent samples t-test

Studentov t-test korišćen je da se odredi signifikantnost razlika u veličini zuba i širine zubnih lukova između polova. Korišćen je Wilcoxon test za određivanje sistemske greške. P vrednosti manje / ili jednako 0,05 se smatraju signifikantnim.

## **Rezultati**

Statističko poređenje pokazalo je da nema značajnih razlika između prvog i drugog premeravanja za meziodistalni promer zuba, maksilarnu interpremolaru i intermolaru širinu luka. Rezultati ispitivanja pokazali su da su vrednosti za interpremolaru i za intermolaru širinu luka izmerene na studijskim modelima pacijenata kod oba pola manje, nego vrednosti koje su dobijene primenom Pontove formule ( $p < 0,001$ ) (Tabela 1 i Tabela 2). Pearsonov koeficijent korelacije poka-zuje da postoji signifikantna korelacija između vrednosti interpremlarne i intermolarne širine luka, izmerenih direktno na studijskim modelima pacijenata, i vrednosti dobijenih primenom Pontove formule, na nivou značajnosti  $p < 0,001$  (Tabela 3). U Tabeli 4. prikazana je procentualna zastupljenost osoba kod kojih su izmerene vrednosti ispod/iznad ili jednake vrednostima predviđenim PI ( $\pm 1$  mm). Vrednosti stvarne interpremlarne širine, kod 71,3% osoba muškog pola i kod 66% osoba ženskog pola manje su od očekivanih vrednosti po Pontovoj formuli.

Vrednosti stvarne intermolarne širine, kod 68,3% osoba muškog pola i 66% osoba ženskog pola manje su od očekivanih vrednosti po Pontovoj formuli. Samo kod 12,5% osoba muškog pola i 7,7% osoba ženskog pola (interpremlarna širina), i 18,8% osoba muškog pola i 20,5% osoba ženskog pola (intermolarna širina) nema signifikantne razlike ( $-1$  mm/ $+1$  mm) u odnosu na očekivane vrednosti.

was employed to detect if there was a significant difference between tooth and/or arch width values for both sexes. Wilcoxon statistical test was applied to determine the systematic error. P values less than/or equal to 0.05 were considered to be significant.

## **Results**

The statistical comparison showed that the differences between the first and second measurements for mesiodistal diameters of teeth and maxillary interpremolar arch width and maxillary intermolar arch width were insignificant. Mean values of interpremolar arch width for both sexes are presented in Table 1 and for the intermolar arch width in Table 2. The results showed that the true interpremolar and intermolar arch widths measured on the casts for both male and female groups were generally lower than the interpremolar and intermolar arch widths estimated by Pont's formula ( $p < 0.001$ ). Pearson's correlation coefficient revealed that significant correlations exists between interpremolar and intermolar arch widths determined directly on the dental casts and those estimated by Pont's Index (Table 3;  $p < 0.001$ ). Table 4 contains the percentage of subjects whose measured values were under/over or equal to Pont's prediction ( $\pm 1$  mm).

The values of measured interpremolar width in 71% of male subjects and 66% of female subjects were lower than the expected values based on Pont's formula. The values of measured intermolar width in 68.3% of male subjects and 66% of female subjects were lower than the expected values based on Pont's formula.

Only in 12.5% of male subjects and 7.7% of female subjects (interpremolar width) and 18.8% of male subjects and 20.5% of female subjects (intermolar width) there was no significant difference ( $-1$ mm/ $+1$ mm) between the measured and expected values.

**Tabela 1.** Deskriptivna analiza za interpremolarnu širinu (mm)  
**Table 1.** Descriptive analysis for interpremolar width (mm)

	Gender					
	Male (N=101)			Female (N=100)		
	Mean	(±) SD	CV	Mean	(±) SD	CV
IPW(t)	37.75	1.94*	5.14	36.81	2.15	5.83
IPW(e)	39.93	2.36** <sup>a</sup>	5.92	38.60	2.56	6.63
SI	31.94	1.89**	5.92	30.88	2.05	6.63
SI/ IPW(t)	0.85	0.05	5.76	0.84	0.05	6.50

\* $p < 0.01$ , \*\* $p < 0.001$ , a- Pont's estimation vs. true value ( $p < 0.001$ ); IPW(t) - True interpremolar width as measured on the casts, IPW(e) - Pont's estimation for interpremolar width, SD - Standard Deviation.

**Tabela 2.** Deskriptivna analiza za intermolarnu širinu (mm)  
**Table 2.** Descriptive analysis for intermolar width (mm)

	Gender					
	Male (N=101)			Female (N=100)		
	Mean	(±) SD	CV	Mean	(±) SD	CV
IMW(t)	47.27	2.66**	5.63	45.97	2.24	4.88
IMW(e)	49.91	2.95** <sup>a</sup>	5.92	48.25	3.20	6.63
SI	31.94	1.89**	5.92	30.88	2.05	6.63
SI/IMW(t)	0.68	0.04	6.57	0.67	0.04	5.98

\*\* $p < 0.001$ , a - Pont's estimation vs. true ( $p < 0.001$ ); IMW(t) - True intermolar width as measured on the casts, IMW(e) - Pont's estimation for intermolar width, SD - Standard deviation.

**Tabela 3.** Koeficijent korelacije ( $r$ ) između izmerenih i vrednosti širine luka prema Pontovoj formuli

**Table 3.** Correlation coefficient ( $r$ ) between measured and arch width values according to Pont's formulae

	Males ( $n = 101$ )		Females ( $n = 100$ )	
	$r$	$p$	$r$	$p$
IPW(e)	0.46	< 0.001	0.45	< 0.001
IMW(e)	0.33	< 0.001	0.49	< 0.001

IPW(e) - Pont's estimation for interpremolar width, IMW(e) - Pont's estimation for intermolar width.

**Tabela 4.** Broj i procenat ispitanika kod kojih su izmerene vrednosti ispod, iznad ili po Pontovim predviđanjima  $\pm 1$ mm  
**Table 4.** Number and percentage of subjects who have measured values under, over or Pont's prediction  $\pm 1$ mm

	Under Pont's prediction	Over Pont's prediction	Pont's prediction $\pm 1$ mm
IPW Males ( $n=101$ )	72 (71.3%)	9 (8.9%)	20 (19.8%)
Females ( $n=100$ )	66 (66.0%)	13 (13.0%)	21 (21.0%)
IMW Males ( $n=101$ )	69 (68.3%)	12 (11.9%)	20 (19.8%)
Females ( $n=100$ )	66 (66.0%)	13 (13.0%)	21 (21.0%)

IMW - Intermolar width

### *Diskusija*

Predviđanje idealne veličine zubnog luka i postizanje stabilnih rezultata po završetku ortodontske terapije često su tema ispitivanja<sup>12,21</sup>. Jedna od metoda opisana je još 1909. godine od strane Ponta, koji je ispitivanje sproveo na francuskoj populaciji, pri čemu tačan broj ispitanika nije poznat, pa je i sam autor predložio neophodnost provere indeksa na drugim populacijama<sup>13</sup>. Poznata je činjenica da se veličina zuba razlikuje između polova i populacija<sup>1,6-9,22</sup>. Zbog toga je klinička primena Pontovog indeksa bila tema brojnih studija sa namerom da se odredi da li se može koristiti u predviđanju idealne širine zubnog luka kod pripadnika različitih naroda<sup>15-18,20,23-25</sup>. Rezultati ispitivanja sprovedenog na ortodontskim pacijentima u srpskoj populaciji pokazuju da su interpremolarne i intermolarne širine zubnog luka, koje su izmerene na modelu, generalno manje od interpremolarne i intermolarne širine predviđene Pontovom formulom,  $p < 0,001$ . Ovi rezultati poklapaju se sa rezultatima dobijenim prethodnim ispitivanjima<sup>14,23</sup>. Međutim, Nimkarn i sar.<sup>19</sup> opisuju da su predviđene vrednosti precenjene u odnosu na vrednosti izmerene na studijskim modelima, zato dobijene rezultate treba razmatrati s oprezom.

Primenom Pontovog indeksa kod ispitanika Indijske populacije, Gupta i sar. dobili su signifikantno značajnu zavisnost između veličine širine inciziva i veličine zubnog luka<sup>16</sup>.

### *Discussion*

In order to produce more stable results and to predict an ideal arch width, up to now, different clinical studies have been performed<sup>12,21</sup>. One of these was described in 1909 by Pont who acquired the data from French population, but without the exact number of subjects included in the study<sup>13</sup>. Pont also proposed the necessity of testing the index on other populations as well<sup>13</sup>. It is a well known fact that the teeth size varies between sexes and populations<sup>1,6-9,22</sup>. Having in mind these facts and using different criteria, the clinical application of Pont's Index has been extensively investigated in numerous studies<sup>15-18,20,23-25</sup> in order to determine whether the Pont's Index could be used in prediction of an ideal arch width for different populations<sup>23-25</sup>.

The results of our study based on Serbian population showed that the values of measured interpremolar arch width and intermolar arch width were generally lower than Pont's prediction (Table 1). These findings were consistent with those found for other populations<sup>14,23</sup>. However, Nimkarn et al.<sup>19</sup> discovered an overestimation of arch widths relative to actual arch width measured on the dental casts. Thus the obtained results should be taken with caution.

By applying Pont's Index on Indian population, Gupta et al. showed significant relationship between the arch widths sum and incisor widths sum<sup>16</sup>. Pont's Index suitability in a sample consisted of Navajo-Indians and American dental medicine students was studied, where the authors

Primena Pontovog indeksa kod pripadnika Navaho indijanaca i studenata stomatologije u USA nije prikladna i autori predlažu revidiranje koje bi omogućilo kliničku primenu<sup>18</sup>. Slične rezultate objavili su Nimkarn i sar. u Indiji<sup>19</sup>. Podaci za populaciju Australijskih aboridžina, Indonežana i Australijanaca bele rase, takodje potvrđuju da Pontov indeks nije prikladan za upotrebu u kliničkoj praksi<sup>14</sup>. Utvrđeno je takodje da ovaj indeks ne treba koristiti u ovom obliku u analizi idealnog zubnog luka kod pripadnika turskog naroda<sup>20</sup>.

U ispitivanju, Pearsonov koeficijent korelacije pokazao je da postoji značajna korelacija između vrednosti inter-premolarne i intermolarne širine koje su izmerene na studijskim modelima i vrednosti dobijenih matematičkim izračunavanjem. Ovi nalazi su u saglasnosti sa nekim od prethodnih studija<sup>16</sup>, a razlikuju se od ispitivanja većeg broja autora koji su objavili slabu korelaciju između očekivane širine i stvarne širine zubnog luka<sup>14,19,23</sup>. Iako postoji statistički značajna pozitivna korelacija izmerenih vrednosti i po formuli sračunatih vrednosti IPŠ i IMS, ipak između ovih vrednosti postoji i statistički značajna razlika na maksimalnom nivou statističke značajnosti ( $p < 0,001$ ). Dobijeni rezultati navode na zaključak da Pontov indeks u ovom obliku nije odgovarajući za srpsku populaciju. Brojni autori su objavili slične rezultate na osnovu kojih zaključuju da su potrebni populacioni specifični indeksi<sup>14,18,19,20,24</sup>.

U uzorku zubni lukovi pacijenata su užu u poređenju sa vrednostima dobijenim izračunavanjem, pa se može reći da ova formula precenjuje potrebnu širinu zubnog luka da bi se izbeglo stanje teskobnosti zuba<sup>25</sup>.

## Zaključak

Pontov indeks koji se koristi u ortodontiji za određivanje potrebne širine zubnog luka za smeštaj zuba u pravilan niz, bez teskobe, nije primenljiv u postojećem obliku kod pacijenata srpskog porekla, mada treba uzeti ove zaključke s oprezom, s obzirom na to da su doneseni na osnovu analize relativno malog broja studijskih modela (200 modela). Neophodno je sprovesti ispitivanja na velikom uzorku da bi se odredili populaciono specifični standardi za srpsku populaciju.

reported that the Pont's Index usage in clinical practice should be furthermore reviewed<sup>18</sup>. Also, the similar results were presented by Nimkarn et al.<sup>19</sup> The data from Australian Aborigines, Indonesians and white Australian populations, confirmed that the Pont's Index is not applicable in clinical practice<sup>14</sup>. Additionally, it was established that Pont's Index should not be used during the analysis of the ideal arch within Turkish individuals<sup>20</sup>. The previously discussed investigations showed that Pont's Index was uncertain clinical parameter to be used for dental arch width prediction.

In study, calculation of Pearson's correlation coefficient revealed the existence of significant correlations between interpremolar and intermolar arch widths calculated directly on the dental casts and those estimated by Pont's Index. The present findings are in agreement with some of the previous studies<sup>16</sup>, however there is still a great number of them which presented opposite results i.e. poor correlation between the anticipated arch width estimated by Pont's Index and the actual arch width calculated directly from the casts<sup>14,19,23</sup>. Although there is statistically significant positive correlation between values, there is also a statistically significant difference between values obtained from formulas for inter-premolar and -molar width ( $p < 0,001$ ). The obtained results suggest that Pont's Index in this form is not suitable for Serbian population. Numerous authors also published similar findings, concluding that there is a need for population specific indexes<sup>14,18,19,20,24</sup>.

In our study, sample arches are narrower compared to Pont sample which indicates that Pont's index inclines to overestimation of the arch width required to unloose crowding<sup>25</sup>.

## Conclusion

According to the limitations of the study, in a sample of 200 subjects, it could be concluded that Pont's index which is used in orthodontics to determine the necessary width of the dental arch for normal occlusion without crowding is not applicable for the Serbian population in its current form. Thus, it is essential to establish new specific standards for prediction of ideal dental arch based on a larger sample in order to use it in everyday clinical practice.

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### ***Conflict of Interest***

The authors have declared that no COI exists.

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