

## Re-assessment of Pont's index in Angle class one normal occlusion amongst Kabul population

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### Abstract:

**Background:** In orthodontic cases management, many information obtained from dental cast which are critical in diagnosis, treatment planning and evaluation of treatment results. Pont's index which was introduced and published by Pont in 1909 shown that the ratio b/w sum of maxillary incisors and inter-premolar arch width (MPV) in maxilla is (0.80) and inter-molar arch width (MMV) is (0.64). Also(**aims**), to re-asses the Pont's index in angle class one normal occlusion amongst Kabul population, its validity and reliability for the predication of ideal arch width of interpremolar and intermolar area. Hence(**Methodology**), it's a descriptive and statistical study, sample size consists of 35 male and female aged 16 to 36 years old, cast are measured for maxillary incisors and interpremolar arch width from distal pits and intermolar arch width from central occlusal pits with sliding caliper (Metal Varner clipper), data analyzed by IBM SPSS 25 version. Although (**Result**), descriptive and statistical analysis shown that (calculated premolar value) CPV and CMV (calculated molar value) are greater than what is measured as Measured premolar value and measured molar value on the cast. So the mean ratio b/w sum of maxillary incisor and MPV is estimated to be (0.85) and MMV was (0.66). Furthermore (**Conclusion**), Pont's analysis shown different values amongst Kabul population from that was reported as Pont's index, for its clinical use in Kabul best to consider current study suggestions.

**Key words:** Pont's index, MPV (interpremolar arch width), MMV (intermolar arch width, CPV, CMV.

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**Introduction:**

While managing orthodontic cases, many information obtained from dental cast which are critical in diagnosis, treatment planning and proceeding of treatment results. <sup>(1)</sup> There is a clear association between tooth size, size of arch and maxillary intermolar arch and degree of crowding; <sup>(2)</sup> for the treatment of crowding there are many methods to make equal size of dental arch according to teeth material and make a proper interpremolar and intermolar arch width in the maxilla accordingly to the patient’s teeth sizes. Pont’s index which was introduced and published by the famous orthodontist Pont is a way to measure the interpremolar and intermolar arch width and it shown that the ration b/w sum of maxillary incisors and inter- premolar arch width (MPV) in maxilla is (0.80) and the ratio b/w sum of maxillary incisors and inter-molar arch width(MMV) is (0.64). <sup>(3)</sup>

According to Pont, sum of maxillary incisors multiply to 100 and divide it over 80 ideal interpremolar arch width is predicted or It may have divided over 64 for ideal intermolar arch width predication <sup>(4)</sup>. Pont collected data from French population and it was not specific how many subjects were included. He apparently suggested to, the reliability of his research should

tested in other population because he was aware of possible differences b/w different ethnic groups. <sup>(5)</sup>

In Germany, USA and many other countries conducted studies shown Pont’s index importance in clinical use. <sup>(1)</sup>

Pont’s index effectiveness is not sure among all, as this analysis published according to France and it is hypothesized that the Pont’s index may not fit to Afghanistan people, however for establishing normal class one relation is a great value to study Pont’s index amongst Kabul population.

Demographic table0.0

	Frequenc y	Percent	Valid Percent	Cumulative Percent
Male	24	68.6	68.6	68.6
Valid female	11	31.4	31.4	100.0
Total	35	100.0	100.0	

**METHODS AND MATERIALS:**

The study has been approved by the ethical and scientific committee of the Noman-e Sadat institute of higher education and carried out in accordance with the principles of the declaration of Ministry of Health in Afghanistan. Written consent was

obtained from subjects of participants in this study and impressions are taken and poured by trained professionals.

This is a descriptive and analytical study, sample size consist of 35 participants aged 16 to 36 years old both from male and female gender, all which have been randomly selected are Afghanistan origin and live in center of Kabul city.(table0.0) Criteria for selection of sample was class one Angle normal dental relationship <sup>(2)</sup>. Most of permanent teeth were present with lest and mild spaces in some arches (with no extraction in upper arch and congenitally missing) with normal skeleton and no deformities. Accordingly, most of those casts which have been gone through orthodontics treatment, having age more of 36 years as well as, less than 16 years and does not have normal relationships are excluded from the study.

All maxillary incisors are measured and calculated with a sliding caliper gauge (Metal Varner clipper) accurate up to 0.1mm. and teeth are measured mesio-distally from anatomic one contact point to other contact point on the opposite site for each cast by the main researcher at Noman-e Sadat higher education institute campus.

According to Pont the arch width measured in first maxillary premolar region between distal pits and between maxillary molars from their central fossa <sup>(6)</sup>. Pont's introduced equation was used to predict arch width between maxillary premolars (CPV) and molars (MMV) as explained in next lines. Sum of maxillary incisors divided by 80 multiplied by 100 and as well as sum of maxillary incisors divided by 64 multiplied by 100.

For the analyzing of data (SPSS IBM) program updated version 25 was used. The statistical analysis used include: Descriptive statistics (mean, standard deviation, minimum and maximum with confidence rate of (95 %)).

**Results:** Descriptive and statistical analysis of mean of sum of maxillary incisors for male and female shown in

table1.

Descriptive and statistical analysis of the mean of interpremolar arch width (MPV) was shown in table (3), and inter-molar (MMV) is shown in Table (4).

Calculated premolar arch width and molar arch width which are estimated by Pont's formula are greater than MPV and MMV from the studied cast.

Descriptive and statistical analysis for CPV according to Pont's index

revealed overestimation of arch by 2.551 table (4), however for MMV is 1.5672 show in table (5).

Analysis of the data in current research shown that mean of the ratio b/w sum of maxillary incisors and MPV is greater than (0.80) Table (6), as well as mean of the ratio b/w sum of maxillary incisors and MMV is greater than (0.64) which is estimated in Pont's index. Table (7)

Mean of the measured molar value is seen to be greater than the mean of measured premolar value by about ten millimeters. Table (8)

Ratio Statistics for sum incisors / MPV table6.0

Mean	Minimum	Maximum	Std. Deviation
.857	.742	.947	.049

Ratio Statistics for sum incisors / MMV table7.0

Mean	Minimum	Maximum	Std. Deviation
.664	.585	.750	.045

## Discussion:

The sample size of current study determined randomly 35 both 24male and 11female over the center of Kabul

population and the result found that the ratio between sum of maxillary incisors and measured premolar arch width is (0.855) and measured molars arch width is (0.664), whereas Agneska Rykman, Dalia Samailene study on

52 subjects (age range from 18 to 35 years) with normal occlusion, from Lithuanian individuals reveals same measurements<sup>(5)</sup>. Huda A Al-Sarraf studied on 44 boys and girls aged 14 to 16 years, results shown the use of Pont's index for estimation of maxillary dental arch width is not so reliable and cannot be considered

to be of great clinical value in diagnosis

and treatment planning considerations <sup>(1)</sup>, 142 subjects are randomly selected in a research for determination and application of Pont's index in Turkish population, the correlation b/w MPV and MMV and its corresponding calculated arch width according to Pont's formulae proven low in the study which was done in turkey by Celebi <sup>(6)</sup>. Sample size is not mentioned in original analysis of Pont' Index.

**Descriptive analysis mean of the sum of incisors. Table1.0**

Journal	N	Minimum	Maximum	Mean	Std. Deviation
sum incisors	35	28.00	38.20	32.0343	2.06297

**Descriptive analysis of Difference b/w CMV<sup>(1)</sup> – MMV<sup>(2)</sup> table5.0**

	Mean	N	Std. Deviation	Std. Error Mean
Pair 3 CMV	49.9729	35	3.16341	.53471
MMV	48.4057	35	3.43022	.57981

**Descriptive analysis of the mean of (MMV)table3.0**

	N	Minimum	Maximum	Mean	Std. Deviation
MMV	35	41.00	56.00	48.4057	3.43022
Valid N (listwise)	35				

**Descriptive analysis of Difference b/w CPV<sup>(1)</sup> – MPV<sup>(2)</sup> table4.0**

	Mean	N	Std. Deviation	Std. Error Mean
Pair 2 CPV	40.0110	35	2.56139	.43295
MPV	37.4600	35	2.53484	.42847

descriptive analysis of current research over center of Kabul population revealed that the mean of estimated

**Descriptive analysis of Difference b/w MMV<sup>(1)</sup>-MPV<sup>(2)</sup> table8.0**

	MMV/MPV Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 MMV – MPV	10.94571	1.77389	.29984	10.33636	11.55507	36.505	34	.000

CPV and CMV by Pont's index is greater than the mean of actual MPV and MMV on the studied sample size, which is opposite of what have been proven by Huda A Al-sarraf in Mousel, a greater MPV and MMV than CPV and CMV<sup>(1)</sup>. validity of Pont's index in Bangladesh is not acceptable as the mean of ratio b/w Sum of maxillary incisors and MPV was (0.89), whereas the mean of ratio b/w sum of maxillary incisor and MMV was (0.66)<sup>(9)</sup>. in current study the mean ratio b/w sum of maxillary incisors and MPV is (0.85) and the mean ration b/w sum of maxillary incisors and MMV proven to be (0.66).the present study findings are disagree with of Dalidjan et al..<sup>(8)</sup> this study is agree with the findings of Nimkarn et al..<sup>(10)</sup> who found an overestimation of arch width estimated by Pont's index relative to actual arch width measured directly on the dental cast.

**Conclusion:** Pont's index is not reliable and valid over Kabul population as it's explained by Pont's in 1909, whereas the ratio b/w sum of maxillary incisors and interpremolar

arch width and molar arch width is different according to ethnic groups. In Kabul, it's suggested that during predication of ideal interpremolar arch width and molar arch width, that is good to first estimate the ratio b/w sum of maxillary incisors and MPV as well as, sum of maxillary incisors and MMV if, it is on the range which is shown in table 6 and 7 so it's normal, to find the ideal interpremolar arch width and intermolar arch width its best to be sum of maxillary incisors multiply to 100 and divided to 85.7 for interpremolar ideal arch width and divided to 66.4 for ideal intermolar arch width.

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**Acknowledgement:** Thanks Dr Murtaza Hofiani and Pharmacist Zaman Nowrozi for guidance and help.

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