

Crown Height and its Relation to Arch Width, Arch Length and Arch Perimeter in Ideal Occlusion





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Abstract

Introduction: To investigate crown height for sexual dimorphism and its relation to arch length, arch perimeter and arch width (Inter canine, Inter premolar, Intermolar) groups of maxilla and mandible.

Material and Methods: Cross sectional study was done the data were collected from 128 subjects (64 males and 64 females with mean age 19.4 ± 1.9 SD). Arch perimeter, arch length, crown height, and width of arch of both maxilla and mandible were acquired by digital calliper (Mitutoyo, Japan). Total variables measured were 4,855. Sex differences in the crown height were explored. Analysis of variance (ANOVA) was applied for evaluating the differences if any between arch perimeter, arch length, and arch width groups.

Results: Noteworthy larger mean values in males than females for crown height ($p \leq 0.05$) for maxillary as well mandibular arches. No substantial differences were observed in average vs. large, average vs. small, large vs. small groups of arch length, arch perimeter and arch width (Inter canine, Inter premolar, Intermolar) groups ($p \leq 0.05$) for both maxillary and mandibular arches.

Conclusions: Our results specified sexual disparities in the height of crown. Crown height has no substantial relation to different arch perimeter, arch length, and arch width groups of both maxilla and mandible. Hence it might be useful for orthodontic case investigation and treatment of various malocclusion groups.

Introduction

Variations in tooth size and tooth size ratio have been connected with diverse ethnic foundations and occlusion status [1]. Sexual dimorphism in crown dimension has a relation and is influenced by humanoid sex genes and hormones [2]. Hereditary and ecological factors have strong effects on the human teeth [3]. In orthodontic diagnosis and treatment planning, great importance has been attached to evaluating the tooth size and its discrepancies on the global population [4]. For the achievement of pleasant smile and proper interdigitation, the preadjusted fixed orthodontic brackets should be ideally positioned. Thus, the crown height is of extreme value in orthodontic bonding. The teeth crown height has significant relation to facial stature, both can be swayed by orthodontic treatment [5] Therefore, during orthodontic planning to design a smile the macro, mini and micro-aesthetics should be deliberated afore [6-10]. The crown height of incisors has tremendous effect on

the smile of a patient, and leads an imperative part in facial charm [11]. Linear measurements have been incorporated into various dental model analyses to help the clinician for designing the most appropriate treatment plan [12]. Some studies have investigated race and sex differences. Other authors have suggested no significant differences in the tooth size ratio with different malocclusion [13].

However, the crown height was investigated in relation to facial height [14], facial appearances [15] and smile. According to our knowledge till date no one investigated the crown height in relation to the arch length, width, perimeter in normal occlusion. Current study goal was to explore the crown height of both maxilla and mandible, correspondingly to reconnaissance the following objectives for the first time in Pakistani population.

- a) To evaluate crown height in relation to arch perimeter groups.

- b) To evaluate crown height in relation to arch length groups.
- c) To evaluate crown height in relation to arch width groups in
- d) Inter canine width
- e) Inter premolar width
- f) Intermolar width
- g) To appraise amount of sexual dimorphism

Methods

Cross sectional study was done, the dental and oral examinations were carried out by careful selection of subjects from Pakistani population. University Sains Malaysia ethical committee ethical approval, bearing letter # (USM/JEPeM/140376), before commencement of the study participants gave informed consent. The design and conduction of this study was in accordance with STROBE guideline (Strengthening the Reporting of Observational studies in Epidemiology), being applied in current manuscript [16-20].

Sample Size Calculation

Size of the sample was calculated at a power of 80%, using estimated standard deviations 0.60mm [21], biologically significant mean difference 0.3mm, with equal sizes of sample [22]. Size of sample calculated was 64 females and 64 males, total 128 participants with mean age.

The inclusion as well the exclusion criteria:

Inclusion Criteria

- a) All patient's origin was Pakistan determined by interviews, having common paternities plus ancestors without multi-ethnic marriages.
- b) Subjects were aged 18-24 years.
- c) Maxillary and mandibular arches which are well-aligned, showing normal development and growth patterns.
- d) None of the participants had undertaken orthodontic treatment, with all thorough erupted permanent teeth, (3rd) third molars as exception.

- e) Class I molar, canine relationship with incisors plus Ideal occlusion in harmony with British Standards Institute [23].
- f) No spacing, crowding or cross bite.
- g) Straight profile identified by examination of the profile view.
- h) Teeth following the ideal line of occlusion
- i) No anomalies in craniofacial region.

Exclusion Criteria

- a) Any restorations or caries interproximal.
- b) Any supernumerary or missing teeth.
- c) Anomalous morphology or size of teeth.
- d) Extruded and intruded teeth.
- e) Tooth wear affecting tooth size measurements.
- f) Destruction to casts.

Dental and oral examinations were done with cautious selection of participants. For diminishing error and bias cross-examination of participants was done with skilled orthodontist along with dentists who contributed all over sittings of screening. Use of alginate impression material (Zhermack Orthoprint alginate ISO 1563 – ADA 18 Italy) for obtaining dental impressions of both upper plus lower arches of individual participant and was then dispensed with hard plaster, Type III quick stone of China (Dental Stone) following instructions by manufacturer. Total variables measured were 4,855.

Measurement of Crown Height and Arch Dimensions

Both arches (Maxillary and mandibular) dental models of each participant was carefully selected according to inclusion and exclusion criteria. Both arches (Maxillary and mandibular) arch length, arch width, crown height were recorded by digital calliper (DC) (Mitutoyo, Japan) [24].

Crown Height Measurement

Crown heights were recorded as the greatest distance on buccal/labial surface from the occlusal/incisal line to cervical line parallel to occlusal plane [25] (Figure 1).

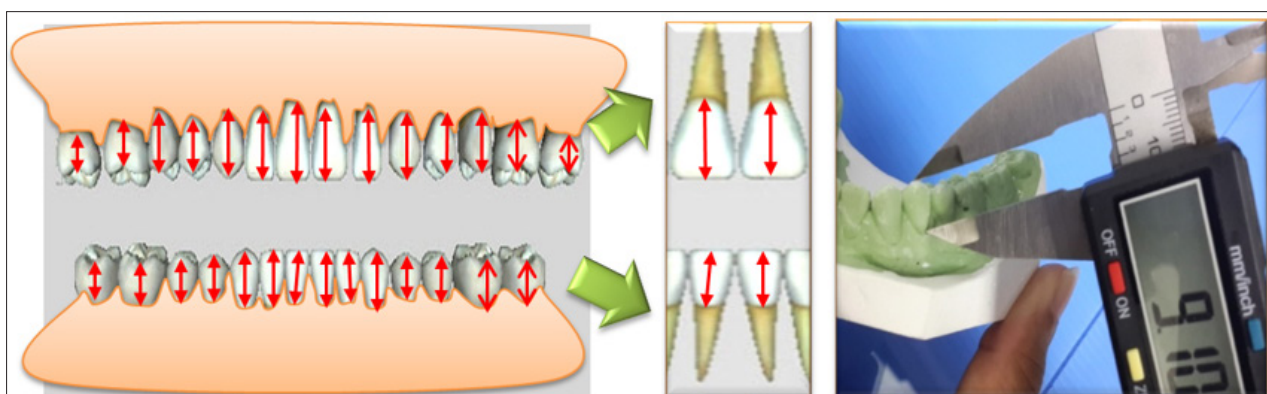


Figure 1: Crown height measurement via digital caliper.

Arch Dimensions Measurements

Arch width of maxillary and mandibular variables (Figure 2a)

- Maxillary and mandibular inter canine widths were obtained between tips of cusp.
- Maxillary as well as mandibular interpremolar widths were obtained between cusp tips of first maxillary premolars [26].
- Maxillary and mandibular intermolar widths were obtained between the mesiobuccally cusp tips the of first molars of maxillary and mandibular respectively [27].

Arch Length, Arch Perimeter Measurements

Arch Length: Arch length was obtained using triangular shaped lines amongst the mesiobuccally cusp tips of first permanent molars and central point between incisors of each respective arch (Figure 2b).

Arch Perimeter: Arch perimeter was measured as a segmental sum of linear lines on the left and right side of respective arches (Figure 2c).

Arch Length, Arch Perimeter and Arch Width Grouping: The participants were additionally grouped accordingly:

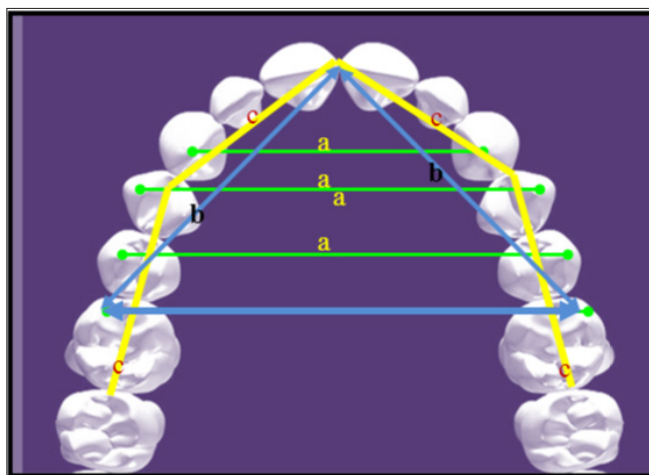


Figure 2: Arch dimension measurements.

- Arch width
- Arch length
- Arch perimeter

- Arch length groups (small, average and large).

The numbers of subjects for small, average and large arch length groups in the maxilla and mandible were 46, 44 and 38 respectively.

- Arch perimeter groups (small, average and large).

The number of subjects for small, average, and large arch perimeter groups in the maxilla and mandible were 44, 45 and 39 respectively.

- Arch widths group (small, average and large)

The number of subjects for small, average, and large arch width groups in the maxilla and mandible were 44, 45 and 39 respectively for (intercanine, interpremolar and intermolar width). These groupings were determined on data values of the Mean \pm 2 SD, >2 SD and <2 SD grouped in the average, large and small group, correspondingly (Alam et al.).

Error Study

20% of dental casts were randomly selected for interobserver errors. There was 2 weeks' time interval approximately between the first and second readings. The ME (method error) was analyzed by the Dahlberg's formula: $ME = (\sum (x_1 - x_2)^2 / 2(28))^{1/2}$. x_1 being

first and x_2 being second measurement and n is the number of repeated measurements [9].

Statistical Analyses

Data verification and analysis was done statistically by use of IBM SPSS (Statistics Version 22.0, Armonk, NY: IBM Corp.) confidence level being set at 5% ($P < 0.05$) for significance test. Application of independent t tests for comparing mean values amongst males and females crown height in relation to all variables. Evaluation of values difference for arch width, length and perimeter was done with ANOVA (Analysis of variance).

Results

Method Error

Use of Dahlberg's formula for determining method error, not exceeding 0.05mm for linear variables of teeth crown height. The collective errors for all the variables were small and was considered to be in acceptable limits [9].

Sexual Disparities

Tables 1 & 2 show the significant differences between the sexes with p values ($p \leq 0.001$), ($p \leq 0.01$) and ($p \leq 0.05$) in crown height for both arches (maxillary, mandibular) respectively.

Table 1: Maxillary arch sexual disparities in crown height.

Variables	Sex	Mean	SD	95% CI		P Value
				Lower	Upper	
11	M	9.44	0.67	.197	.659	.000
	F	9.01	0.65			
12	M	7.98	0.71	.089	.541	.007
	F	7.67	0.57			
13	M	8.94	0.86	.470	1.057	.000
	F	8.18	0.82			
14	M	7.23	0.68	.413	.920	.000
	F	6.57	0.77			
15	M	6.04	0.67	.179	.643	.001
	F	5.62	0.65			
16	M	5.93	0.59	.186	.592	.000
	F	5.54	0.57			
17	M	5.56	0.61	.274	.679	.000
	F	5.08	0.55			
21	M	9.41	0.68	.195	.653	.000
	F	8.98	0.63			
22	M	7.93	0.72	.038	.498	.023
	F	7.67	0.59			
23	M	8.89	0.87	.357	.930	.000
	F	8.25	0.76			
24	M	7.26	0.73	.346	.869	.000
	F	6.65	0.77			
25	M	6.03	0.68	.079	.534	.009
	F	5.72	0.62			
26	M	5.88	0.60	.151	.559	.001
	F	5.52	0.57			
27	M	5.51	0.62	.178	.568	.000
	F	5.14	0.49			

Note: *sDI notation; F, female; M, male; CI, confidence interval; SD, standard deviation ($p \leq 0.001$), ($p \leq 0.01$) and ($p \leq 0.05$).

Table 2: Mandibular arch sexual disparities in crown height.

Variables	Sex	Mean	SD	95% CI		P Value
				Lower	Upper	
31	M	7.50	0.61	.14	.59	.002
	F	7.13	0.68			
32	M	7.48	1.00	.02	.61	.039
	F	7.17	0.66			
33	M	8.87	0.87	.21	.79	.001
	F	8.37	0.78			
34	M	7.48	0.70	.08	.53	.009
	F	7.18	0.58			
35	M	6.49	0.50	.14	.50	.001
	F	6.18	0.53			
36	M	6.28	0.48	.16	.48	.000
	F	5.95	0.45			

37	M	5.93	0.64	.16	.60	.001
	F	5.55	0.60			
41	M	7.51	0.59	.15	.59	.001
	F	7.15	0.66			
42	M	7.48	0.98	.00	.58	.051
	F	7.19	0.65			
43	M	8.91	0.87	.16	.76	.003
	F	8.45	0.82			
44	M	7.57	0.70	-.03	.44	.088
	F	7.37	0.63			
45	M	6.55	0.47	.10	.47	.003
	F	6.26	0.57			
46	M	6.29	0.48	.09	.43	.004
	F	6.03	0.50			
47	M	5.97	0.62	-2.34	1.22	.536
	F	6.52	7.17			

Note: *FDI notation; F, female; M, male; CI, confidence interval; SD, standard deviation ($p \leq 0.001$), ($p \leq 0.01$) and ($p \leq 0.05$).

Disparities in Relation to Arch Length, Perimeter and Widths Groups of Maxilla

Table 3-7 shows the maxillary arch perimeter, length, and width

(intercanine, interpremolar and intermolar) groups in relation to crown height respectively. No noteworthy differences were observed in large vs. small, average vs. large, average vs. small arch groups ($p \leq 0.05$).

Table 3: Crown height in relation to upper arch perimeter groups.

Variables	UAPG	Mean	SD	95% CI		P
				Lower	Upper	
11	Av vs Sm	9.23	0.61	-0.34	0.37	1.000
	Av vs Lar	9.21	0.75	-0.39	0.36	1.000
	Lar vs Sm	9.23	0.73	-0.37	0.37	1.000
12	Av vs Sm	7.74	0.59	-0.46	0.22	1.000
	Av vs Lar	7.85	0.74	-0.41	0.30	1.000
	Lar vs Sm	7.91	0.66	-0.18	0.52	.724
13	Av vs Sm	8.54	0.67	-0.38	0.56	1.000
	Av vs Lar	8.46	0.98	-0.74	0.25	.693
	Lar vs Sm	8.70	1.09	-0.33	0.65	1.000
14	Av vs Sm	6.87	0.61	-0.45	0.38	1.000
	Av vs Lar	6.91	0.91	-0.45	0.41	1.000
	Lar vs Sm	6.92	0.87	-0.38	0.48	1.000
15	Av vs Sm	5.74	0.53	-0.52	0.19	.795
	Av vs Lar	5.90	0.86	-0.34	0.41	1.000
	Lar vs Sm	5.86	0.64	-0.24	0.50	1.000
16	Av vs Sm	5.74	0.53	-0.34	0.29	1.000
	Av vs Lar	5.76	0.65	-0.29	0.37	1.000
	Lar vs Sm	5.71	0.67	-0.35	0.30	1.000
17	Av vs Sm	5.27	0.51	-0.43	0.21	1.000
	Av vs Lar	5.38	0.71	-0.28	0.39	1.000
	Lar vs Sm	5.32	0.65	-0.28	0.39	1.000
21	Av vs Sm	9.17	0.62	-0.35	0.36	1.000
	Av vs Lar	9.16	0.73	-0.46	0.28	1.000
	Lar vs Sm	9.25	0.72	-0.29	0.45	1.000

22	Av vs Sm	7.70	0.58	-0.49	0.20	.898
	Av vs Lar	7.85	0.77	-0.37	0.35	1.000
	Lar vs Sm	7.86	0.65	-0.20	0.51	.847
23	Av vs Sm	8.54	0.63	-0.39	0.51	1.000
	Av vs Lar	8.48	0.90	-0.72	0.23	.627
	Lar vs Sm	8.72	1.09	-0.28	0.65	1.000
24	Av vs Sm	7.01	0.63	-0.35	0.48	1.000
	Av vs Lar	6.94	0.91	-0.42	0.46	1.000
	Lar vs Sm	6.92	0.89	-0.52	0.34	1.000
25	Av vs Sm	5.79	0.52	-0.50	0.18	.788
	Av vs Lar	5.95	0.80	-0.30	0.42	1.000
	Lar vs Sm	5.89	0.65	-0.26	0.45	1.000
26	Av vs Sm	5.67	0.51	-0.36	0.27	1.000
	Av vs Lar	5.72	0.68	-0.33	0.33	1.000
	Lar vs Sm	5.72	0.64	-0.28	0.37	1.000
27	Av vs Sm	5.27	0.47	-0.46	0.14	.585
	Av vs Lar	5.43	0.63	-0.17	0.46	.762
	Lar vs Sm	5.28	0.65	-0.30	0.32	1.000

Note: *FDI notation; UAPG, upper arch perimeter group; CI, confidence interval; SD, standard deviation; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation Mean diff., mean differences. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/†††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 4: Crown height in relation to upper arch length groups.

Variables*	UALG	Mean	SD	95% CI		P
				Lower	Upper	
s						
11	Av vs Sm	2.00	9.33	0.72	-0.12	0.59
	Av vs Lar	9.09	0.69	-0.52	0.22	.312
	Lar vs Sm	9.24	0.66	-0.46	0.28	.970
12	Av vs Sm	7.86	0.71	-0.21	0.47	1.000
	Av vs Lar	7.73	0.64	-0.52	0.19	1.000
	Lar vs Sm	7.90	0.64	-0.32	0.39	.774
13	Av vs Sm	8.66	0.81	-0.14	0.80	1.000
	Av vs Lar	8.33	0.91	-0.86	0.11	.269
	Lar vs Sm	8.71	1.01	-0.44	0.53	.184
14	Av vs Sm	6.94	0.72	-0.23	0.59	1.000
	Av vs Lar	6.76	0.83	-0.69	0.15	.841
	Lar vs Sm	7.02	0.83	-0.34	0.51	.380
15	Av vs Sm	5.80	0.62	-0.41	0.30	1.000
	Av vs Lar	5.86	0.76	-0.34	0.40	1.000
	Lar vs Sm	5.82	0.70	-0.35	0.39	1.000
16	Av vs Sm	5.79	0.53	-0.20	0.43	1.000
	Av vs Lar	5.68	0.68	-0.40	0.26	1.000
	Lar vs Sm	5.75	0.61	-0.37	0.29	1.000
17	Av vs Sm	5.22	0.53	-0.45	0.20	1.000
	Av vs Lar	5.35	0.67	-0.39	0.28	1.000
	Lar vs Sm	5.40	0.66	-0.15	0.51	1.000
21	Av vs Sm	9.29	0.72	-0.11	0.59	.569
	Av vs Lar	9.05	0.68	-0.55	0.18	.299
	Lar vs Sm	9.24	0.65	-0.42	0.31	.662
22	Av vs Sm	7.87	0.69	-0.12	0.56	1.000

	Av vs Lar	7.66	0.65	-0.58	0.12	.375
	Lar vs Sm	7.89	0.65	-0.34	0.37	.350
23	Av vs Sm	8.70	0.80	-0.06	0.83	1.000
	Av vs Lar	8.31	0.80	-0.87	0.04	.112
	Lar vs Sm	8.73	0.99	-0.43	0.49	.087
24	Av vs Sm	7.04	0.80	-0.17	0.65	1.000
	Av vs Lar	6.80	0.80	-0.66	0.19	.488
	Lar vs Sm	7.03	0.82	-0.44	0.42	.566
25	Av vs Sm	5.90	0.65	-0.31	0.38	1.000
	Av vs Lar	5.86	0.70	-0.35	0.36	1.000
	Lar vs Sm	5.86	0.66	-0.40	0.32	1.000
26	Av vs Sm	5.71	0.55	-0.30	0.33	1.000
	Av vs Lar	5.69	0.66	-0.34	0.31	1.000
	Lar vs Sm	5.71	0.62	-0.33	0.33	1.000
27	Av vs Sm	5.25	0.49	-0.39	0.21	1.000
	Av vs Lar	5.35	0.62	-0.36	0.27	1.000
	Lar vs Sm	5.39	0.65	-0.17	0.45	1.000

Note: *FDI, notation; UALG, upper arch length groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 5: Crown height in relation to upper arch intercanine width groups.

Variables	UAICW	Mean	SD	95% CI		P
				Lower	Upper	
11	Av vs Sm	9.26	0.63	-0.30	0.43	1.000
	Av vs Lar	9.19	0.75	-0.39	0.35	1.000
	Lar vs Sm	9.21	0.71	-0.41	0.32	1.000
12	Av vs Sm	7.92	0.68	-0.12	0.57	.345
	Av vs Lar	7.70	0.60	-0.51	0.20	.850
	Lar vs Sm	7.85	0.69	-0.41	0.28	1.000
13	Av vs Sm	8.66	0.75	-0.24	0.72	.654
	Av vs Lar	8.42	1.07	-0.67	0.32	1.000
	Lar vs Sm	8.59	0.94	-0.55	0.41	1.000
14	Av vs Sm	6.92	0.72	-0.33	0.51	1.000
	Av vs Lar	6.83	0.89	-0.56	0.30	1.000
	Lar vs Sm	6.95	0.79	-0.38	0.45	1.000
15	Av vs Sm	5.80	0.66	-0.36	0.36	1.000
	Av vs Lar	5.81	0.81	-0.45	0.30	1.000
	Lar vs Sm	5.88	0.61	-0.28	0.44	1.000
16	Av vs Sm	5.76	0.62	-0.28	0.36	1.000
	Av vs Lar	5.72	0.68	-0.32	0.34	1.000
	Lar vs Sm	5.72	0.53	-0.37	0.27	1.000
17	Av vs Sm	5.39	0.54	-0.20	0.46	1.000
	Av vs Lar	5.27	0.79	-0.36	0.31	1.000
	Lar vs Sm	5.29	0.53	-0.43	0.23	1.000
21	Av vs Sm	9.26	0.62	-0.25	0.47	1.000
	Av vs Lar	9.14	0.72	-0.40	0.34	1.000
	Lar vs Sm	9.17	0.73	-0.44	0.28	1.000
22	Av vs Sm	7.85	0.71	-0.24	0.46	1.000
	Av vs Lar	7.74	0.59	-0.43	0.29	1.000

	Lar vs Sm	7.81	0.70	-0.39	0.31	1.000
23	Av vs Sm	8.65	0.76	-0.26	0.66	.881
	Av vs Lar	8.45	0.97	-0.64	0.31	1.000
	Lar vs Sm	8.61	0.90	-0.49	0.42	1.000
24	Av vs Sm	7.01	0.82	-0.25	0.59	1.000
	Av vs Lar	6.84	0.88	-0.61	0.26	.991
	Lar vs Sm	7.01	0.72	-0.41	0.43	1.000
25	Av vs Sm	5.89	0.67	-0.31	0.39	1.000
	Av vs Lar	5.85	0.72	-0.39	0.33	1.000
	Lar vs Sm	5.89	0.62	-0.35	0.35	1.000
26	Av vs Sm	5.75	0.62	-0.23	0.40	1.000
	Av vs Lar	5.67	0.69	-0.33	0.32	1.000
	Lar vs Sm	5.68	0.51	-0.40	0.24	1.000
27	Av vs Sm	5.39	0.55	-0.21	0.40	1.000
	Av vs Lar	5.30	0.69	-0.31	0.32	1.000
	Lar vs Sm	5.29	0.51	-0.41	0.21	1.000

Note: *FDI, notation; UAICW, upper arch intercanine width groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 6: Crown height in relation to upper arch interpremolar width groups.

Variables*	UAPMW	Mean	SD	95% CI		P
				Lower	Upper	
s						
11	Av vs Sm	9.29	0.69	-0.41	0.32	1.000
	Av vs Lar	9.07	0.71	-0.45	0.28	1.000
	Lar vs Sm	9.29	0.67	-0.24	0.49	1.000
12	Av vs Sm	7.90	0.71	-0.23	0.47	1.000
	Av vs Lar	7.67	0.68	-0.44	0.26	1.000
	Lar vs Sm	7.89	0.58	-0.38	0.32	1.000
13	Av vs Sm	8.65	0.95	-0.28	0.68	.959
	Av vs Lar	8.30	0.91	-0.75	0.21	.540
	Lar vs Sm	8.70	0.87	-0.41	0.55	1.000
14	Av vs Sm	6.93	0.83	-0.42	0.42	1.000
	Av vs Lar	6.78	0.84	-0.51	0.34	1.000
	Lar vs Sm	6.98	0.72	-0.34	0.51	1.000
15	Av vs Sm	5.86	0.83	-0.33	0.40	1.000
	Av vs Lar	5.71	0.71	-0.43	0.31	1.000
	Lar vs Sm	5.91	0.49	-0.34	0.39	1.000
16	Av vs Sm	5.81	0.61	-0.23	0.40	1.000
	Av vs Lar	5.60	0.69	-0.52	0.13	.429
	Lar vs Sm	5.79	0.52	-0.21	0.43	1.000
17	Av vs Sm	5.32	0.70	-0.43	0.23	1.000
	Av vs Lar	5.29	0.60	-0.35	0.31	1.000
	Lar vs Sm	5.35	0.58	-0.22	0.44	1.000
21	Av vs Sm	9.28	0.67	-0.39	0.33	1.000
	Av vs Lar	9.04	0.71	-0.49	0.24	1.000
	Lar vs Sm	9.23	0.67	-0.21	0.52	.919
22	Av vs Sm	7.90	0.68	-0.18	0.52	.704
	Av vs Lar	7.62	0.70	-0.46	0.25	1.000
	Lar vs Sm	7.85	0.61	-0.42	0.28	1.000

23	Av vs Sm	8.66	0.89	-0.25	0.67	.826
	Av vs Lar	8.35	0.86	-0.73	0.19	.469
	Lar vs Sm	8.68	0.86	-0.40	0.53	1.000
24	Av vs Sm	7.02	0.88	-0.29	0.56	1.000
	Av vs Lar	6.80	0.85	-0.51	0.34	1.000
	Lar vs Sm	7.03	0.67	-0.47	0.38	1.000
25	Av vs Sm	5.98	0.78	-0.29	0.41	1.000
	Av vs Lar	5.74	0.68	-0.37	0.34	1.000
	Lar vs Sm	5.89	0.49	-0.40	0.31	1.000
26	Av vs Sm	5.73	0.63	-0.30	0.34	1.000
	Av vs Lar	5.64	0.67	-0.45	0.19	1.000
	Lar vs Sm	5.73	0.52	-0.21	0.43	1.000
27	Av vs Sm	5.36	0.63	-0.35	0.26	1.000
	Av vs Lar	5.29	0.58	-0.33	0.30	1.000
	Lar vs Sm	5.33	0.55	-0.25	0.37	1.000

Note: *FDI, notation; UAPMW, upper arch interpremolar width groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 7: Crown height in relation to upper arch intermolar width groups.

Variables*	UAIMW	Mean	SD	95% CI		P
				Lower	Upper	
ss						
11	Av vs Sm	9.17	0.68	-0.41	0.32	1.000
	Av vs Lar	9.21	0.71	-0.45	0.28	1.000
	Lar vs Sm	9.29	0.69	-0.24	0.49	1.000
12	Av vs Sm	7.88	0.67	-0.23	0.47	1.000
	Av vs Lar	7.76	0.64	-0.44	0.26	1.000
	Lar vs Sm	7.85	0.68	-0.38	0.32	1.000
13	Av vs Sm	8.60	0.83	-0.28	0.68	.959
	Av vs Lar	8.41	0.99	-0.75	0.21	.540
	Lar vs Sm	8.68	0.92	-0.41	0.55	1.000
14	Av vs Sm	6.87	0.83	-0.42	0.42	1.000
	Av vs Lar	6.87	0.88	-0.51	0.34	1.000
	Lar vs Sm	6.96	0.69	-0.34	0.51	1.000
15	Av vs Sm	5.83	0.71	-0.33	0.40	1.000
	Av vs Lar	5.80	0.78	-0.43	0.31	1.000
	Lar vs Sm	5.86	0.58	-0.34	0.39	1.000
16	Av vs Sm	5.73	0.58	-0.23	0.40	1.000
	Av vs Lar	5.64	0.67	-0.52	0.13	.429
	Lar vs Sm	5.84	0.57	-0.21	0.43	1.000
17	Av vs Sm	5.25	0.64	-0.43	0.23	1.000
	Av vs Lar	5.35	0.64	-0.35	0.31	1.000
	Lar vs Sm	5.36	0.60	-0.22	0.44	1.000
21	Av vs Sm	9.13	0.65	-0.39	0.33	1.000
	Av vs Lar	9.16	0.72	-0.49	0.24	1.000
	Lar vs Sm	9.29	0.69	-0.21	0.52	.919
22	Av vs Sm	7.88	0.66	-0.18	0.52	.704
	Av vs Lar	7.71	0.64	-0.46	0.25	1.000
	Lar vs Sm	7.81	0.71	-0.42	0.28	1.000
23	Av vs Sm	8.62	0.75	-0.25	0.67	.826

	Av vs Lar	8.41	0.95	-0.73	0.19	.469
	Lar vs Sm	8.69	0.92	-0.40	0.53	1.000
24	Av vs Sm	7.01	0.87	-0.29	0.56	1.000
	Av vs Lar	6.88	0.85	-0.51	0.34	1.000
	Lar vs Sm	6.97	0.68	-0.47	0.38	1.000
25	Av vs Sm	5.91	0.71	-0.29	0.41	1.000
	Av vs Lar	5.85	0.72	-0.37	0.34	1.000
	Lar vs Sm	5.87	0.57	-0.40	0.31	1.000
26	Av vs Sm	5.67	0.62	-0.30	0.34	1.000
	Av vs Lar	5.65	0.63	-0.45	0.19	1.000
	Lar vs Sm	5.78	0.58	-0.21	0.43	1.000
27	Av vs Sm	5.29	0.56	-0.35	0.26	1.000
	Av vs Lar	5.34	0.61	-0.33	0.30	1.000
	Lar vs Sm	5.35	0.59	-0.25	0.37	1.000

Note: *FDI, notation; UAIMW, upper arch intermolar width groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Disparities in relation to arch length, perimeter and widths groups of mandibles

Table 8-12 show the mandibular arch perimeter, length, and

width (intercanine, interpremolar and intermolar) groups in relation to crown height respectively. No noteworthy differences observed in large vs. small, average vs. large, average vs. small arch groups (p ≤ 0.05).

Table 8: Crown height in relation to lower arch perimeter groups.

Variables*	LAPG	Mean	SD	95% CI		P
				Lower	Upper	
31	Av vs Sm	7.34	0.68	-0.29	0.41	1.000
	Av vs Lar	7.28	0.70	-0.39	0.31	1.000
	Lar vs Sm	7.32	0.62	-0.38	0.33	1.000
32	Av vs Sm	7.40	0.65	-0.26	0.64	.898
	Av vs Lar	7.21	1.16	-0.61	0.29	1.000
	Lar vs Sm	7.37	0.66	-0.49	0.42	1.000
33	Av vs Sm	8.60	0.77	-0.51	0.39	1.000
	Av vs Lar	8.66	0.92	-0.39	0.52	1.000
	Lar vs Sm	8.59	0.90	-0.46	0.45	1.000
34	Av vs Sm	7.39	0.63	-0.26	0.43	1.000
	Av vs Lar	7.31	0.79	-0.33	0.37	1.000
	Lar vs Sm	7.29	0.55	-0.46	0.24	1.000
35	Av vs Sm	6.30	0.56	-0.27	0.29	1.000
	Av vs Lar	6.29	0.60	-0.40	0.16	.891
	Lar vs Sm	6.41	0.44	-0.17	0.40	1.000
36	Av vs Sm	6.17	0.45	-0.19	0.32	1.000
	Av vs Lar	6.11	0.50	-0.21	0.30	1.000
	Lar vs Sm	6.06	0.53	-0.37	0.15	.912
37	Av vs Sm	5.77	0.60	-0.39	0.28	1.000
	Av vs Lar	5.83	0.69	-0.12	0.56	.349
	Lar vs Sm	5.60	0.66	-0.51	0.18	.738
14	Av vs Sm	7.37	0.67	-0.26	0.42	1.000
	Av vs Lar	7.29	0.70	-0.39	0.30	1.000
	Lar vs Sm	7.33	0.60	-0.38	0.31	1.000

42	Av vs Sm	7.40	0.65	-0.28	0.60	1.000
	Av vs Lar	7.24	1.16	-0.56	0.34	1.000
	Lar vs Sm	7.35	0.59	-0.50	0.40	1.000
43	Av vs Sm	8.69	0.83	-0.47	0.45	1.000
	Av vs Lar	8.69	0.92	-0.45	0.48	1.000
	Lar vs Sm	8.68	0.89	-0.48	0.46	1.000
44	Av vs Sm	7.51	0.70	-0.34	0.36	1.000
	Av vs Lar	7.50	0.75	-0.25	0.46	1.000
	Lar vs Sm	7.39	0.54	-0.48	0.23	1.000
45	Av vs Sm	6.34	0.56	-0.38	0.18	1.000
	Av vs Lar	6.44	0.60	-0.29	0.28	1.000
	Lar vs Sm	6.44	0.44	-0.18	0.39	1.000
46	Av vs Sm	6.17	0.48	-0.31	0.22	1.000
	Av vs Lar	6.21	0.49	-0.15	0.38	.852
	Lar vs Sm	6.09	0.55	-0.34	0.20	1.000
47	Av vs Sm	7.11	8.71	-1.44	3.84	.820
	Av vs Lar	5.92	0.66	-2.45	2.90	1.000
	Lar vs Sm	5.69	0.56	-4.11	1.27	.604

Note: *FDI, notation; LAPG, lower arch perimeter groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 9: Crown height in relation to lower arch length groups.

Variables*	LALG	Mean	SD	95% CI		p
				Lower	Upper	
s						
31	Av vs Sm	7.34	0.68	-0.09	0.59	.242
	Av vs Lar	7.28	0.70	-0.38	0.31	1.000
	Lar vs Sm	7.32	0.62	-0.56	0.14	.427
32	Av vs Sm	7.40	0.65	-0.40	0.50	1.000
	Av vs Lar	7.21	1.16	-0.45	0.47	1.000
	Lar vs Sm	7.37	0.66	-0.52	0.40	1.000
33	Av vs Sm	8.60	0.77	-0.21	0.68	.606
	Av vs Lar	8.66	0.92	-0.35	0.55	1.000
	Lar vs Sm	8.59	0.90	-0.78	0.12	.233
34	Av vs Sm	7.39	0.63	-0.37	0.33	1.000
	Av vs Lar	7.31	0.79	-0.37	0.33	1.000
	Lar vs Sm	7.29	0.55	-0.32	0.39	1.000
35	Av vs Sm	6.30	0.56	-0.28	0.29	1.000
	Av vs Lar	6.29	0.60	-0.25	0.32	1.000
	Lar vs Sm	6.41	0.44	-0.33	0.25	1.000
36	Av vs Sm	6.17	0.45	-0.23	0.29	1.000
	Av vs Lar	6.11	0.50	-0.21	0.31	1.000
	Lar vs Sm	6.06	0.53	-0.34	0.18	1.000
37	Av vs Sm	5.77	0.60	-0.30	0.37	1.000
	Av vs Lar	5.83	0.69	-0.17	0.52	.649
	Lar vs Sm	5.60	0.66	-0.55	0.13	.413
14	Av vs Sm	7.37	0.67	-0.10	0.58	.269
	Av vs Lar	7.29	0.70	-0.36	0.32	1.000
	Lar vs Sm	7.33	0.60	-0.56	0.13	.382
42	Av vs Sm	7.40	0.65	-0.39	0.50	1.000

	Av vs Lar	7.24	1.16	-0.39	0.51	1.000
	Lar vs Sm	7.35	0.59	-0.57	0.34	1.000
43	Av vs Sm	8.69	0.83	-0.26	0.65	.901
	Av vs Lar	8.69	0.92	-0.45	0.47	1.000
	Lar vs Sm	8.68	0.89	-0.67	0.26	.870
44	Av vs Sm	7.51	0.70	-0.34	0.37	1.000
	Av vs Lar	7.50	0.75	-0.39	0.33	1.000
	Lar vs Sm	7.39	0.54	-0.34	0.37	1.000
45	Av vs Sm	6.34	0.56	-0.25	0.32	1.000
	Av vs Lar	6.44	0.60	-0.28	0.29	1.000
	Lar vs Sm	6.44	0.44	-0.33	0.25	1.000
46	Av vs Sm	6.17	0.48	-0.27	0.25	1.000
	Av vs Lar	6.21	0.49	-0.15	0.38	.842
	Lar vs Sm	6.09	0.55	-0.38	0.16	.956
47	Av vs Sm	7.11	8.71	-1.33	3.95	.693
	Av vs Lar	5.92	0.66	-2.46	2.88	1.000
	Lar vs Sm	5.69	0.56	-4.21	1.16	.514

Note: *FDI, notation; LALG, lower arch length groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 10: Crown height in relation to lower arch intercanine widths groups.

Variables*	LAICW	Mean	SD	95% CI		P
				Lower	Upper	
31	Av vs Sm	7.38	0.65	-0.09	0.59	.242
	Av vs Lar	7.17	0.76	-0.38	0.31	1.000
	Lar vs Sm	7.38	0.57	-0.56	0.14	.427
32	Av vs Sm	7.46	0.66	-0.40	0.50	1.000
	Av vs Lar	7.25	0.72	-0.45	0.47	1.000
	Lar vs Sm	7.26	1.12	-0.52	0.40	1.000
33	Av vs Sm	8.73	0.88	-0.21	0.68	.606
	Av vs Lar	8.49	0.82	-0.35	0.55	1.000
	Lar vs Sm	8.62	0.87	-0.78	0.12	.233
34	Av vs Sm	7.45	0.64	-0.37	0.33	1.000
	Av vs Lar	7.30	0.72	-0.37	0.33	1.000
	Lar vs Sm	7.22	0.61	-0.32	0.39	1.000
35	Av vs Sm	6.32	0.57	-0.28	0.29	1.000
	Av vs Lar	6.32	0.59	-0.25	0.32	1.000
	Lar vs Sm	6.36	0.45	-0.33	0.25	1.000
36	Av vs Sm	6.15	0.44	-0.23	0.29	1.000
	Av vs Lar	6.07	0.51	-0.21	0.31	1.000
	Lar vs Sm	6.12	0.53	-0.34	0.18	1.000
37	Av vs Sm	5.76	0.61	-0.30	0.37	1.000
	Av vs Lar	5.72	0.68	-0.17	0.52	.649
	Lar vs Sm	5.74	0.67	-0.55	0.13	.413
14	Av vs Sm	7.41	0.63	-0.10	0.58	.269
	Av vs Lar	7.18	0.76	-0.36	0.32	1.000
	Lar vs Sm	7.39	0.55	-0.56	0.13	.382
42	Av vs Sm	7.47	0.65	-0.39	0.50	1.000

	Av vs Lar	7.24	0.72	-0.39	0.51	1.000
	Lar vs Sm	7.27	1.10	-0.57	0.34	1.000
43	Av vs Sm	8.78	0.86	-0.26	0.65	.901
	Av vs Lar	8.54	0.86	-0.45	0.47	1.000
	Lar vs Sm	8.72	0.90	-0.67	0.26	.870
44	Av vs Sm	7.58	0.63	-0.34	0.37	1.000
	Av vs Lar	7.38	0.66	-0.39	0.33	1.000
	Lar vs Sm	7.44	0.72	-0.34	0.37	1.000
45	Av vs Sm	6.42	0.54	-0.25	0.32	1.000
	Av vs Lar	6.40	0.61	-0.28	0.29	1.000
	Lar vs Sm	6.40	0.48	-0.33	0.25	1.000
46	Av vs Sm	6.20	0.48	-0.27	0.25	1.000
	Av vs Lar	6.13	0.51	-0.15	0.38	.842
	Lar vs Sm	6.15	0.53	-0.38	0.16	.956
47	Av vs Sm	5.83	0.58	-1.33	3.95	.693
	Av vs Lar	5.79	0.64	-2.46	2.88	1.000
	Lar vs Sm	7.10	0.72	-4.21	1.16	.514

Note: *FDI, notation; LALG, lower arch intercanine widths groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/†††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 11: Crown height in relation to lower arch interpremolar widths groups.

Variables*	LAPMW	Mean	SD	95% CI		P
				Lower	Upper	
ss						
31	Av vs Sm	7.44	0.63	0.01	0.69	.043
	Av vs Lar	7.09	0.72	-0.65	0.03	.081
	Lar vs Sm	7.41	0.59	-0.38	0.31	1.000
32	Av vs Sm	7.48	0.64	-0.16	0.74	.354
	Av vs Lar	7.18	0.71	-0.58	0.31	1.000
	Lar vs Sm	7.32	1.14	-0.61	0.29	1.000
33	Av vs Sm	8.73	0.84	-0.24	0.66	.796
	Av vs Lar	8.52	0.85	-0.32	0.58	1.000
	Lar vs Sm	8.60	0.90	-0.66	0.24	.796
34	Av vs Sm	7.47	0.60	-0.37	0.53	1.000
	Av vs Lar	7.28	0.76	-0.15	0.54	.533
	Lar vs Sm	7.24	0.59	-0.30	0.38	1.000
35	Av vs Sm	6.36	0.53	-0.58	0.11	.311
	Av vs Lar	6.29	0.60	-0.21	0.36	1.000
	Lar vs Sm	6.35	0.49	-0.35	0.22	1.000
36	Av vs Sm	6.33	0.54	-0.29	0.28	1.000
	Av vs Lar	6.09	0.39	-0.26	0.26	1.000
	Lar vs Sm	6.08	0.51	-0.34	0.17	1.000
37	Av vs Sm	5.74	0.59	-0.34	0.35	1.000
	Av vs Lar	5.73	0.68	-0.34	0.34	1.000
	Lar vs Sm	5.73	0.69	-0.35	0.34	1.000
14	Av vs Sm	7.46	0.64	0.01	0.68	.043
	Av vs Lar	7.11	0.70	-0.65	0.02	.071
	Lar vs Sm	7.43	0.57	-0.36	0.31	1.000
42	Av vs Sm	7.47	0.63	-0.18	0.71	.464

	Av vs Lar	7.21	0.70	-0.56	0.33	1.000
	Lar vs Sm	7.32	1.11	-0.59	0.30	1.000
43	Av vs Sm	8.86	0.87	-0.11	0.80	.214
	Av vs Lar	8.52	0.83	-0.61	0.30	1.000
	Lar vs Sm	8.67	0.91	-0.65	0.27	.935
44	Av vs Sm	7.63	0.60	-0.12	0.58	.341
	Av vs Lar	7.40	0.71	-0.35	0.35	1.000
	Lar vs Sm	7.39	0.68	-0.58	0.12	.326
45	Av vs Sm	6.43	0.52	-0.23	0.34	1.000
	Av vs Lar	6.38	0.63	-0.31	0.26	1.000
	Lar vs Sm	6.40	0.47	-0.31	0.26	1.000
46	Av vs Sm	6.12	0.45	-0.31	0.22	1.000
	Av vs Lar	6.17	0.52	-0.28	0.25	1.000
	Lar vs Sm	6.18	0.55	-0.21	0.33	1.000
47	Av vs Sm	5.81	0.55	-2.67	2.67	1.000
	Av vs Lar	5.81	0.65	-3.95	1.37	.724
	Lar vs Sm	7.10	0.72	-1.38	3.96	.732

Note: *FDI, notation; LAIPG, lower arch interpremolar widths groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/†††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Table 12: Crown height in relation to lower arch intermolar widths groups.

Variables*	LAIMW	Mean	SD	95% CI		P
				Lower	Upper	
31	Av vs Sm	7.43	0.76	-0.09	0.59	.242
	Av vs Lar	7.18	0.56	-0.50	0.21	.957
	Lar vs Sm	7.32	0.63	-0.45	0.24	1.000
32	Av vs Sm	7.46	0.74	-0.23	0.66	.747
	Av vs Lar	7.25	0.58	-0.46	0.47	1.000
	Lar vs Sm	7.24	1.17	-0.67	0.23	.709
33	Av vs Sm	8.73	0.91	-0.28	0.61	1.000
	Av vs Lar	8.56	0.78	-0.44	0.49	1.000
	Lar vs Sm	8.54	0.88	-0.65	0.25	.876
34	Av vs Sm	7.40	0.64	-0.19	0.50	.814
	Av vs Lar	7.24	0.70	-0.45	0.26	1.000
	Lar vs Sm	7.34	0.65	-0.41	0.28	1.000
35	Av vs Sm	6.39	0.59	-0.14	0.42	.646
	Av vs Lar	6.25	0.49	-0.39	0.19	1.000
	Lar vs Sm	6.35	0.51	-0.32	0.24	1.000
36	Av vs Sm	6.10	0.44	-0.27	0.24	1.000
	Av vs Lar	6.11	0.50	-0.29	0.24	1.000
	Lar vs Sm	6.14	0.54	-0.22	0.29	1.000
37	Av vs Sm	5.86	0.52	-0.21	0.46	1.000
	Av vs Lar	5.73	0.72	-0.22	0.48	1.000
	Lar vs Sm	5.60	0.70	-0.59	0.08	.202
14	Av vs Sm	7.44	0.74	-0.08	0.60	.194
	Av vs Lar	7.19	0.56	-0.51	0.19	.840
	Lar vs Sm	7.34	0.62	-0.44	0.24	1.000
42	Av vs Sm	7.46	0.73	-0.25	0.62	.912

	Av vs Lar	7.28	0.58	-0.41	0.50	1.000
	Lar vs Sm	7.23	1.15	-0.67	0.21	.636
43	Av vs Sm	8.76	0.98	-0.33	0.58	1.000
	Av vs Lar	8.64	0.75	-0.48	0.47	1.000
	Lar vs Sm	8.64	0.88	-0.58	0.34	1.000
44	Av vs Sm	7.50	0.65	-0.21	0.48	1.000
	Av vs Lar	7.37	0.66	-0.52	0.20	.841
	Lar vs Sm	7.53	0.71	-0.32	0.38	1.000
45	Av vs Sm	6.50	0.57	-0.08	0.48	.238
	Av vs Lar	6.29	0.54	-0.41	0.17	.957
	Lar vs Sm	6.41	0.49	-0.36	0.20	1.000
46	Av vs Sm	6.16	0.44	-0.25	0.28	1.000
	Av vs Lar	6.14	0.56	-0.30	0.24	1.000
	Lar vs Sm	6.17	0.53	-0.25	0.28	1.000
47	Av vs Sm	5.88	0.52	-2.60	2.67	1.000
	Av vs Lar	5.84	0.69	-3.99	1.49	.815
	Lar vs Sm	7.09	0.05	-1.44	3.87	.806

Note: *FDI, notation; LAIMW, lower arch intermolar widths groups; SM, small arch length; AV, average arch length; LA, large arch length; CI, confidence interval; SD, standard deviation. Av vs Sm*, Av vs Lar† and Lar vs Sm§ (***/†††/§§§p≤ 0.001), (**/††/§§p≤ 0.01) and (*/†/§p≤ 0.05).

Discussion

Current research investigated the crown height in relation with arch perimeter, length and width groups (intercanine, interpremolar and intermolar) for the first time [12]. Investigates only mesiodistal size of tooth and size of tooth ratio in relation to these groups via CBCT acquisitions. In orthodontic diagnosis as well as treatment planning, the evaluation of tooth size and tooth size discrepancy is an indispensable step and this investigation is generally determined by conventional plaster study model analysis [10]. The crown height is of extreme value in the orthodontic bonding, the wrong bracket position can have adverse consequences on the ideal treatment goals. Current study reveals the crown height database which can be used as norms for the placement of preadjusted fixed orthodontic brackets. The responsibility of the orthodontist is to visualize the macro, mini and micro-esthetics to design a pleasant smile. The crown height has great part in facial charm.

The crown height has importance in relation to placement of orthodontic brackets bonding, also has effect on the facial height of the patient. Current study revealed the crown height of male is significantly greater than female (Tables 1-2) which are in accordance with other investigators. Our research investigates the class I ideal occlusion with ideal overjet, overbite and proper interdigitation to arch perimeter, length and width groups (intercanine, interpremolar and intermolar). The research results showed no significant difference to these groups of ideal occlusions (Tables 3-12). Other study investigated the ideal occlusion in relation to tooth size ratios and found significant difference to these groups [12] but the Crown height has no significant difference to various arch groups. Crown height is a valuable landmark for the orthodontists to manage open or deep bite cases. Thus, the current study provides, the norms, database for the crown height of Pakistani population.

Therefore, orthodontics can use crown height as a reference guide for the purpose of orthodontic intrusion and extrusion. For the Pakistani population the tooth was investigated in mesiodistal, buccolingual and diagonal dimension. Crown height of maxilla and mandible revealed for first time sexual disparities in Pakistani population. These norms shall be supportive in orthodontics clinical treatment planning, prosthodontics, periodontology and restorative dentistry. Furthermore, the norms will be of great value in forensic dentistry, and dental anthropology. As the human teeth and arch size have lots of variations in size in relation to culture, race and sex. Therefore, such investigations need to be carried out on other population.

Conclusion

- No significant differences were observed for crown height relating to-
- Maxillary and mandibular arch perimeter groups
- Maxillary plus mandibular arch length groups
- Maxillary plus mandibular arch width groups
- Inter canine width groups
- Inter first premolar width groups
- Inter first molar width groups
- Significant sexual dimorphisms were observed in the crown height of males and females.

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