

Cephalometric Norms of High School Students with Normal Occlusion in Hamadan(2002)

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ABSTRACT

Statement of problem: Comprehensive diagnosis is regarded as an important base for orthodontic treatment. An effective way to achieve a correct diagnosis is to compare the craniofacial skeleton of patients with normal cases in the same race through lateral cephalograms.

Purpose:The present study was designed to determine the cephalometric norms of senior high school students in the city of Hamedan in 2002 and compare with results of other studies.

Material & Methods: According to the normal occlusion definition 25 girls and 27 boys aged between 17 – 20 years were selected. They did not have any facial malformation and history of orthodontic treatment .Lateral cephalograms were obtained in Natural Head Position (NHP). Twenty one cephalometric variables were measured three times. Student t test was used to compare the results with other studies.

Results: The mean length of anterior cranial base of girls and boys (72.5 ± 3.7 , 76.8 ± 3.7) were significantly less than Michigan norms for girls and boys (76.9 ± 3.9 , 83.3 ± 3.8) ($p=0.005$). There was a significant tendency to more straight profile and forward rotation of mandible (88.3 ± 4.6 , 89.6 ± 2.7) vs. Cooks' (80.8 ± 3.1 , 82.1 ± 2.2) ($p=0.005$). Linear measurements of boys were generally greater than of girls.

Conclusion: It is important to consider ethnic and racial variations and sex differences in preparing problem list and treatment planning.

Key words: Cephalometry, Occlusion, Orthodontic Treatment.

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INTRODUCTION

The goal of orthodontic treatment is to establish the best occlusal relationship along with acceptable beauty and stability. Therefore, correct diagnosis should be made by comprehensive evaluation of craniofacial morphology.⁽¹⁾ Cephalometric analysis of craniofacial skeleton is an important tool in orthodontic diagnosis. The aim of cephalometric analysis is to compare the cephalometric measurements of patients with standard measured references. According to age, sex and race standards vary. During the cephalometric studies Bjork(1947), Down (1952), Hitchcock and Taylor(1966) discovered racial differences.⁽²⁾

Alcaide et al. reported racial specificity during their wide research on standards of male Japanese.⁽³⁾

The purpose of this study was to determine the cephalometric measurements of two groups of preuniversity boys and girls in Hamadan and also to compare them with other studies.

MATERIAL&METHODS

After 2 stage screening of 1204 boys and 1305 girls(17-19 year old) among Hamadan high schools students(first stage was done by trained dental students and second stage by research advisor), 27 boys and 25 girls were selected according to the following criteria: 1- Iranian, 2-no history of past orthodontic treatment, 3-symmetric face and facial harmony, 4-Class I occlusion with normal overjet and overbite, 6-crowding less than 1 mm,7-no obvious proximal caries. According to statistical estimation the minimum of 22 cases for each sex were enough.

Lateral cephalograms were obtained from all

samples in NHP position. An orthodontist traced the radiographs. As shown in Fig. 1, twenty one cephalometric variables including 15 angles, four lines and two ratios were measured three times by one person with one week interval . The results were evaluated and compared with norms of other studies by using student t test.^(2,4,5,6) Reliability of measurements was calculated through Phi correlation coefficient formula[$R=(MsB-MsE)/MsB$].

RESULTS

Mean age of male and female groups were 18.4 ± 1.4 and 18 ± 1.1 years, respectively. Mean, standard deviation, Phi correlation coefficient of all variables in boys have been demonstrated in Table 1 and compared with other norms according to P-values. The Phi correlation coefficient for all variables was more than 0.94 that was high enough. There were significant decrease in anterior cranial base ($p=0.001$), mandibular body length ($p=0.007$) and lower incisor protrusion ($p=0.001$) in present study vs. other norms.

Table 2 shows the same information in girls. The Phi correlation for all variables was more than 0.90 that was also high enough. Similar to boys, there were significant differences between present study and other norms in anterior cranial base ($p=0.005$) and mandibular body length ($p=0.000$). Therefore, according to the results, a tendency to a more straight profile was obvious.

There was some increase in anterior cranial base, body length and ramus height and forward rotation of mandible in boys compared with girls. Differences between boys and girls are shown in Table 3.

Table 1– Mean, SD and Phi correlation coefficient of variables in boys vs. standard

Variables	Boys Mean (SD)	Standard Mean (SD)	Phi	P value
Saddle angle	124.0 (4.9)	123 (5)	0.98	0.299
Articular angle	146.4 (6.3)	143 (6)	0.98	0.003*
Gonial angle	118.7 (5.9)	123.6 (6)	0.98	0.002*
Sum	388.9 (5.6)	389.6 (5.7)	0.96	0.572
SNA	81.8 (4.6)	81.4 (4.4)	0.98	0.727
SNB	79.8 (3.0)	78.2 (3.9)	0.97	0.102
ANB	1.99 (2.7)	3.2 (2.4)	0.97	0.157
Y axis – TH**	59.0 (2.9)	63.9 (4.5)	0.99	0.023*
N pog – TH	89.6 (2.7)	82.1 (2.2)	0.98	0.005*
AB – TH	4.6 (4.1)	13.9 (5.5)	0.97	0.001*
Upper1 – TH	110.3 (6.5)	107.8 (7.0)	0.94	0.134
Lower1 – TH	116.1 (5.5)	126.9 (6.5)	0.97	0.001*
GoGn – TH	20.1 (5.7)	27.5 (4.7)	0.94	0.001*
GoGn – SN	28.9 (5.2)	32.6 (5.2)	0.98	0.016*
Interincisal angle	134.2 (7.9)	126.6 (10)	0.97	0.004*
Anterior cranial base	76.8(3.7)	83.3 (3.8)	0.98	0.001*
Posterior cranial base	40.3 (5.4)	38.2 (3.1)	0.98	0.196
Ramus height	54.2 (4.0)	54.3 (1.4)	0.98	0.993
Body length	83.1 (4.2)	86.3 (3.6)	0.97	0.007*
Post./Ant.Facial height	68.3 (4.2)	65.3(4.2)	0.98	0.367
Lower/Total Facial height	57.1 (2.6)	58.1(2.5)	0.95	0.059

*significant difference

**TH means True Horizontal

Table 2– Mean, SD and Phi correlation coefficient of variables in girls vs. standard

Variables	Girls Mean (SD)	Standard Mean (SD)	Phi	P value
Saddle angle	127.4 (4.1)	123 (5)	0.96	0.008*
Articular angle	142.2(5.1)	143 (6)	0.98	0.505
Gonial angle	122.3 (5.8)	123.6 (6)	0.98	0.290
Sum	392.9 (10.1)	389.6 (5.7)	0.96	0.211
SNA	80.2 (3.2)	81.8 (3.7)	0.98	0.338
SNB	77.3 (2.7)	79.2 (2.3)	0.98	0.016*
ANB	2.6 (1.5)	2.6 (2.4)	0.97	0.371
Y axis – TH	59.0 (5.7)	65.1 (3.2)	0.99	0.130
N pog – TH	88.3 (4.6)	80.8 (3.1)	0.95	0.001*
AB – TH	7.9 (5.5)	15.9 (5.5)	0.94	0.003*
Upper1 – TH	7.9 (5.5)	106.6 (7.1)	0.97	0.390
Lower1 – TH	120.5 (7.6)	127.8 (6.3)	0.97	0.000*
GoGn – TH	23.1 (5.5)	27.5 (4.7)	0.91	0.011*
GoGn – SN	33.6 (4.4)	31.3 (3.1)	0.91	0.153
Interincisal angle	129.8 (7.8)	126.6 (13)	0.90	0.313
Anterior cranial base	72.5 (3.7)	76.9 (3.9)	0.97	0.005*
Posterior cranial base	34.2 (2.4)	34 (2.2)	0.96	0.810
Ramus height	49.0 (3.7)	49.6 (3.9)	0.91	0.707
Body length	74.8 (4.5)	81 (4)	0.98	0.000*
Post./Ant.Facial height	64.7 (5.1)	65.0 (2.8)	0.93	0.894
Lower/Total Facial height	56.8 (2.3)	56.9 (3.5)	0.94	0.834

*significant Differences

Table 3 – P value of differences in mean of norms between boys and girls

Variables	P value		
Saddle angle	0.008*	U1 – TH	0.390
Articular angle	0.505	L1 – TH	0.000*
Gonial angle	0.290	Interincisal angle	0.313
Sum	0.211	Anterior cranial base	0.005*
SNA	0.338	Posterior cranial base	0.810
SNB	0.016*	Ramus height	0.707
ANB	0.731	Body length	0.000*
Y axis – TH	0.130	Post./Ant. Facial height	0.894
Npog – TH	0.001*	Lower/Total Facial height	0.834
AB – TH	0.003*		
GoGn – TH	0.011*		
GoGn – SN	0.153		

DISCUSSION

In the present study, there were significant decrease in anterior cranial base and mandibular body length vs. Michigan standards.⁽⁴⁾ Racial differences and genetic influences could be responsible for these variations.

Also there was significant decrease in mandibular plan angle vs. Viazis norms⁽⁵⁾ that may be due to the differences in the age of samples between these two studies. Michigan longitudinal growth study showed that there is a counter clockwise rotation of mandible along with age. This study evaluated 17-20 year old boys and girls who had passed their growth spurt but in Viazis' report younger patients were studied.

Less protrusion of mandibular incisors was seen in the present study. Regarding the age of boys and girls and age of Cook' standards⁽⁶⁾ this was predictable, because according to Bjork, delayed mandibular growth by getting older could cause more pressure on facial soft tissue and lingual movement of mandibular incisors.⁽⁷⁾

Sex differences were generally seen in linear variables as others.⁽⁸⁾ Also a significant counter-clockwise rotation of mandible and

significant retrusion of lower incisors in males compared with females were found that lead to more straight profile. According to Behrents (who reported similar findings), during adolescence mandible tends to rotate in a counter-clockwise model in the males and clockwise direction in the females and lower incisors become more protrusive in the females.⁽⁹⁾ It is suggested during diagnostic process and VTO consider gender differences.

CONCLUSION

Present study, in concordance with other researches suggests considering racial and sex differences in orthodontic diagnosis and treatment planning. It is necessary to collect such data from all around Iran for more perfect justice.

REFERENCES

1. Proffit WR., Field HW. Contemporary orthodontics. 4th ed. St louis, Mosby, 2002: 4
2. Athanasio E. Orthodontic cephalometry .1st ed. London, Mosby, 1995: 63-5
3. Alcaide RE, Jinno T. Cephalometric norms in Japanese adults. J Oral Maxillofac Surg 1988; 56:129-34

4. Monograph of centre for human growth and development. Michigan University a longitudinal growth study in children from 6–16 years. Ann Arbor 1979; 2: 123-345.
5. Viazis AD. Atlas of orthodontics principle and clinical applications. 1st ed. Philadelphia, WB Saunders, 1993:67-69.
6. Cooke MS, Stephan HY .A summary of 5 factors cephalometric analysis based on natural head position. Am J Orthod Dentofac Orthop 1988;93:213-23 .
7. Proffit WR, Field HW. Contemporary orthodontics. St louis, Mosby, 2000:109-10.
8. Moyers RE. Handbook of orthodontics. 1st ed. Chicago, Year book medical pub, 1988:67.
9. Behrents RG, Enlow DH. Adult facial growth. 3rd ed. Philadelphia: W.B. Saunders, 1990:436-8.