대한치과교정학회지 : 제 1 권 제 1 호
J. K. A. O. : Vol. 1, No. 1, Dec., 1970

AN ANALYSIS OF THE DENTO-FACIAL COMPLEX IN KOREAN

Myung Ja Joo, D.D.S.

Dept. of Orthodontics, Graduate School, Seoul National University

Directors: Assist. Prof. **Hi Won Cho**, D.D.S., M.S.D., Ph.D.

》國文抄錄《

韓國人 齒牙 및 顔貌形態에 關한 頭部 X-線學的 硏究

서울大學校 大學院 齒醫學科 矯正學專攻

(指導 趙 熙 國 助敎授)

朱 明 子

著者는 矯正學의 診斷 및 治療에 應用하기 위하여 韓國人 10歲 兒童 男女 50名과 成人 男女 106名의 頭部側貌 X-線寫眞을 使用하여 Björk, Downs, Steiner 氏 등의 分析法에 依해 다음과 같은 計測値를 얻었다.

(1) 正常咬合者 10歲 兒童 男女 50名과 23歲 成人 男女 106의 標準偏差表를 作成하였다.

(2) Anterior Cranial Base에 對한 Mandibular Body의 比는 約 1:1.1로 나타났다.

(3) T to Po의 比(Holdaway ratio)는 約 4.2:1로 나타 났으며 Tweed Triangle 은 各各 32°, 52°, 96°로 나타났다.

(4) 韓國人은 白人에서 보다 下顎顔部의 後方位, 즉 下顎骨 後方位로 나타났으며 同時에 韓國人은 白人보다 上下顎 前齒의 唇側傾斜를 갖인 顔貌로 나타났다.

INTRODUCTION

Cephalometrics is used as a valuable tool in orthodontics and its investigation has contributed to the study of the head, face, and dentition. By measuring the various parts of the face, the jaws and the dentition information is obtained for establishing classification, diagnosis, treatment planning and prognosis.

Downs (1948) [3] was the first to select a series of cephalometric skeleto-dental landmarks for use in clinical appraisal, and after the work of Downs, many systems of analysis were advanced.

Namely, the analysis of Graber, [8] Jarabak, [4] Steiner, [6] Björk, [1] Wylie [9] are valuable to the orthodontics for analyzing cases and planning treatment.

In the view of recent investigation into roentgenographic cephalometry in Korean, Ahn [10] and Suh [11] first represented cephalometric standards following the method by Downs, Graber

* 本 論文의 要旨는 1970年 11月 16日 大韓齒科矯正學會 第3回 學術大會에서 發表하였음.

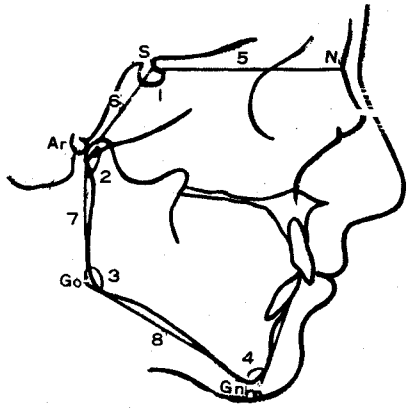


Fig. 1. 1. Saddle angle (Cranial base angle)
2. Joint angle (Articular angle)
3. Jaw angle (Gonial angle)
4. Chin angle
5. Ant. cranial base length
6. Post. cranial base length
7. Ramus height
8. Body length

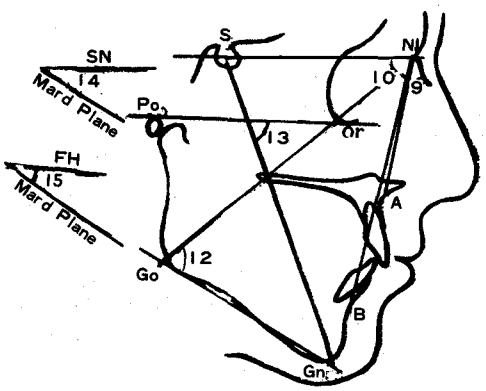


Fig. 2. 9. SNA
10. SNB
11. ANB
12. Facial depth angle
13. Y-axis
14. Go. Gn. SN.
15. FMA

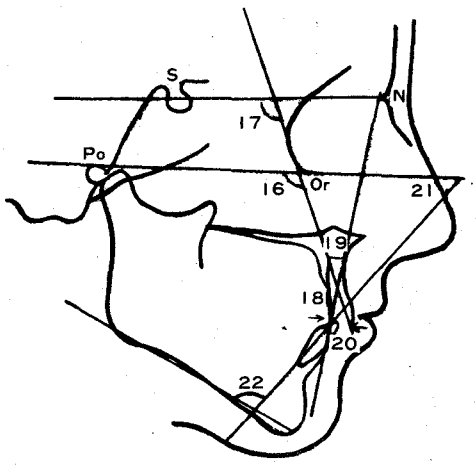


Fig. 3. 16. $\underline{1}$ to FH
17. $\underline{1}$ to SN
18. Interincisal angle
19. $\underline{1}$ to NA (degree)
20. $\underline{1}$ to NA (m.m.)
21. FMIA
22. IMPA

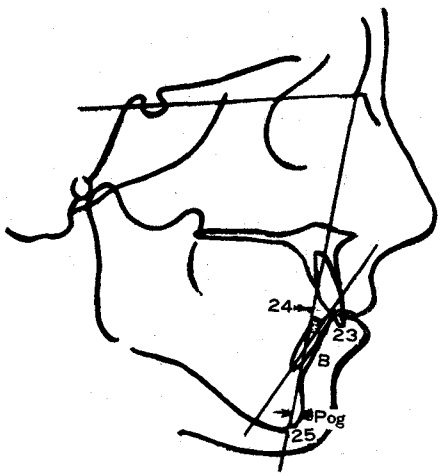


Fig. 4. 23. $\underline{1}$ to NB (degree)
24. $\underline{1}$ to NB (m.m.)
25. Po to NB (m.m.)

and Steiner.

The author made the standards by selecting the necessary items in analyzing method of Björk,[5] Downs,[3] Wylie,[9] Steiner,[6] Graber.[8] and Tweed.[7] By considering the vertical aspects of occlusion in addition to the antero-

posterior relationships of face, author attempted to obtain them by means of diagnostic and treatment in orthodontics.

MATERIAL AND METHOD

The materials used in this study were 156 lateral head X-ray films of males and females, taken by Infirmary, College of Dentistry, Seoul National University. The samples were consisted of 10 aged children (25 males and 25 females) and 23 aged adults (56 males and 50 females) in clinical normal occlusion.

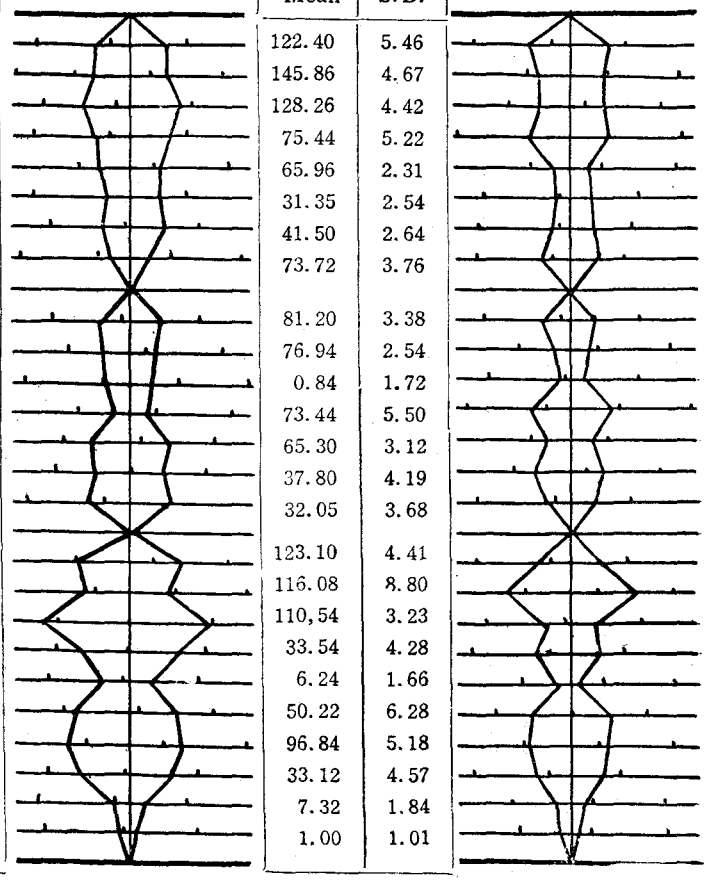
The roentgenographic cephalograms were traced on tracing papers, on which the following planes and angles were measured.

(Fig. 1, Fig. 2, Fig. 3, Fig. 4)

1. Saddle angle (Cranial base angle)
2. Joint angle (Articular angle)
3. Jaw angle (Gonial angle)
4. Chin angle
5. Anterior cranial base length
6. Posterior cranial base length
7. Ramus height
8. Body length
9. SNA
10. SNB
11. ANB
12. Facial depth angle
13. Y-axis
14. Go, Gn, SN
15. FMA

Table I. Standard deviation chart of 10 years

Value Measured	Male		Female	
	Mean	S.D.	Mean	S.D.
Saddle angle	122.48	4.69	122.40	5.46
Joint angle	147.72	4.79	145.86	4.67
Jaw angle	132.20	6.54	128.26	4.42
Chin angle	73.18	5.30	75.44	5.22
Ant. cranial base length	66.98	4.32	65.96	2.31
Post. cranial base length	33.10	3.72	31.35	2.54
Ramus height	40.78	4.13	41.50	2.64
Body length	74.58	2.92	73.72	3.76
S N A	81.12	4.42	81.20	3.38
S N B	77.78	3.44	76.94	2.54
A N B	3.18	3.10	0.84	1.72
Facial depth angle	76.96	2.10	73.44	5.50
Y-axis	68.48	5.39	65.30	3.12
Go. Gn. SN.	39.96	4.58	37.80	4.19
F M A	33.54	5.34	32.05	3.68
$\underline{1}$ to FH	117.34	7.45	123.10	4.41
$\underline{1}$ to SN	114.34	5.48	116.08	8.80
Inter incisal angle	119.70	10.89	110,54	3.23
$\underline{1}$ to NA (degree)	29.98	6.51	33.54	4.28
$\underline{1}$ to NA (m.m.)	5.08	3.06	6.24	1.66
FMIA	48.66	6.06	50.22	6.28
IMPA	95.70	7.52	96.84	5.18
T to NB (degree)	30.64	6.16	33.12	4.57
T to NB (m.m.)	7.20	1.90	7.32	1.84
Po to NB (m.m.)	1.08	1.39	1.00	1.01



16. 1 to FH
17. 1 to SN
18. Interincisal angle
19. 1 to NA (degee)
20. 1 to NA (m.m.)
21. FMIA
22. IMPA
23. T to NB(degree)
24. T to NB(m.m.)
25. Po to NB

Table Ⅰ. Standard deviation chart of 23 years

Value Measured	Male		Female	
	Mean	S.D.	Mean	S.D.
Saddle angle	127.29	3.76	125.51	4.27
Joint angle	146.52	6.18	147.18	5.51
Jaw angle	122.97	6.67	121.93	5.63
Chin angle	74.97	3.43	73.66	5.95
Ant. cranial base length	71.76	2.41	69.51	5.33
Post. cranialbase length	42.28	3.12	35.73	3.02
Ramus height	57.94	5.16	54.09	3.44
Body length	84.42	5.38	83.13	4.87
S N A	82.51	4.17	82.61	3.13
S N B	78.81	4.02	77.93	2.01
A N B	3.51	1.61	1.62	2.34
Facial depth angle	75.93	3.86	75.94	4.22
Y-axis	74.99	4.93	67.57	4.03
Go. Gn. SN	37.69	4.14	36.76	4.97
F M A	29.36	5.71	31.67	4.61
1 to FH	118.78	4.82	120.90	4.78
1 to SN	114.39	3.29	116.12	3.62
Inter incisal angle	126.70	7.03	126.73	5.51
1 to NA(degree)	24.56	5.61	24.49	4.67
1 to NAcm.m.)	7.20	2.43	7.19	3.14
FMIA	55.48	5.18	53.16	3.72
IMPA	94.80	4.34	94.62	6.31
T to NB(degree)	27.97	2.55	31.59	4.26
T to NB(m.m.)	6.65	2.44	7.58	2.04
Po to NB(m.m.)	2.31	1.82	1.84	2.95

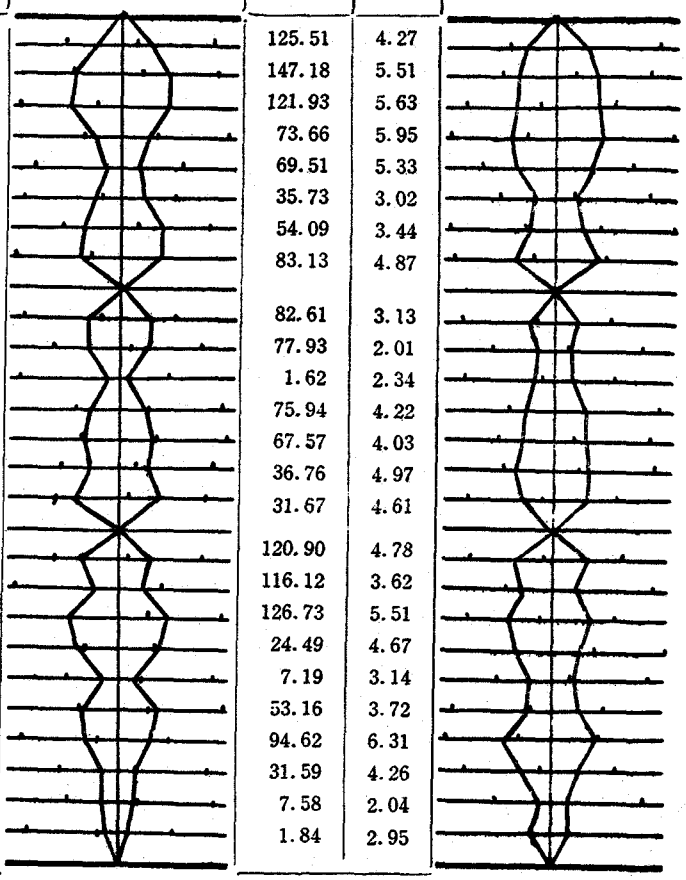


Table Ⅱ. Tweed Triangle

Value Measured / Age		FMA		FMIA		IMPA	
		Mean	S.D	Mean	S.D	Mean	S.D
10 years	M	33.54	5.34	48.66	6.09	95.70	7.52
	F	32.04	3.68	50.22	6.28	96.84	5.18
23 years	M	29.36	5.71	55.48	5.18	94.80	4.34
	F	31.67	4.61	53.16	3.72	94.62	6.31

RESULTS

(1) As the causes of the facial prognathism tendency, Björk adopted such factors as, saddle angle, articular angle, jaw angle, chin angle, anterior cranial base length, posterior cranial base length, ramus height, body length. Björk suggested that one or any combined influence of reduction of saddle angle, reduction of articular angle, reduction of jaw angle, increase of chin angle, reduction of anterior cranial base, increase of ramus height, and inc-

rease of mandibular body length have important significance in the formation of facial prognathism[5].

According to those values mentioned above, there are great differences between Korean and whites in chin angle, by 1 S. D. larger in Korean. This value is due to posterior position of mentale portion in Korean.

(2) SNA is defined as the relation of maxillary denture base to cranium. Both Korean and American have about the same SNA, of maxillary apical base. Similary, SNB mean the relation of mandibular denture base to cranium and it's smaller in Korean than in American. As for ANB of Korean, which estimates skeleto-dento-alveolar pattern by the inter-relationsphips of maxillary and mandibular apical base, it's larger than that of American.

(3) The items such as facial depth angle, Y-aixs, Go, Gn, SN, FMA stand for inclination of lower border of mandible to cranium.

When these angles are large, the tendency of mandibular vertical growth is large and if not, horizontal component large, Go, Gn, SN of Korean is 1 S. D. larger than those of American, but which means the posterior position of Mandible, not vertical tendency in Korean.

(4) $\underline{1}$ to FH, $\underline{1}$ to SN means the axial inclination of maxillary central incisors with cranium and it's slightly larger in Korean than in American.

$\underline{1}$ to NA is large in both angular and linear measurement, in Korean which shows the protrusion of upper incisors to cranial structure in antero-posterior plane.

IMPA relates the mandibular incisors to the madibular apical base. It is comparatively larger in Korean. Also $\underline{1}$ to NB is large in both angular and linear measurement, FMIA and IMPA show the procumbency of lower incisors of Korean.

The smaller value of Po to NB in Korean compared with American, also shows the posterior position of mentale portion.

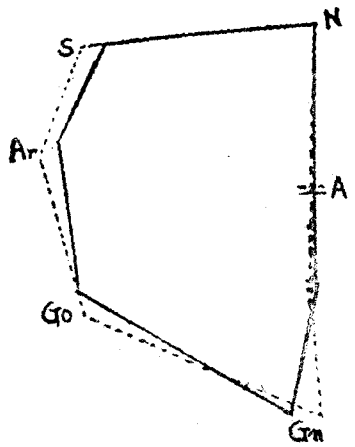


Fig. 5. Facial Polygons derived from mean values. Superimposition is on Sella-Nasion. Continuous line denotes Korean; broken line, American.

CONCLUSION

(1) The author has measured the cephalometric standards of 10 and 23 years of males and females and made the tables of standard deviation.

(2) The ratio of mandibular body to anterior cranial base is about 1 : 1. 1.

(3) The ratio of $\overline{1}$ to Po (Holdaway ratio) is about 4. 2 : 1.

(4) The angles of Tweed's triangle are 32°, 52° and 96°.

(5) Summarizing the analysis given above, Korean has posterior position of mentale portion; be shown, that of mandible.

(6) At the same time it is shown that Korean have larger labial inclination of maxillary and mandibular incisors compared with the whites.

Table. Ⅳ. Comparison of Dento-facial Complex between American and Korean.

Value Measured	Korean			American
	Mean	S.D.		Mean
Saddle angle	124.41	4.54		123
Joint angle	146.84	5.28		143
Jaw angle	126.38	5.80		130
Chin angle	74.06	4.97		64
Ant. cranial base length	68.57	3.59		73
Post. cranial base length	35.61	3.07		37
Ramus height	48.57	3.84		53
Body length	78.88	4.23		80
S N A	81.85	2.77		82
S N B	77.86	3.02		80
A N B	3.18	2.19		2
Facial depth angle	75.56	3.92		not estab.
Y-axis	69.08	4.36		59.4
Go, Gn, SN	38.07	4.47		32
F M A	31.53	4.83		25
$\underline{1}$ to FH	120.03	5.36		112
$\underline{1}$ to SN	115.23	5.29		103
Interincisal angle	119.66	6.66		135
$\underline{1}$ to NA(degree)	27.64	5.26		22
$\underline{1}$ to NA(m.m.)	6.42	2.56		4
F M I A	51.88	5.31		65
I M P A	95.48	5.85		90
$\overline{1}$ to NB(degree)	30.82	4.38		25
$\overline{1}$ to NB(m.m.)	7.18	2.05		4
Po to NB (m.m.)	1.70	1.79		4

ACKNOWLEDGEMENTS

The author would like to thank Prof. Chong Duck Yoo, Professor of Oral Anatomy Dept., Assist. Prof. Hi Won Cho, Chairman of Dept. of Orthodontics, Assist. Prof. Cheong Hoon Suh, Dept. of Orthodontics, Prof. Hyung Kyu Ahn, Chairman of Dept. of Radiology, College of Dentistry, Seoul National University for their kind suggestions on the topics treated here.

REFERENCES

1) Björk, A.: The face in Profile; An anthropological X-ray investigation on Swedish Children and Conscripts, Berlingka Bakstryckerict Lund, 1947.

2) Björk, A.: The significance or growth changes in facial pattern and their relationship to in occlusion, Dent. Res., 71:179-208, 1951.

3) Downs, W.B.: The role of Cephalometrics in Orthodontic case analysis and Diagnosis, A. J. O., 38:162-182, 1952.

4) J.R. Jarabak: Technique and Treatment with the light-wire appliances, C. V. Mosby Company, 144-149, 1964.

5) J.A. Salzmann:Practice of Orthodontics (1), J. B. Lippincott Company, 480-553, 1966.

6) Steiner, C.C.: Cephalomterics as a Clinical tool, Vistas in Orthodontics, 131-161, 1962.

7) Tweed, C.H.: The Frankfort Mandibular Incisor Angle (FMIA) in Orthodontic Diagnosis, Treatment Planning, and Prognosis, Angle

Orthodontist, 24:121-169, 1954.
8) T.M. Graber: Orthodontics, Principles and Practice, Sounders, 433:453, 1966.
9) Wylie, W.L.: The assessment of antero-posterior dysplasia, Angle Ortho., 17:97-109, 1947.
10) Hyung Kyu Ahn: Roentgenographic Studies on the Maxillo-facial Growth and Development, The Journal of Korean Dentistry, 2:13-21, 1968.
11) Cheoung Hoon Suh: Roentgeno-Cephalometric Standards for Korean According to the Steiner's Analysis, The Journal of Korean Modern Medicine, 6:515-527,