An analysis for the variability of soft tissue facial profile

Ne'am F AGHA*

ABSTRACT

The purpose of this study was to investigate whether there is relationships between the skeletal craniofacial structures and the variability of facial profile. The sample consist of 100 cephalometric films [50 males & 50 females for adults (18-25years) having normal dental class I occlusion] collected from P.O.P department, collage of dentistry in Mosul university. The sample classified according to skeletal classification into class I, II, & III also classified according to the profile into:- cisprofile, orthoprofile & transprofiles We measured the length of 3 skeletal bases, in addition to the position of pogonion & the thickness of soft tissue covering the anterior aspect of middle and lower face area. The variables entered spss computer system for analysis. we found that males have more skeletal Cl I & III than females,but females have more skeletal Cl II .males have larger records for all the variables & the difference is significant.

Key words: Cisfrontal, orthofrontal, transfrontal profile

الخلاصة

الغرض من هذه الدّراسة للتحقّق سواء هناك علاقات بين التراكيب الهيكلية (maxillary cranial, mandibular) واختلاف الصورة الجانبية الوجهية للناس. ومن هنا قسنا الطّول من ٣ قواعد هيكلية، بالأضافة إلى موقع pogonion سمك النّسيج الرخو يغطّي مساحة الوجه السفلي. العينة تتضمّن على ١٠٠ صورة شعاعية (٥٠ ذكر و ٥٠ إنثى) جمعت من قسم التقويم و الاطفال من كلية طب الأسنان في جامعة الموصل. المتغيّرات دخلتspss نظام حاسبة للتّحليل. صنّفت العينة طبقا للتّصنيف الهيكلي في الصّنف I، II و III, أيضا طبقا للصورة الجانبية transprofiles: و orthoprofile cisprofile, وجدنا ان الذّكور عندهم أكثر I وIII صنف هيكلي من الإناث، لكن إناث عندهنّ أكثر II صنف هيكلي . الذّكور عندهم قياسات أكبر من الإناث مع كل المتغيّرات و الفرق معنوي .

INTRODUCTION

One of the main purposes of orthodontic treatment today is to produce an acceptable appearance of the soft tissue. It just happens, however, that there is no stereotyped curtain that will fit all skeletons there is no formula or analysis which will give us a soft tissue line that will please all orthodontists. The face that we believe to be pleasing is not the same for each orthodontist, and, as subtelny[1] says, it exists only in the "mind' s eye" of the individual practitioner [2]

*Ne'am Fakhri AGHA; BDS, MSc: Assistant Lecturer. Department of Pedodontics, Orthodontics, and Preventive Dentistry, College of Dentistry, University of Mosul, Mosul, IRAQ.

The soft tissue mass of the face provides an important field of investigation for the orthodontists, in the recent years, the orthodontist cannot deny the fact that most of the patients seek orthodontic treatment with desire to improve their looks. Orthodontists have long recognized that occlusion and facial beauty are so interdependent that they must be simultaneous and equal goals of treatment.[3,4]
The deformities of the facial profile almost invariably require correction of two or more aspects of the profile to obtain a positive fine result. One must combine various specific operation, those operations can be divided into 3 groups by location, i.e. upper, middle and lower thirds of the face and involve removing excesses or adding; whenever necessary as well as modifying one or more angles to bring them into harmony with the esthetic concept of facial profile.[5]

Many principles are involved in the diagnosis and treatment of facial deformities. The fact that the facial skeleton directly influences the soft tissue profile. The concept of facial surgery was first introduced in 1944 as a guideline in the planning and assessment of the face[6]

Most important is the fact that the profile type is determined by the size & position of the three cranial bases of the facial skeleton: the anterior cranial base, the maxillary base, and the mandibular base the three profile types, that are esthetically balanced and that are reproduced frequently by artists and sculptors are the straight anteface , the straight retroface, and the average face[7]. Izard called these types of profile as transfrontal, cisfrontal and orthofrontal face respectively[8].
The proportional analysis used in Moorrees[9] and Lundstrom et al study[10] provide a tool by which specific landmarks can be quantified & analyzed in meaningful way through which relevant deviation from the "midnormal" profile can be expressed in millimeters. This will help form a factual background for a variety of treatment consideration.

Objectives

1. To know the distribution of facial profile among the students in Mosul University.
2. To know also the distribution of the skeletal classification from sample of Cl I normal occlusion & the distribution of the facial profile according to the skeletal classifications .
3. To know the effect of the skeletal bases on the variability of soft tissue profile.

MATERIALS AND METHODS

In this cross sectional study the sample consisted of 100 x- ray films collected from P.O.P department in the collage of dentistry in Mosul University. Those are students age (18-25 year) had class I normal occlusion, with good facial profile, have no previous orthodontic treatment.

A standard cephalometric film taken for them by S.S white ortho Ceph. Machine. Then we trace the cranial, maxillary & mandibular bases, the soft tissue out line, upper & lower incisor and first molars.
The landmarks :- which depended by Ricketts[11] Rakosi [12] are:-

S:- sella , the center of the shadow of the sella turcica.
N:- nasion, the most anterior point of fronto- nasal suture.
A:- subspinal ,the deepest midline point in the curved bony . outline of alveolar process of the maxilla .
a:- the deepest point at the concavity of upper lip.
B:- the deepest point at the concavity of alveolar process of the mandible
b:- submental, the deepest point in the concavity of lower lip.
Gl:- glabella :- the most prominent point of the forehead.
ANS:-anterior nasal spine ,the tip of the bony anterior nasal spine in the median plane.
PNS :- posterior nasal spine,the intersection of a continuation of anterior wall of the pterygopalatin fossa & the floor of the nose.
Me: menton,the lowest point of the mandible.
Go:- Gonion,point located by bisecting angle formed by the posterior border of the ramus and inferior border of the mandible.
Pogo:-pogonion,the most prominent anterior point on soft tissue midsagittal plane.

The skeletal classification depending on the value of ANB angle which depended also by Rakosi [12] in that:

Cl I = 2-4° , Cl II over 4° , Cl III = less than 2°

The profile classification depended on Izard plane as reference line that drawn from Gl vertical to frankfort horizontal plane, then according to position of Pogonion from this plane(Izard),the profile classified as:

Orthofrontal profile :- when Pogo located on Izard plane ±4mm
Transfrontal profile:- when Pogo located anterior to Izard & more than 4mm
Cisfrontal profile:- when Pogo located posterior to Izard & less than 4mm
This classification depended by Harry[13]
The measurements :-

Pogo : position of pogonion from Izard plane.
SN :- length of cranial base from sella to nasion
Palat :- length of the maxilla , distance from ANS to PNS.
MP :- length of the mandible distance from Go to Me.
Aa:- thickness of soft tissue at the concavity of upper lip.
Bb:- thickness of soft tissue at the concavity of lower lip.

RESULTS

Table (1) shows that the males have more skeletal CL I & III than females while females have more skeletal Cl II than males . The profile classification shows that the males have larger records in the transprofile for the 3 skeletal classification, females have more orthoprofile in skeletal Cl II &III , and there are equal results in cisprofile for both sexes.

Table (1): Distribution of facial profile among skeletal classification

	Sex	No.	Cisfront	Orthofront	Transfront
I	M.	29	3	13	13
	F.	23	6	12	5
	T.	52	9	25	18
II	M.	11	0	5	6
	F.	20	0	16	4
	T.	31	0	21	10
III	M.	10	3	2	5
	F.	7	0	4	3
	T.	17	3	6	8
Total	M.	50	6	20	24
	F.	50	6	32	12
	T.	100	12	52	36

Table (2) for description of the variable that shows a significant difference for all the variables that males have larger records than females.

Table (2): Description of the variables.

	Sex	No.	Mean	SD	Mini	Maxi	t-value
Pog	M.	50	3.44	6.40	-12.00	12.50	2.2 S.
	F.	50	1.00	5.71	-11.00	14.00	
	T.	100	2.12	6.10	-11.00	14.00	
SN	M.	50	77.68	3.93	72.00	85.00	5.0 S.
	F.	50	74.04	3.35	67.00	86.00	
	T.	100	75.85	4.08	67.00	86.00	
Palat.	M.	50	56.60	5.08	46.00	65.00	2.51 S
	F.	50	54.20	4.56	43.00	75.00	
	T.	100	55.38	4.97	43.00	75.00	
Mp	M.	50	80.68	4.91	69.00	91.00	5.73 S.
	F.	50	75.75	4.07	67.00	84.00	
	T.	100	78.13	5.11	67.00	91.00	
Aa	M.	50	15.70	1.90	12.00	19.00	5.46 S.
	F.	50	13.60	1.93	9.00	18.00	
	T.	100	14.65	2.18	9.00	19.00	
Bb	M.	50	13.19	1.41	10.00	18.00	3.3 S.
	F.	50	12.20	1.61	10.00	17.00	
	T.	100	12.70	1.59	10.00	18.00	

Tabulated t = 2.0 S-significant NS-non significant SD-standard deviation

Table (3.) description of the variables according to profile classification shows a significant difference in SN for the 3 types of profile that is larger for males than females & a significant differences for (Mp, Aa & Bb) in ortho & transprofile that is larger in males than females.

Table (3): Description of the variables according to profile classification

	Sex	Cisprofile			Orthoprofile			Transprofile		
		Mean	SD	t-value	Mean	SD	t-value	mean	SD	t-value
Pog	M.	-9.25	2.63	0.62	0.55	2.41	0.6	7.90	4.82	1.2
	F.	-8.33	7.79	NS.	0.64	5.43	NS.	6.38	5.72	NS.
SN	M.	79.65	4.38	2.4	77.64	4.14	3.4	77.40	3.76	2.6
	F.	74.19	3.55	S.	74.19	3.55	S.	73.75	3.16	S.
Palat.	M.	55.00	2.50	2.5	57.90	5.67	0.42	55.72	4.76	1.0
	F.	54.16	4.91	S.	54.59	4.91	NS.	54.21	4.25	NS.
Mp	M.	76.75	1.71	1.1	80.09	5.05	3.2	81.80	4.84	4.3
	F.	75.65	3.74	NS.	75.66	3.75	S.	75.33	4.80	S.
Aa	M.	15.75	2.87	0.29	15.71	1.55	4.3	15.71	2.58	4.0
	F.	14.17	2.40	NS.	13.53	2.34	S.	13.50	1.24	S
Bb	M.	13.00	2.00	0.44	13.33	1.49	2.4	13.10	1.30	2.5
	F.	12.00	2.67	NS.	12.28	1.61	S.	12.08	1.08	S.

SD-standard deviation

Table (4): Comparison of 3 types of profile , shows, a significant difference in Pogo between each of (cis -ortho), (trans – ortho), & (trans – cis) profile for each of males & females and a significant difference for Mp in (cis – ortho) for males and (trans-cis) profile for males & females .all the significance at probability level of 0.05, tabulated t = 2.02

Table (4): Comparison of the three types of profile.

	Sex	Cis	Ortho	t-value	Trans	Ortho	t-value	Trans	Cis	t-value
		Mean	Mean		Mean	Mean		Mean	Mean	
Pog	M.	-9.25	0.55	6.9 S.	7.90	0.55	6.7 S	7.90	-9.25	6.6 S
	F.	-8.33	0.64	7.8 S.	6.38	0.64	2.2 S	6.38	-8.33	7.9 S
SN	M.	79.65	77.64	1.4 NS.	77.40	77.64	0.8 NS	77.40	79.65	1.6 NS
	F.	74.19	74.19	1.8 NS.	73.75	74.19	0.7 NS	73.75	74.19	1.7 NS
Palat.	M.	55.00	57.90	0.2 NS.	55.72	57.90	0.3 NS.	55.72	55.00	0.1NS
	F.	54.16	54.59	0.7 NS.	54.21	54.59	0.1NS.	54.21	54.16	0.2NS
Mp	M.	76.75	80.09	2.4 S.	81.80	80.09	0.3 NS.	81.80	76.75	3.9 S
	F.	75.65	75.66	1.3 NS	75.33	75.66	0.6 NS.	75.33	75.65	2.2 S
Aa	M.	15.75	15.71	0.6 NS	15.71	15.71	0.1NS	15.71	15.75	1.2 NS
	F.	14.17	13.53	0.4 NS.	13.50	13.53	0.6 NS.	13.50	14.17	0.9 NS
Bb	M.	13.00	13.33	0.4 NS	13.10	13.33	0.7 NS	13.10	13.00	0.8 NS
	F.	12.00	12.28	0.3 NS	12.08	12.28	0.7 NS.	12.08	12.00	0.4 NS

SD-standard deviation

Table (5) the correlation of the variables at p. 0.01, we found, high correlation between (Pogo-MP) , (SN – Mp), (Aa-Bb) & moderate correlation between (SN-palat), (palat –Mp), (palat- Aa) (Mp- Bb).

Table (5): Correlation of the variables

Variables	Pog.	SN.	Palat.	Mp.	Aa.	Bb.
Pog.	M. 1.00 F. 1.00 T. 1.00					
SN.	M. 0.17. F. 0.21 T. 0.20	1.00 1.00 1.00				
Palat.	M. 0.31 F. 0.22 T. 0.25	0.48 0.44 0.46	1.00 1.00 1.00			
Mp.	M. 0.75 F. 0.93 T. 0.84	0.86 0.71 0.78	0.61 0.53 0.57	1.00 1.00 1.00		
Aa.	M. 0.17 F. 0.13 T. 0.11	0.10 0.18 0.21	0.64 0.51 0.55	0.15 0.01 0.27	1.00 1.00 1.00	
Bb.	M. 0.20 F. 0.13 T. 0.01	0.32 0.22 0.16	0.23 0.20 0.05	0.65 0.42 0.53	0.72 0.71 0.72	1.00 1.00 1.00

DISCUSSION

In an attempt to look for the variability of facial profile & the distribution of the 3 types of facial profile among the skeletal classification and between males & females those can be seen in table(1). In this table we found :-

Cl I :- the males have more skeletal. Cl I than female, while for the profile a more trans & ortho profile for males than females, & females have more cisprofile than males.

Cl II :- females have more skeletal. Cl II than males , also females have more ortho profile than males, males have more transprofile than females, , An equal (zero record) for cis profile for the 2 sexes.

Cl III :- male have more skeletal III than female. ,female have more ortho profile than male, while male have more trans and cis-profile than female.

Total profile classification found that an equal record in cis- profile for males & females, females. have more orthoprofile than males, males have more transprofile than females. the materials about this subject is limited there is no previous study taken skeletal & profile classification (to the best of my knowledge). Harry[13] use the same reference line (Izard plane) and the same classification(±4mm from Izard plane) of profile for adults but there is no skeletal classification , comparison of this study & Harry's study shown below.

	Sex	Present study %.		Harry's study	
		No	%	No	%
Trans-front	M.	24	24	26	43.3
	F.	12	12	28	46.7
Ortho-front	M.	20	20	4	6.7
	F.	32	32	2	3.3
Cis-front	M.	6	6	0	0
	F.	6	6	0	0
Total		100	100	60	

The difference in distribution of profile type ,we note that males have more transprofile than females for the two studies, for orthoprofile females in this study have more record than males while Harry's study the males have more records. this reflect the racial difference. for the cisprofile an equal result between males and females for the two studies.

Table.(2) Description of the variables :

Pogo: males have the most retruded position of Pogo from Izard Plane (-12.0m) while females. have most protruded position of Pogo from Izard plane (14.0mm) ; although males have larger mean value than females & that the difference is significant .

the length of skeletal bases (SN, palat & Mp) longer in males than females. The comparison with other study below.

	Sex	Present Study	AL.Sayagh. 1999	EL-Faituri 1994
SN	M.	77.68	77.01	74.68
	F.	74.04	73.08	70.86
Palate	M.	56.60	59.45	56.10
	F.	54.20	57.25	52.81
Mp	M.	80.68	81.78	
	F.	75.75	76.77	

We note a nearly equal records for this study & . AL-Sayagh's study [14]because the sample from the same university & same city, but the difference with El-Faituri study [15] reflect the racial difference.

For the soft tissue thickness (Aa, Bb) larger for males than females. no previous data for these variables, but Ta`ani[16]&our previous study[17] proved that males have thicker soft tissue covering the face using different variables .

Table(3.)Description of the variables according to the profile classification a significant difference between males and females can be seen for :-

SN for the three types of profile .

Mp, Aa & Bb in ortho & transprofile the males always have larger records in the above variables than females. this reflects the difference between 2 sexes within the same profile type.

Table (4) Comparison of facial profile we found , a significant difference within the males and within the female for :-

Pogo for the 3 types of profile with each other, as this landmark determine the profile type, we note a smallest record ,most retruded position of the chin (Pogo); is for males (cis type), males also have most protruded position of the chin for transprofile. So males have the extremities for position of Pogo from Izard plane , while females. take the middle part this finding is identical with the finding that females have more ortho profile than males in (tab 1).Sergl et al [18] also proved that males profiles in contrast to females profiles exhibited more conspicuous facial features such as pronounced convexity & concavity, while females have more straight profile. other significant difference found in :-

Mp between (cis- ortho) for males only; & (trans- cis) for both sexes while non significant differences for (trans- ortho) profile for both sexes & (cis-ortho)for females .; this difference explain the effect of Mp length on determining the profile type ;for males(cis-ortho),as the males have records too away from Izard plane, So that the difference is significant while females . have a nearly closer record of cis from ortho profile thus the difference is non significant; the same explanation is for (trans- cis) profile for both sexes as the 2 type have an extremities records from the middle part (ortho) type .

A non significant difference for (SN, palat, Aa & Bb) for the 3 type of profile, means have no effect on determining the profile types .

The correlation of the variables in table (5) shown, high correlation in:-

(Pogo- Mp) means the position of Pogo depend on the length of Mp.

(SN- Mp) means a balance in face formation for upper & lower face part imbalance lead to abnormal facial profile.

(Aa- Bb) means even thickness covering the face in upper & lower lips.

A moderate correlation for (SN- palat), (palat-Mp), (palat-Aa) & (Mp-Bb) , also balancing in face formation for these areas.

CONCLUSIONS

1. In normal dental Class I occlusion the males have more skeletal Class I and Class III than females ,while females have more skeletal Class II than males.
2. Males have the extremity of the classification (skeletal &profile),So males have more transfront profile than females and the females have more orthofront profile than males while in relation to cisfrot profile both sexes have the same percentage of cisfrontal profile..
3. Males have significant larger records in all the variables we measure it (Pogo, SN, Palat, Mp, Aa & Bb) than females.
4. Mp length determine the type of the profile, if it is long or short while Pogo which we depend on it for the classification also determine the profile type by it's position from Izard plane .
5. High correlation found between (Pogo- Mp), (SN-Mp),and (Aa-Bb).

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