Lips and incisors position in normal class I occlusion

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ABSTRACT

In order to analyze the effectiveness of upper and lower incisors on the position of upper and lower lips, 100 students, 50 males and 50 females, aged 18-25 years from Mosul University are selected with class I normal occlusion, good facial esthetic, normal overbite and overjet, having no history of orthodontic treatment. A standard cephalometric film was taken showing the soft tissue profile with the underlying skeletal framework. Tracing of these films including the cranial, maxillary and mandibular bases, upper and lower incisors and the soft tissue out line. Eight variables entered spss computer analysis to evaluate the mean value of the variables. The sample is distributed according to skeletal classification into skeletal class I,II and III. A significant difference was found only in position of upper lip for females between skeletal class I and II, and a high correlation was found in position of upper incisor with lower incisor and upper lip with lower lip.

Key words: Class I occlusion, incisor, lip, facial esthetic.

الخلاصة

ان الهدف من هذا البحث هو لمعرفة تاثير موقع وميلان القواطع (الاسنان الامامية) على موقع الشفتين لذا اختيرت عينة مكونة من (100 طالب،50 ذكرا،50 انثى) تتراوح اعمارهم بين 18−25 سنة من كليـــات مختلفة في جامعة الموصل. ثم اخذت اشعة جانبية لهم . قسمت هذه العينة الى 3 اقسام اعتمادا على التصنيف الهيكلي للفكين الماخوذ من الاشعة , ثمانية متغيرات ادخلت للبرنامج الاحصائي (spss) للتحليل.

وقد لوحظ وجود فرق معنوي فقط لموقع الشفة العليا للإناث بين النوع الهيكلي(1,2) ,وارتباط عـــالي بين موقع الاسنان العليا والسفلي وكذلك موقع الشفتين العليا والسفلي.

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INTRODUCTION

Orthodontics includes treatment of dental and skeletal structures. Disharmonies & the final effect of them on the soft tissue covering of the face. There must be some balance between the soft tissue and the underlying skeletal and dental structures in order to obtain stability of the attained orthodontic results, especially that related with incisors position and the covering perioral muscles. Numerous studies in the past described the relationship between upper and lower incisors position on the upper and lower lips. During the process of treatment planning one of the facial profile areas to which the clinician orthodontist pays particular attention is the maxillary and mandibular lips, since they are supported by the anterior teeth. Any dental changes that may occur during orthodontic therapy will have direct impact on their position [1]

Downs[2] selected A- pogonion plane as a line connecting the most anterior limits of basal bone of the maxilla with the mandible. Ricketts[3] found those lips convexity decrease consistently from the deciduous dentition age to the age of full adult dentition. the lips are progressively more retracted when facial disproportion and ugliness prevail it is important to recognize facial form as an orthodontic problem. he said that upper lip will thicken slightly following retraction of upper incisors depending on the strain of the lip in the beginning, there will be 1mm of thickening of upper lip for each 3mm retraction of upper incisors, the lower lip does not thicken but curls backward as a result of upper anterior retraction.

Studies done by Burston[4], Subtelny[5], Merrifield[6], Iwasawa[7], Lew[8], and katsaros[9] have been conducted the same conclusion.

Ricketts[10] also depended A - pogonion plane [dental plane) as arefence line to measure the position and the inclination of the lower incisors in 1000 cases study found the mean of lower incisor position is 0.5 mm forward of A-pogonion plane with standard deviation of 2.5 mm, the inclination was 25.4° ± 6.8.

Bloom[11] says that there is a definite relationship between the dento-skeletal framework and soft tissue profile around the mouth. upper incisor movements cause changes in the superior sulcus, upper lip and lower lip.
As lower incisor change so do the inferior sulcus and lower lip. Knowing of these changes, it is possible to predict the perioral soft tissue changes in relation to anterior tooth movement[6].

Riolo et al[12] depend NPog line to measure the distance of maxillary incisor. This is important in the treatment planning and is frequently the key factor in deciding:

1. Whether extraction is indicated.
2. Whether the lower incisor can be moved forward.
3. Whether anchorage is critical.

The researchers using AB plane as a reference line are very limited. Hedin[13] used AB plane as reference line to measure the position of lower incisor.

AIMS OF THE STUDY

1. To evaluate the mean value of the measurements for lips and incisors position in normal class I occlusion in Mosul City.
2. To know the relation between the position of upper and lower incisors with the upper and lower lips and the effect of upper and lower incisors inclination on perioral soft tissue profile.

MATERIALS AND METHODS

The sample was collected from the students of Mosul University. One hundred students, 50 males and 50 females aged 18-25 years having normal occlusion, class I molar and canine relation, with good facial profile. They have no history of orthodontic treatment. X-ray film taken for them by S.S. White machine with focal distance 190 cm after standardization of the machine. The x-ray film placed on the viewer with image facial facing to the right then the tracing paper fixed. We traced the out line of the cranium, maxilla mandible, and soft tissue profile contour, upper and lower incisors

The skeletal classification depending on the value SNA-SNB = ANB, which is depended by Rakosi[14] where; ANB for class I = 2-4°, class II = over 4°, class III = less than 2°.

The landmarks: Which depended by Rakosi[14]:

A - The deepest point in the curved bony of concavity of the maxilla.
B: - The deepest point at the concavity of the alveolar processes of the mandible
Ls: - Laberale superius, the most anterior point of upper lip.
Li: - Laberale inferius, the most anterior point of lower lip.
sn: - subnasal point, the intersection point of the lower border of the nose with upper lip.
b :- the deepest point in curvature at the soft tissue of the mandible.

*The reference line:*Is AB line, which also can call. The dental plane as it located at the dental area ,the distances measured from this line is: -

UCI: - Distance from. Upper incisor edge vertical to AB lines .
LCI: - Distance from. Lower incisor edge vertical to AB lines .
UL: - Distance from Ls vertical to AB line .
LL: - Distance from Li vertical to AB line.

The angles used are:

1. Angle between AB line with the long axis of upper incisor AUC .
2. The angle between AB line with the long axis of lower incisor ALC.
3.Nasolabial angle NLA: angle at sn between lower border of the nose and upper lip.
4. Labiomental fold Mn : angle at b between Lower lip and the tangent of the chin.

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RESULTS

The normative value of the measurements for the entire sample seen in table1.

Table (1): Normative Value of the measurement in class I normal occlusion

	Sex	Mean	S.D.	Minimum	Maximum	t-value
* UCI	M.	8.70	7.0	4.0	11.0	0.16
	F.	8.54	1.83	5.0	12.0	N.S.
	T.	8.62	5.10	4.0	12.0	
* LCI	M.	4.98	2.06	1.5	8.0	-1.09
	F.	5.42	1.93	2.0	10.0	N.S.
	T.	5.20	2.01	1.5	10.0	
*UL	M.	21.05	2.46	16.0	24.5	4.29
	F.	19.24	2.08	16.0	24.5	S.
	T.	21.07	2.56	16.0	24.5	
* LL	M.	20.59	2.18	16.0	24.5	3.37
	F.	18.93	2.37	15.0	26.5	S.
	T.	20.43	2.39	15.0	26.5	
**AUC	M.	151.60	5.54	134.5	166.0	2.65
	F.	148.81	5.11	140.5	158.0	S.
	T.	150.20	5.49	134.5	166.0	
**ALC	M.	158.91	5.29	148.5	172.0	0.61
	F.	158.58	5.77	151.0	172.0	N.S.
	T.	157.46	5.26	148.5	172.0	
**NLA	M.	98.15	12.65	75.0	134.0	3.41
	F.	106.75	14.61	87.0	122.0	S.
	T.	102.45	14.27	75.0	134.0	
**Mn	M.	124.65	12.97	83.0	152.0	-1.16
	F.	127.89	12.31	99.0	142.0	N.S
	T.	¹26.27	12.69	83.0	152.0	

* in mm   ** in degree   S-significant   NS-non significant

The table shows a non-significant difference between the males and the females for the position of upper and lower incisors to AB line. But a significant difference for the position of upper and lower lips between males and females and that the males have larger records for both variables UL and LL than for the females. Also a significant difference for AUC between two sexes that is larger measurement for males than for females but non-significant differences for ALC. Again a significant difference between males and females for NLA with larger records for females than for males, but a non- significant difference for Mn and larger measurement for males than for females.

Table (2) shows that skeletal class I forms the majority of class I occlusion followed by skeletal class II then III

Table (3) for the mean Value for skeletal class I, II, and III. Shows:
UCI: A non- significant difference between males and females for class I, and II but significant difference for class III and larger for the females than for the males, this means that females had more protrusive upper incisor than males on class III.

LCI: A. non-significant difference between males and females for class I and III with significant difference   for class II, the females had more protrusive lower incisor than males on class II.

UL: A   significant difference between males and females for class II male had more protrusive upper lip than females. But non-significant difference for classes III.

LL: A significant difference between two sexes found for class I male had more protrusive lower lip than females, but non- significant difference for class II and III.

AUC: A non- significant difference between two sexes found for class I, with, significant difference for class II and III

ALC: A non- significant difference for the three classes between males and females

NLA: A significant difference seen in class I but non- significant difference for class II and III

Mn: A non- significant difference for the three classes between males and females.

Table (2): Distribution of the sample according to skeletal relation.

sex	Dental class I normal occlusion.					
	Skeletal cl I		Skeletal cl II		Skeletal cl III	
	No.	%	No.	%	No.	%
male	31	62	12	24	7	14
Female	27	54	19	38	4	8

Table (3): Mean Value of class I, II, III. in class I normal occlusion

	Sex	Mean	S.D.	t-value	Mean	S.D.	t-value	Mean	S.D.	t-value
		I			II			III		
*ACI .	M.	7.82	1.46	-1.10	7.54	2.14	-1.60	7.29	1.52	-2.24
	F.	8.31	1.94	N.S.	8.71	1.79	N.S.	9.25	1.32	S.
*LCI	M.	4.97	1.55	-0.44	4.16	1.98	-2.0	5.28	1.47	-1.04
	F.	5.15	1.85	N.S.	5.71	2.24	S.	5.88	0.25	N.S.
*UL	M.	21.34	2.41	3.04	20.29	2.61	2.36	21.07	2.56	0.05
	F.	19.43	2.37	S.	18.61	1.38	S.	21.00	1.96	N.S.
*LL	M.	20.81	2.01	2.71	2.71	20.13	2.39	1.92	20.42	2.39
	F.	19.11	2.67	S.	18.55	2.12	N.S.	19.50	1.29	N.S.
**AUC	M.	150.85	5.44	0.73	153.08	5.85	2.63	152.36	5.69	2.26
	F.	149.83	5.15	N.S.	147.76	5.33	S.	146.88	2.46	S.
**ALC	M.	159.17	4.54	-0.58	160.21	5.62	1.58	157.78	4.66	0.22
	F.	159.94	5.56	N.S	156.29	6.17	N.S.	157.25	3.50	N.S.
**NLA	M.	96.74	10.49	-3.57	102.33	17.12	-0.34	97.21	13.17	-0.98
	F.	106.43	10.15	S.	104.23	10.91	N.S	102.88	5.84	N.S
**Mn	M.	125.45	14.36	-0.62	121.04	11.41	-186	127.28	8.20	0.94
	F.	122.59	11.93	N.S.	19.24	13.62	N.S.	122.38	8.54	N.S.

*-in mm   **-in degree   S-significant   NS-non-significant

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Comparison of the three classes: -

• Comparison of class I and II :

From the table 4 we can see the value of t-test for the males and for females for the entire variable and by comparing it with tabulated t = 2.02, there is a non-difference for the measurements.

• Comparison of class II and III :

In table 5 also t -value between the variables for the males and for the females compared with tabulated t = 2.00, shown a non- significant difference for all the variable except significant for UL variables for the females.

• Comparison of class I and III :

In table 6 t -value of the variables, the tabulated t = 2.02, show a non-significant difference for all the variables for the males and for the females.

Table (4): Comparison of class I, II for Males and Females

	Sex	Mean I	Mean II	t-value	Significance
*UCI	M.	7.82	7.54	0.5	N.S
	F.	8.31	8.71	-0.71	N.S
*LCI	M.	4.97	4.16	1.68	N.S
	F.	5.15	5.71	-0.93	N.S
*UL	M.	21.34	20.29	1.21	N.S
	F.	19.43	18.61	1.48	N.S
*LL	M.	20.81	2.71	0.87	N.S
	F.	19.11	18.55	0.79	N.S
**AUC	M.	150.85	153.08	-0.93	N.S
	F.	149.83	147.76	1.74	N.S
**ALC	M.	159.17	160.21	-1.18	N.S
	F.	159.94	156.29	1.32	N.S
**NLA	M.	96.74	102.33	-1.30	N.S
	F.	106.43	104.23	0.70	N.S
**Mn	M.	125.45	121.04	1.05	N.S
	F.	122.59	19.24	-0.50	N.S

*-in mm   **-in degree   N-significant   NS-non significant

Table (5): Comparison of class II, III for Males and Female

	Sex	Mean II	Mean III	t-value	Significance
*UCI	M.	7.54	7.29	1.10	N.S
	F.	8.71	9.25	-0.59	N.S
*LCI	M.	4.16	5.28	-1.34	N.S
	F.	5.71	5.88	-0.14	N.S
*UL	M.	20.29	21.07	-0.64	N.S
	F.	18.61	21.00	-2.95	S
*LL	M.	2.71	1.92	-0.27	N.S
	F.	18.55	19.50	-1.10	N.S
**AUC	M.	153.08	152.36	1.01	N.S
	F.	147.76	146.88	-0.15	N.S
**ALC	M.	160.21	157.78	0.27	N.S
	F.	156.29	157.25	0.34	N.S
**NLA	M.	102.33	97.21	0.73	N.S
	F.	104.23	102.88	-1.60	N.S
**Mn	M.	121.04	127.28	-1.38	N.S
	F.	19.24	122.38	1.34	N.S

*- in mm   **-in-degree   S-significant   NS-non significant

Table (6): Comparison of class I, III for Males and Females

	Sex	Mean I	Mean III	t-value	Significance
*UCI	M.	7.82	7.29	0.87	N.S
	F.	8.31	9.25	-1.23	N.S
*LCI	M.	4.97	5.28	-0.01	N.S
	F.	5.15	5.88	-1.93	N.S
*UL	M.	21.34	21.07	0.26	N.S
	F.	19.43	21.00	-1.46	N.S
*LL	M.	20.81	1.92	0.42	N.S
	F.	19.11	19.50	-0.43	N.S
**AUC	M.	150.85	152.36	-0.38	N.S
	F.	149.83	146.88	1.31	N.S
**ALC	M.	159.17	157.78	-0.66	N.S
	F.	159.94	157.25	1.87	N.S
**NLA	M.	96.74	97.21	-0.10	N.S
	F.	106.43	102.88	-1.69	N.S
**Mn	M.	125.45	127.28	-0.32	N.S
	F.	122.59	122.38	1.02	N.S

*-in mm   **-in degree   .S-significant   NS-non significant

Correlation of the Normative Variables: -

From the table 7 we can see the correlation of the variables for the males and females and the total sample at probability level (P=0.01). We note a high correlation found between UCI and LCI also found high correlation between UL & LL.

A moderate correlation found between UCI and AUC and LCI with ALC also LCI with LL.

UCI & LCI referred to the position of upper incisor & lower incisor to AB plane while AUC, ALC for the inclination of upper and lower incisors to AB pl_ne, so there is correlation between the position & the inclination of the incisor. As we know the upper lip depend on the upper incisors while Lower lip depend on both upper & lower incisors, so there is a moderate correlation in our result between UCI & LL.

Table (7): Correlation of the Normative Value

	Sex	UCI	LCI	UL	LL	ALC	AUC	NLA	Mn
UCI	M.	1.00							
	F.	1.00							
	T.	1.00							
LCI	M.	0.77	1.00						
	F.	0.82	1.00						
	T.	0.80	1.00						
UL	M.	0.42	0.25	1.00					
	F.	0.40	0.33	1.00					
	T.	0.41	0.20	1.00					
LL	M.	0.64	0.53	0.79	1.00				
	F.	0.51	0.47	0.76	1.00				
	T.	0.55	0.50	0.79	1.00				
AUC	M.	-0.62	-0.71	-0.24	-0.38	1.00			
	F.	-0.54	-0.62	-0.16	-0.15	1.00			
	T.	0.57	-0.66	-0.17	-0.21	1.00			
ALC	M.	-0.30	-0.37	-0.05	-0.12	0.29	1.00		
	F.	-0.39	-0.44	-0.04	-0.03	0.49	1.00		
	T.	-0.39	-0.43	-0.05	0.02	0.39	1.00		
NLA	M.	-0.22	-0.11	-0.22	-0.25	0.11	0.22	1.00	
	F.	0.08	0.04	-0.10	0.10	0.08	0.14	1.00	
	T.	0.01	0.02	-0.25	0.19	0.07	0.09	1.00	
Mn	M.	0.13	0.29	-0.27	0.18	-0.19	-0.23	-0.11	1.00
	F.	0.03	0.18	-0.24	0.14	-0.02	0.03	-0.04	1.00
	T.	0.10	0.25	-0.28	0.19	-0.10	-0.14	-0.06	1.00

DISCUSSION & CONCLUSION

From table 1 we can note that the males have larger measurements in the variables UCI, UL, LL, AUC, ALC & the difference is significant in UL, LL, AUC.

Generally males have thicker soft tissue covering the skeletal framework of the face than for the females and this proved by N. Agha[15]. She found that the upper lip UL for males = 22.08 mm, females = 21.2 mm, Lower lip LL for males = 19.62 mm, females = 18.74 mm. Ta'ani[16] found that UL for males = 20.93 mm, females = 20.0

mm, LL for males = 18.44 mm, females = 16.9 mm. Kapoor et al[17] take mixed sample of males & females UL =19.26 mm, LL = 17.13 mm.

For our results UL for males = 21.05 mm, females = 19.24 mm, LL for males = 20.59 mm, females = 18.93 mm. The difference in the results because; the three studies take the facial plane NPOg as a reference line, but in this study we use the dental plane AB reference line, Also the sexual difference clearly seen in the thickness of upper & lower lips for males than for females and that the difference is significant also the males have larger record in AUC than females, this angle formed by the inclination of upper incisor & the position of point A & B with each other in that; if consider the incisor inclination is fixed as the sample have normal occlusion, so this angle is determined by the inclination of AB plane, if the two point A, B, are on the same vertical line or if point A more anterior or posterior to point B so we have skeletal classification (I, II & III) . The females have larger measurements than males in (LCI NLA & Mn) and the difference is significant in NLA.

We expect to gain relation between AUC & NLA angles as those angles from profile view located near together, but from the results; the males have larger record in AUC and the females have larger record in NLA, So, there is no effect on each other this also proved in the table 7 for the correlation of the variables.

The mean value for skeletal class I, II and III in table 3 and we Can see that in class I a significant difference for UL, LL and NLA between two sexes those related to the soft tissue and that the males have larger measurement in UL and LL (linear measurements) while females have larger measurement in NLA.
For class II a significant difference found in LCI, UL and AUC between two sexes also the males have larger measurements in UL and AUC but the females have larger measurements in LCI.

For class III a significant difference found for UCI & AUC and larger for females than for males.
We conclude that there is no one variable have a significant difference for skeletal class I, II and III as a share variable among them, this means the variability in the formation of the face among the different skeletal classes, at the same time we note that ALC and Mn have non- significant difference between males and females, and share in the three classes which give idea that there is no any relation between the two variable and the skeletal classification.

We can also conclude that:

1-comparing skeletal Class I and Class II, there is a non significant difference for all the variables in the males & females.

2- comparing   skeletal Class II and Class III, there is a non significant difference for all the variables in the males & females; except for UL for the females which differ significantly between Class II & III, this may refer to the convexity of female face in Class II.

3- comparing skeletal Class I and Class III, there is a non-significant difference for all the variables in the two sexes.

These results obtained because of the perfect selection of the sample all have Class 9I molar & canine relation of normal occlusion.

4 - High correlation found between UCI with LCI, which means that there is balance in position of upper & lower incisors.

5- High correlation between UL & LL.

6- Moderate correlation between UCI with AUC & between LCI with ALC, so there is harmony between the position and the inclination of the incisors.

7- Moderate correlation for UCI with UL & for UCI with LL.

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