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EFFECT OF LIP POSITIONS ON FACIAL PROFILE ATTRACTIVENESS IN DIFFERENT ANGLE'S CLASSES OF EGYPTIAN FEMALES

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ABSTRACT:

Objective: *The aim of this study was to evaluate Egyptian female profile attractiveness perception among lay males in different Angle`s classifications with different anteroposterior lip positions.* ***Methods:*** *An 18 years old adult Egyptian female whose Lateral Cephalometric readings were within the first standard deviation of Alexandria analysis was chosen. Her lateral profile images were digitally manipulated to produce 27 pictures representing class I, II and III with different anteroposterior lip and nose relations. The images were rated on a 1-27 point score system by 100 males (15-30 years). Comparison among the different classes was done using analysis of variance (ANOVA) followed by Tukey post hoc test for pair wise comparison. The same tests were used to compare across the different lip/nose positions in each class. The level of significance was set at 5% for all analyses.* ***Results and Conclusions:*** *Class I profile was perceived as the most attractive, while class II and III were not significantly different from each other. Generally a preference towards retrusive profiles over protrusive ones was noted in class I and II. Lip chin relation affects the female profile perception more than the lip nose relation; therefore it is recommended to retrude the lips in class II and protrude them in class III.*

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INTRODUCTION

Orthodontics is a medical profession with an artistic touch, as patients frequently seek orthodontic treatment not only to adjust their occlusion but mainly to have an attractive smile and appearance.[1,2]

Since beauty is subjective, the orthodontist should not treat his patients according to numbers dictated by various cephalometric readings, or to his own preferences, as self-perception of facial aesthetics does not always correlate with morphometric measurements such as physical characteristics and cephalometric values.[3,4] Treatment should be based on an understanding of the patient's expectations and delivering the most balanced outcome as regards the patient's will and professional guidelines which the patient might not be aware of. Rivera et al[5] reported that the perception of an esthetic profile by patients undergoing orthognathic surgery might not be consistent with those of orthodontists and oral surgeons, and factors as age, gender and ethnicity must be taken into consideration.

It should also be noted that not only is beauty subjective but also changeable and affected by race. For example, at one time, flat retruded lips were considered beautiful while nowadays a lot of females seek lip injections in order to have fuller lips.

An interesting article by Nguyen and Turley in 1998[6] studied the changes in Caucasian male profile in fashion magazines from the 30's till the 90's and found that the ideal male profile had changed towards having more lip protrusion, lip curl and vermilion border display.

The role of ethnicity in esthetic profile perception could be verified by a study by Soh et al[7] were it was demonstrated that slight lip protrusion was not well accepted in a Chinese community, whereas in another study it was considered attractive in black females. [8]

Ioi et al[9] in 2005 studied the effect of anteroposterior lip position with protrusive and retrusive chin positions in Japanese males and females, and showed that as facial convexity decreased more retruded lip positions were preferred, for both males and females. Conversely the Japanese orthodontists tended to prefer slightly more protruded lip positions as the facial convexity increased.

Anteroposterior lip positions and their harmony with the chin and nose have great impact on profile attractiveness; therefore this study aims to provide the Egyptian orthodontist with the common Egyptian perception of facial profile beauty in different chin and nose positions. In order to thoroughly understand any differences in the perception of facial attractiveness between clinicians and society, to aid in the further development of patient-centered treatment goals.

MATERIALS AND METHODS

The subject who participated in this cross sectional analytical study was one female (18 years) patient who was seeking treatment at the Orthodontic department, Faculty of Dentistry, Alexandria University.

She had a pleasing class I profile, a class I malocclusion and her skeletal, dental and soft tissue Lateral Cephalometric analysis readings fell within the 1st standard deviation of the normal Egyptian cephalometric values[10].

After obtaining a written consent to her approval to participate in this study, her right lateral profile was photographed using a 35-mm SLR[2] camera (Canon EOS 620) with a 100mm focal length lens, from a distance of 10 feet.

The patient was asked to display a relaxed facial expression with the lips closed at rest and the eyes straight ahead with the true horizontal parallel to the floor, and the teeth in maximum intercuspation.

A ruler was held vertically by an assistant at the mid sagital plane infront of the patient, to aid in future metric calibration of the photograph.

The 10 x 15-cm color print was then scanned using an HP Scanjet G3110 Photo Scanner[3], at 300dpi. Adobe Photoshop CS3[4] extended version 10.0, was used to convert the color image into a gray scale.

[2] SLR = Single Lens Reflector.

[3] Hewlett Packard Corp, San Diego, Calif.

[4] Adobe system incorporated, San Jose, Calif.

The image was manipulated using Photoshop to create additional 26 new images as follows:

1- Class I group (9 images). The chin was left untouched, the nose and lips were moved – 4mm, 0, + 4mm in the anteroposterior plane making all possible combinations.

2- Class II group (9 images). The chin was retruded 4mm, the nose and lips were moved as in group 1.

3- Class III group (9 images). The chin was protruded 4mm, the nose and lips were moved as in group 1.

The 4mm was based on a study by romani et al[11] and maple et al[12]

All vertical relationships were unaltered to evaluate only the anteroposterior aspects of the profile.

The 27 photos of the patient were printed out on glossy paper in a size of 10x15-cm and each photo assigned an alphabetical code according to the changes that had been made to the original photograph. This code key was used after rating the pictures to relate the scores given to a particular picture to its nose and lips modifications.

The profile raters whom participated in this study consisted of 100 laypersons, all of which were males, with an age range of (15-30) years, from the Orthodontic Department Faculty of Dentistry, Alexandria University, and from private orthodontic clinics in Alexandria. Each rater was given the photographs unordered and asked to rank the 27 profiles on a scale of 1 (Least attractive) to 27 (very attractive) without any repeat of rank.

Descriptive statistics were calculated as means and standard deviation for the rating score in different groups and subgroups. Comparison among the different classes was done using analysis of variance (ANOVA) followed by Tukey post hoc test for pair wise comparison. The same test was used to compare across the different lip/nose positions. Regression analysis was used to examine the effect of class and different lip/ nose positions. Significance level was set at 5%. Bar charts were used for graphical presentation.

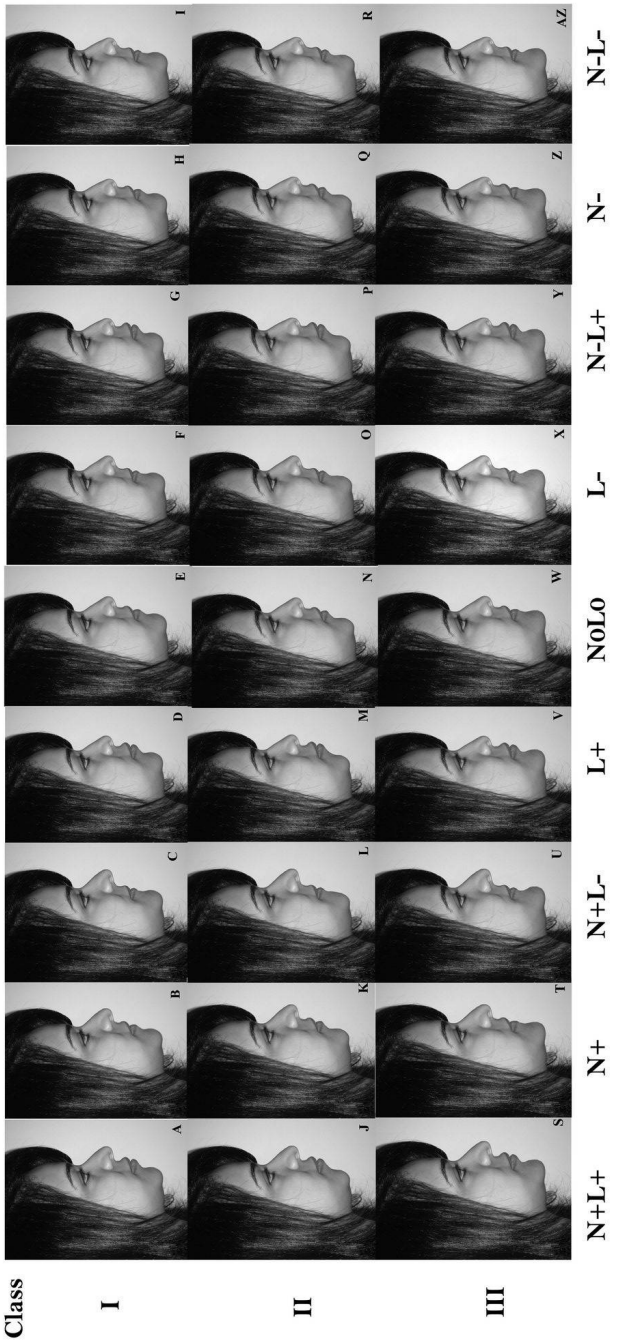

Figure 1: Digitally generated female profile pictures. (N+ = protruded nose, N- = retruded nose, L+ = protruded lip, L- = retruded lip, N0 = unchanged nose, L0 = unchanged lip). "Original picture is E".

RESULTS

Table 1 and Figure 2 show the mean score and SD of the rating scores in different lip/nose combinations in each of the three classes. It could be noted that lip protrusion was not favored in class II, while lip retrusion was not favored in class III. The different lip/nose combinations led to significant differences in each class in the rating scores, with the highest variation shown by the greatest F value in class II.

Table 1: Mean score and standard deviation (SD) of different lip/nose combinations in each of the three classes.

Nose lip combinations	CLASS I		CLASS II		CLASS III	
	Mean	SD	Mean	SD	Mean	SD
N0L0	22.08	5.03	19.10	6.34	20.92	5.47
L-	20.16	6.73	21.80	6.26	12.06	7.55
L+	14.46	6.47	9.68	4.71	15.78	7.04
N-	17.90	6.80	15.84	6.68	14.90	7.53
N+	12.20	6.76	12.78	6.71	11.64	6.27
N+L+	9.10	6.45	6.88	5.23	13.22	6.12
N-L+	10.72	6.85	6.54	4.69	11.36	6.64
N+L-	12.02	6.83	10.62	7.09	8.56	5.58
N-L-	19.40	6.01	18.50	6.07	9.78	7.58
F of ANOVA	26.01		42.31		15.29	
P value	<0.0001*		<0.0001*		<0.0001*	

(N= nose, L= lip, + = protruded, - = retruded, 0= unchanged).
*: Statistically significant at P ≤0.05

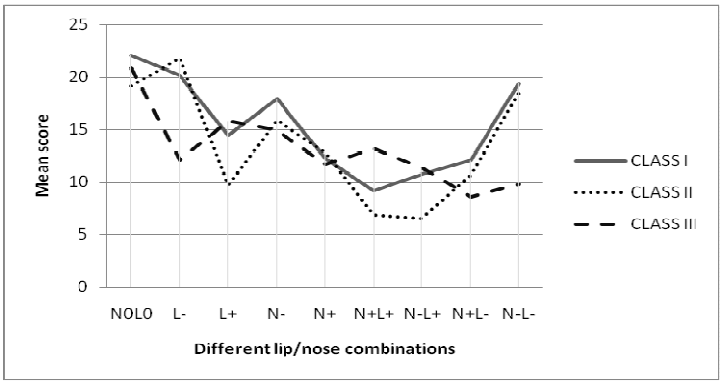

Figure 2: Line graph of mean scores of lip/nose combinations among the 3 classes.

Tables 2, 3 and 4 show the pair wise comparison between different nose/lips combinations in class I, II and III respectively. The upper number in each cell represents the mean difference between the pair under comparison, and the lower number represents the significance. Shaded cells show statistically significant differences between pairs.

Table 2: Tukey post hoc test for pair wise comparison of different nose/lips combinations in class I.

	N0L0	**L-**	**L+**	**N-**	**N+**	**N+L+**	**N-L+**	**N+L-**
N0L0								
L-	1.92 0.862							
L+	**7.620(*)** **.000**	**5.700(*)** **.000**						
N-	**4.180(*)** **0.035**	2.26 0.715	-3.44 0.165					
N+	**9.880(*)** **.000**	**7.960(*)** **.000**	2.26 0.715	**5.700(*)** **.000**				
N+L+	**12.980(*)** **.000**	**11.060(*)** **.000**	**5.360(*)** **0.001**	**8.800(*)** **.000**	3.1 0.287			
N-L+	**11.360(*)** **.000**	**9.440(*)** **.000**	3.74 0.093	**7.180(*)** **.000**	1.48 0.967	-1.62 0.944		
N+L-	**10.060(*)** **.000**	**8.140(*)** **.000**	2.44 0.622	**5.880(*)** **.000**	0.18 1	-2.92 0.369	-1.3 0.985	
N-L-	2.68 0.492	0.76 1	**-4.94(*)** **0.005**	-1.5 0.964	**-7.20(*)** **.000**	**-10.30(*)** **.000**	**-8.68(*)** **.000**	**-7.38(*)** **.000**

*: Statistically significant at $P \leq 0.05$

Table 3: Tukey post hoc test for pair wise comparison of different nose/lips combinations in class II.

	N0L0	**L-**	**L+**	**N-**	**N+**	**N+L+**	**N-L+**	**N+L-**
N0L0								
L-	-2.700 .383							
L+	**9.420(*)** **.000**	**12.120(*)** **.000**						
N-	3.260 .150	**5.960(*)** **.000**	**-6.16(*)** **.000**					
N+	**6.320(*)** **.000**	**9.020(*)** **.000**	-3.100 .203	3.060 .218				
N+L+	**12.220(*)** **.000**	**14.920(*)** **.000**	2.800 .332	**8.960(*)** **.000**	**5.900(*)** **.000**			
N-L+	**12.560(*)** **.000**	**15.260(*)** **.000**	3.140 .189	**9.300(*)** **.000**	**6.240(*)** **.000**	.340 1.000		
N+L-	**8.480(*)** **.000**	**11.180(*)** **.000**	-.940 .997	**5.220(*)** **.00**1	2.160 .689	-3.740 .053	**-4.08(*)** **.022**	
N-L-	.600 1.000	3.300 .139	**-8.82(*)** **.000**	-2.660 .405	**-5.72(*)** **.000**	**-11.6(*)** **.000**	**-11.9(*)** **.000**	**-7.88(*)** **.000**

*: Statistically significant at P ≤0.05

Table 4: Tukey post hoc test for pair wise comparison of different nose/lips combinations in class III.

	N0L0	**L-**	**L+**	**N-**	**N+**	**N+L+**	**N-L+**	**N+L-**
N0L0								
L-	**8.860(*)** **.000**							
L+	**5.140(*)** **.004**	-3.720 .124						
N-	**6.020(*)** **.000**	-2.840 .459	.880 .999					
N+	**9.280(*)** **.000**	.420 1.000	4.140 .053	3.260 .267				
N+L+	**7.700(*)** **.000**	-1.160 .994	2.560 .605	1.680 .943	-1.580 .960			
N-L+	**9.560(*)** **.000**	.700 1.000	**4.420(*)** **.028**	3.540 .171	.280 1.00	1.860 .901		
N+L-	**12.3(*)** **.000**	3.500 .183	**7.220(*)** **.000**	**6.340(*)** **.000**	3.080 .343	**4.660(*)** **.016**	2.800 .479	
N-L-	**11.1(*)** **.000**	2.280 .744	**6.000(*)** **.000**	**5.120(*)** **.005**	1.860 .901	3.440 .202	1.580 .960	-1.220 .992

*: Statistically significant at P ≤0.05

Table 5 shows the comparison among the three classes as regards the mean rating score. The difference among these classes was statistically significant (F= 86.38, P<0.0001). Post hoc comparison shows that class I had a significantly higher mean score than class II and class III, which were not significantly different from each other.

Table 5: ANOVA for mean scores among different classes.

	Class I	**Class II**	**Class III**
Mean ± SD	15.34 ± 7.77[a]	13.53 ± 7.95[b]	13.14 ± 7.49[b]
F of ANOVA	10.37		
P value	<0.0001*		

*: Statistically significant at P ≤0.05.

a, b: different letters denoting statistically significant differences

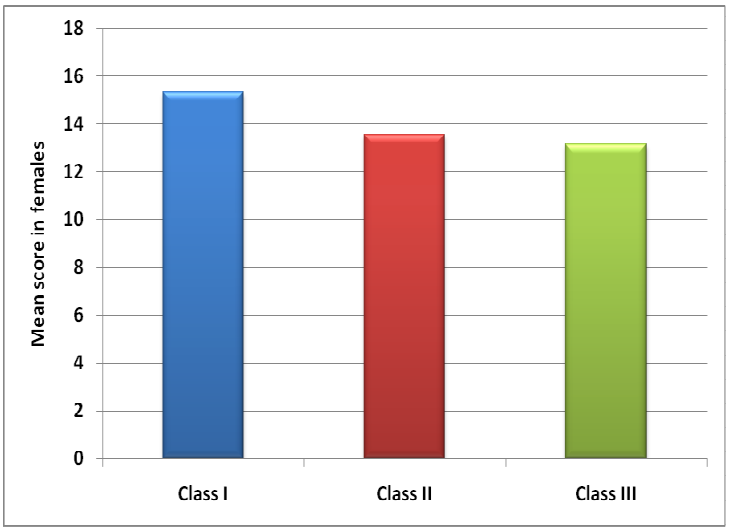

Figure 3: Bar graph of mean scores among different classes.

Table shows the regression model for factors affecting the rating scores. Class, position of lip and nose as well as different combinations of lip and nose positions in different classes significantly affected the rating score (P<0.0001 for all).

Table 6: Regression model for factors affecting rating score

Factors	F	P value
Class	15.17	<0.0001*
Position of lip and nose	56.85	<0.0001*
Class * position of lip and nose	11.98	<0.0001*

DISCUSSION

In this study the raters were chosen to be males because a person is more interested to be found attractive by the opposite sex, rather than peers. The age range was chosen to be (15-30) to coincide with the most fertile period of a male, when judging the possible mate attractiveness is at its peak[13].

The patient was photographed using a 100mm focal length lens, from a distance of 10 feet, and then the images printed and scanned to keep barrel distortion to a minimum, i.e. to avoid foreshortening[5] commonly seen when using digital cameras for portrait shots.

Black and-white digital images were used to eliminate any possible influence of skin and hair color.

Although the visual analogue scale VAS is a simple and rapid method for giving scores, it was not used in this study because there remain many concerns when using this instrument to measure a subjective phenomenon such as facial attractiveness. For example, it is difficult to ensure that all raters interpret the anchor points of "Least attractive" and "very attractive" in exactly the same way or that comparable positioning of the marks on the scale implies the same feeling or intensity of feeling by the same or different raters.[14] Furthermore, it should not be assumed that the same score by different raters implies the same assessment of a particular profile.

[5] Making facial parts closer to the lens (as the nose or chin) appear relatively larger than the rest of the face.

The regression model shown in table 6 indicates that factors as class, lip/nose position and interaction between the class and lip/nose position significantly affect the perception of facial profile attractiveness.

Class I was considered by the layout males more attractive than both class II and III which were not significantly different than each other , indicating that Egyptian males prefer a well balanced female profile and do appreciate and can accurately judge a well positioned chin.

Class II and III had a significantly lower score than class I, this goes along with the findings of a study by Cochrane et al[15] who found that Class II profile was generally perceived to be the least attractive by the public in a white population. Our findings contradict the findings of Soh et al [7] that Chinese males with retrusive mandibles were attractive, and the findings of Ioi et al [9] that Japanese also liked retrusive profiles. Kurado et al[16] reported that Japanese liked retrusive mandibles. Such a contrasting result could be due to cultural and ethnic factors that had influenced the perception, with whites and African having closer beauty standards than Chinese and Japanese.

In class I, the unmodified lip and nose profile had a significantly higher mean score than the profile with manipulated lip and/or nose except the profile with the retruded lip L- that wasn't significantly different from the original profile N0L0, indicating a preference of retruded lips than protruded lips in females, as indicated by L+ being significantly lower than N0L0.

Small or large nose adversely affected the profile attractiveness, except when a small nose was accompanied with a retruded lip again indicating the preference of retrusion over protrusion, and indicating the low tolerance of Egyptian males to any deviation from the ideal female profile.

The N+L+ had the lowest score indicating the un-acceptance of protrusion in females and the preference of a retruded profile provided there is good balance between the lip and nose as indicated by the N-L- having a high score that wasn't significantly different that the original profile.

Small nose is more preferred than large nose as indicated by N- being significantly higher than N+ and N+L+, and lip retrusion is better accepted with small nose than lip protrusion as indicated by N-L+ being significantly lower than N- and N-L-.

In cases with large nose the lip positions didn't have a significant effect on the profile attractiveness.

In class II a small nose or a retruded lip wasn't significantly different from N0L0, indicating again an acceptance of retrusion in the class II female profile. Protruded lips combination had the lowest scores, as well as a big nose that is unaccepted in class II female.

The preference of profile retrusion in class II is clearly demonstrated by N-L- being not different from N0L0, while N+L+ was significantly lower as shown in table 3.

In small nose class II cases it is better to retrude the lips as indicated by N- being significantly more accepted than N-L+ and not different from N-L-. Also in class II cases with a large nose it is better to retrude the lips as indicated by N+ being not different from N+L- but being significantly better than N+L+, this is on contrary to the common feeling that retruded lips in cases with a big nose could lead to more nose prominence, this could be explained by assuming that the lip chin relation affects the female class II profile perception more than the lip nose relation.

In class III the profile with untouched lip and nose N0L0 was significantly more acceptable than all other generated profiles with altered lip and nose position, indicating caution one should exercise when dealing with class III female profiles.

In class III cases with a small nose it is better to protrude the lips than retrude them as indicated by N- being not different from N-L+ but significantly better than N-L-. This could be because a protruded lip provides a more smooth visual transition between the protruded chin and small nose. This again indicates that the lip chin relation is more influential on the profile attractiveness than the lip nose relation.

Class III cases with a big nose were less sensitive to changes in the lips position as indicated by N+ being not different from N+L+ and N+L-.

however when comparing N+L+ to N+L- the earlier was significantly better accepted indicating better acceptance of lip protrusion than lip retrusion in class III cases with big nose.

CONCLUSIONS

1- Class I is more favored in females than class II and class III.

2- There is better acceptance of female retrusive profile by Egyptian males than a protrusive one in class I and II.

3- Lip chin relation affects the female profile perception more than the lip nose relation; therefore it is recommended to retrude the lips in class II and protrude them in class III.

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