Photographical Assessment of Face Pleasantness using Facial Analysis for a Sample of Iraqi Adults Females (Retrospective Study)

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Abstract

Aims: The aim of this study was to assess facial attractiveness and to check if the numeric facial analysis can determine this attractiveness for a sample of Iraqi adults' females and characterize the studied sample according to subjective concepts of facial esthetics in esthetically pleasant, esthetically acceptable and esthetically unpleasant, considering frontal photographs. Subjects and Methods: Forty frontal standardized photograph of females aged between 20 and 22 years old. The frontal photograph and lateral photograph were obtained by asking each female to look to the center of the lens and at a distant mirror respectively which is placed in front of her face. All the frontal photographs were evaluated by using our own esthetics criteria (orthodontist evaluation) as graduation in: pleasant, acceptable and not pleasant. The numeric facial analysis was then performed. Linear, proportional and angular measurements were compared among groups. Results: The sample was consisted of 25% of unpleasant, 55% of acceptable and 20% of pleasant according to subjective analysis. In most measurements there were no differences among groups. Just in one linear measurement (sn-U1 FILS) significant statistical difference was observed. Group III has higher right and a left symmetry angel despite it has lower facial symmetry Conclusions: In the evaluation of facial measurements, it was observed that there were statistically non-significant except for the sn-U1 FILS, which is statistically significant. The photographic evaluations require more than one evaluator in different specialties to give more reliable judgment. The facial analysis influenced by, age, gender, cultural and racial factors.

Keywords: *Attractiveness, Facial esthetics, Facial analysis.*

Introduction

Facial aesthetics can play the most important part in social modulation, self-esteem and interpersonal relationships. As believed relevant psychological aspects of some individuals can determine by the facial appearance [1]. Beauty standards are highly subjective, reflecting the area where they live and an ascertained period of time cultural idiosyncrasies of a population [2]. The orthodontists must be updated about what the population think an ideal face since over the years there were marked alterations in facial esthetic criterions [3].

Moreover, growths as well as after surgical procedures can be widely change the measurements of face [4]. The human face analysis is a science and an art employing both anthropologic and esthetic tools. The appearance of the face is effected by race, age, sex and ethnicity [5].

Orthodontic treatment is planned starting from a global estimation of the face, giving interest to esthetic needs as well as to functional and cephalometric issues [6]. The evaluation of facial esthetics can be done by some authors through direct measurements on the face and clinical exams [7].Although there are many accomplished laser scanning techniques [8] and computerized methods [9], Bishara et al [10].Prefer facial photographs using to appreciate facial esthetics, while photographs allow a more precise evaluation of measurements and proportions, which would be difficult directly on the face.

Also obtaining measurements from photographs provides a permanent record of the face that can be approached at a later time with less invasive to the patient and relatively inexpensive [11]. It is very important to consider the ethnical and

personal characteristics of the patient during aesthetic evaluation, so the unpleasant facial characteristics must be identify through the diagnosis, the professional can be improved with the orthodontic treatment, as well as the aspects considered pleasant and must be recorded during treatment [6]. Several studies [2, 7, 8, 10] were concerting both subjective and numerical facial analysis, to prove esthetical trends of the studied populations and to found the reference values for facial measurements.

The present study aims to assess facial attractiveness and to check if the numeric facial analysis can determine this attractiveness for a sample of Iraqi adults females additionally the studied sample was characterize according to subjective concepts of facial esthetics in esthetically pleasant, esthetically acceptable and esthetically unpleasant, considering frontal photographs.

Material and Method

Forty frontal standardized photograph of females aged between 20 and 22 years old ,without any History of orthodontic treatment, , trauma to the face and facial fractures, facial cosmetic surgery, or any significant deformity in the nose or face as exclusion criterion [12]. The frontal photographs were obtained by asking each female to look to the center of the lens and to look at a distant mirror which is placed in front of her face [13]. All the frontal photographs were evaluated by using our own esthetics criteria (orthodontist evaluation) and assign a value ranging from 1 to 9.

Value 1 meant the lowest facial attractiveness and 9 the highest level of facial attractiveness. We made all evaluations at the same time[6].After results tabulation, the means was calculated for each one of the 40 females and they were classified into 3 groups according to the facial attractiveness, being:

» Group 1: Esthetically unpleasant (score 1, 2, 3 or 4);

» Group 2: Esthetically acceptable (score 5 or 6);

» Group 3: Esthetically pleasant (score 7, 8 or 9).

Only in frontal photographs the photometric tracings were performed to begin the Facial analysis by the same trained observer [6]. The measurements employed by AutoCAD program 2016. Comparisons between numerical measurements obtained in the 3 groups (esthetically pleasant, acceptable and unpleasant) were performed using independent sample t-test. P value considered to be:

Statistically insignificant (NS) at p > 0.05

* Significant at p ≤ 0.05

** Significant at p ≤ 0.01

*** Significant at p ≤ 0.0

Photometric Points

Photometric points used are seen in Figure 1:
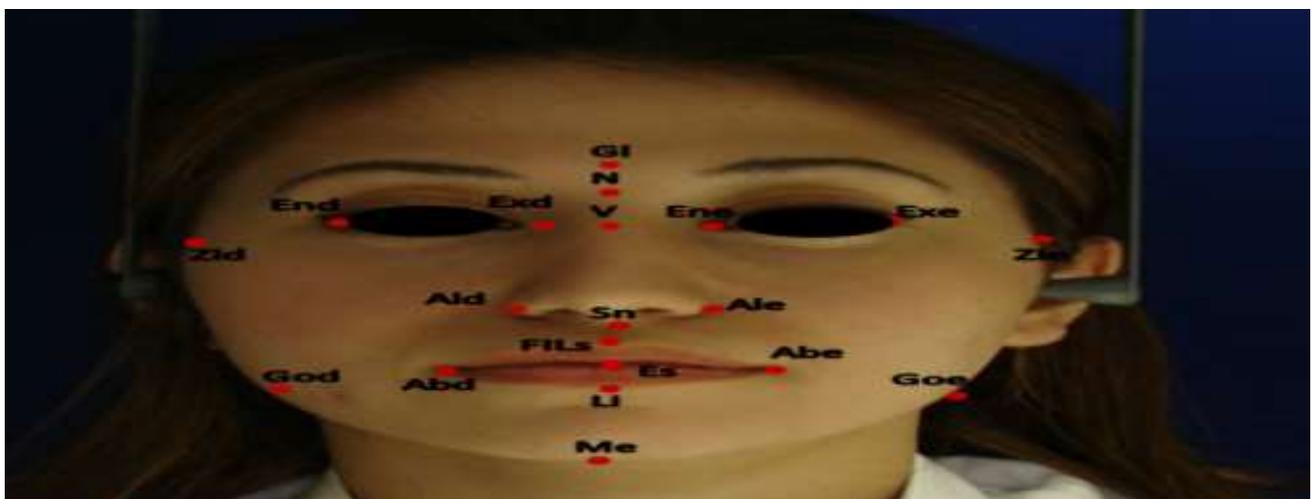
Figure 1: Photometric points: Gl`- soft tissue glabella; N`- soft tissue nasion; Exd- right external corner of the eye; Exe- left external corner of the eye; End- right internal corner of the eye; Ene- left internal corner of the eye; V- point V; Sn- subnasale; Ald- right alar point; Ale- left alar point; F- lower philtrum; Ls- upper philtrum; Li- lower lip; Abd- right mouth angle; Abe- left mouth corner; Es- stomium; Zig- right zigion; God`- right g onion; Goe` left g onion; Me`- menton

Linear Measures

Linear measures are represented in Figures 2, 3 and 4, with its descriptions.
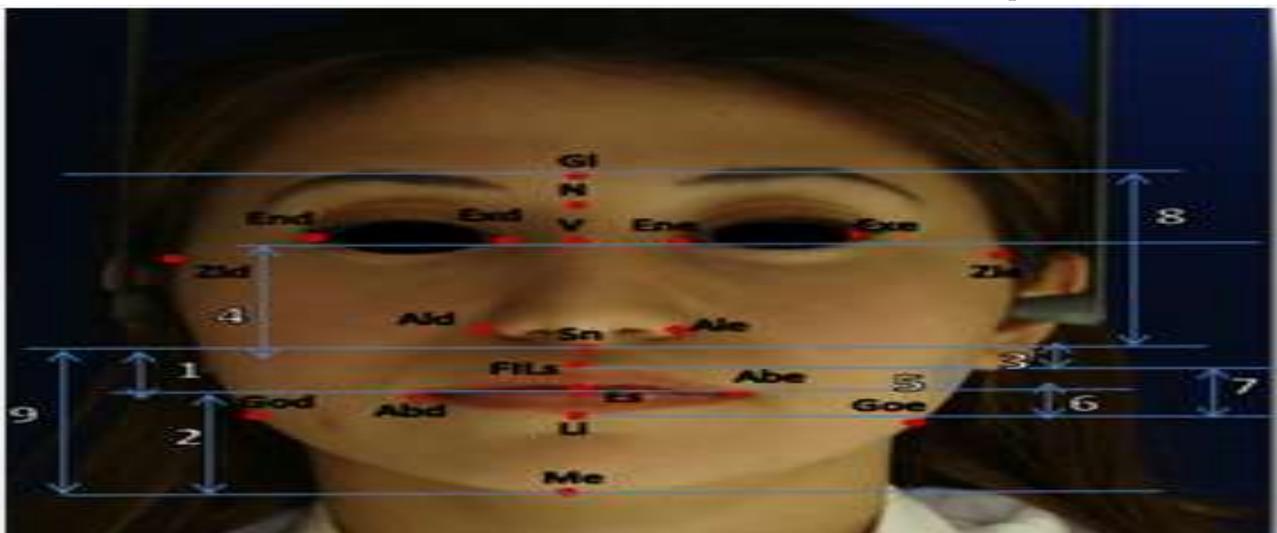
Figure 2: Liner measurments from 1 to 9: 1)Upper lip length (Sn-Es); 2) Lower lip length (Es-Me`); 3) Philtrum length (Sn-U1); 4) Nose prominence (V-Sn); 5) Vermilion border of the upper lip(Ul-Es); 6) Vermilion border of the lower lip Es-Ll); 7) Mouth height Ul-Ll); 8) Middle facial height (Gl – Sn) ; 9) Lower facial height (Sn to Me.inclination)
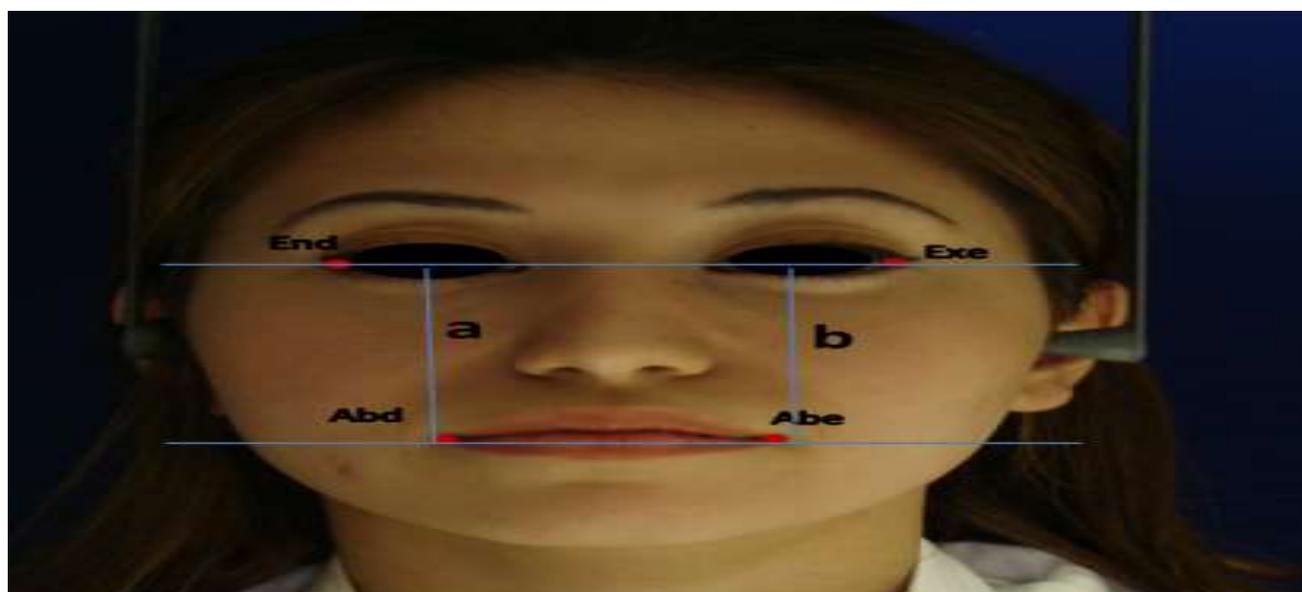
Figure 3: Liner measurments 10: Commissure line inclination-difference in millimeters from the commissure line to the line joining the external of the eye at the Abd point height (a) and at Abe point height (b)
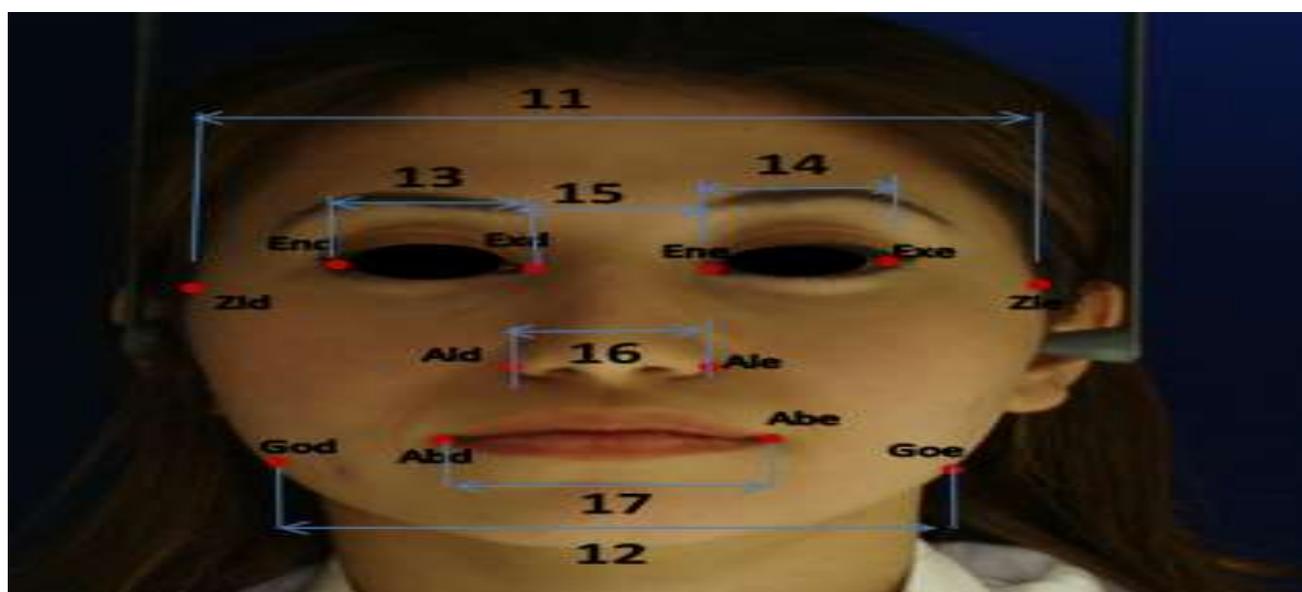
Figure 4: Liner measurments 11 to 17: 11)Upper facial width: (Zid`and Zie`); 12) Lower facial width(God`and Goe); 13)Right eye width (Exd toEnd); 14) Left eye width (Exe to Ene); 15) Intercanthal distance (End to Ene); 16) Nasal width (Ald to Ale); 17) Mouth width (Abd to Abe)

Proportional Measures

Facial index: Is the proportion between the upper facial height (N'-Me') and the upper facial width (Zid'-Zie') [6], as seen in Figure 5 while the Facial Index determines the facial type and is calculated this way:

$$\frac{facial\ height \times 100}{upper\ facial\ width}$$

Facial Height Proportion: The proportion between Middle facial height (Gl'- Sn) and lower facial height (Sn-Me') [6].

Figure 5: Proportional measures- Facial index and Facial Height Proportion

Angular Measures

These measurements are shown in Figures 6 and 7, with their respective descriptions.
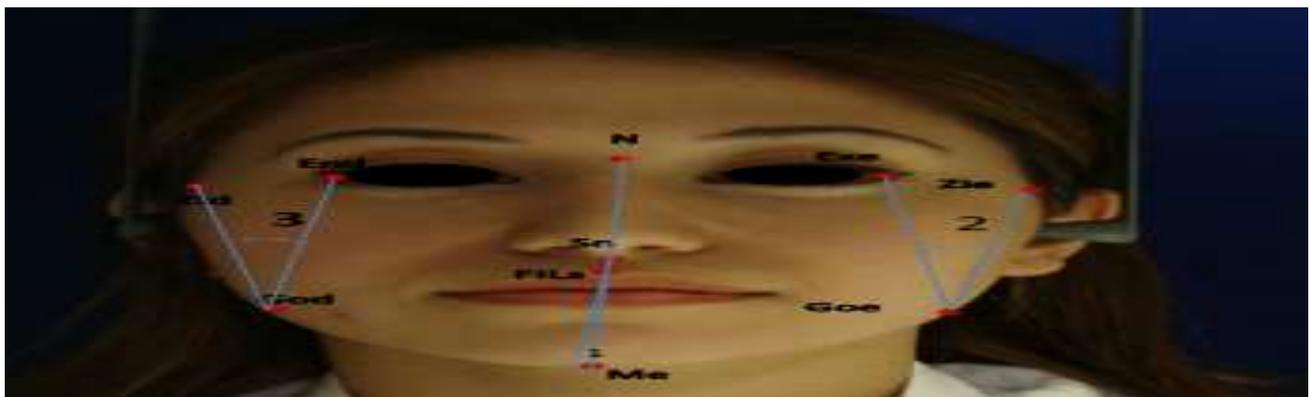
Figure-6: Angular measures 1and 2: 1) Facail asymmetry angle- angle formed between facial midline (N`-F) and Sn Me` 2)Symmetry between left and right side of the face- The difference between left and right angle measurements formed by intersection of Zi`- Go and Ex`-Go line

Figure-6 Angular measures 3and 4: 3) V- angle- formed by lines extending from V to God` point and from V to Goe` 4) Facail aperture modified angle- angle formed by right and left lines extending from Exd` to Exe` to Me` point

Results

Considering the orthodontist evaluation the 40 frontal photographs of the participants were judged and divided into three groups according to the degree of facial attractiveness. From the mean scores individuals were divided into: Group II, corresponding to esthetically acceptable (55%), who has the higher percentage among the three groups of participants followed by group I (25%), then group III (20%) was the lowest percentage of participants (Table 1).

Table 1: grouping of participants in to three groups subjectively according to our own criteria of aesthetic

Groups	N	%
I	10	25
II	22	55
III	8	20
Total	40	100

Table 2: Descriptive statistics of angular measurements in the study groups

Angular measurements	Groups	N	Mean	S.D.	Min..	Max.	F-test	p-value
Facial symmetry angle	I	10	1.300	0.675	1	3	0.805	0.455
	II	22	2.045	1.889	0	7		
	III	8	1.625	1.408	0	4		
left side symmetry	I	10	16.600	1.713	14	18	1.042	0.363
	II	22	17.409	2.175	13	21		
	III	8	18.125	2.949	14	23		
right side symmetry	I	10	16.300	1.160	14	18	0.634	0.536
	II	22	16.955	2.439	12	22		
	III	8	17.500	2.777	14	23		
V angle	I	10	74.000	5.497	66	85	0.575	0.568
	II	22	71.636	5.377	63	82		
	III	8	72.500	7.171	62	85		
Facial aperture modified angle	I	10	46.300	2.406	43	50	0.463	0.633
	II	22	45.500	2.425	42	50		
	III	8	45.500	1.512	43	47		

Table3: Descriptive statistics of proportional measurements in the study group

Proportional Measurements	groups	N	Mean	S.D.	Min.	Max.	F-test	p-value
Facial index	I	10	87.390	3.054	82.317	91.747	0.193	0.825
	II	22	87.620	4.765	79.1183	95.7219		
	III	8	86.493	4.716	77.0616	90.7789		
Facial height proportion	I	10	1.044	0.115	0.8644	1.231	1.145	0.329
	II	22	0.887	0.368	0.0084	1.1616		
	III	8	0.988	0.075	0.8837	1.0952		

According to (Table 2) all the differences of angular measurements after comparing the means, were statistically non-significant, where the facial aperture modified angle and V angle has higher values in group I and the right and left symmetry angels are almost equal in this group and higher in group III which have lower facial symmetry angle than group II. Group II has higher mean of the facial index while the mean of facial height proportion was higher in group I (Table 3).

Table 4: Descriptive statistic of linear measurements in the study groups mm

Variables	Groups	Descriptive Statistics					Comparison	
		N	Mean	S.D.	Min.	Max.	F-test	p-value
sn-Es	I	10	10.586	1.153	8.58	12.68	0.622	0.542
	II	22	11.114	1.354	9.1	14.3		
	III	8	10.816	1.185	8.84	12.03		
Es-Me	I	10	24.530	1.494	21.58	26.62	0.285	0.754
	II	22	24.223	2.363	19.81	29.33		
	III	8	23.781	1.889	19.77	26.01		
sn-U1 FILS	I	10	6.143	0.958	4.88	7.43	0.003	0.997
	II	22	6.174	1.423	4.23	9.62		
	III	8	6.184	1.251	4.42	7.79		
V-sn	I	10	25.391	3.397	22.28	31.31	1.119	0.337
	II	22	24.587	2.458	19.51	27.95		
	III	8	23.484	2.297	19.69	27.31		
Fils-Es	I	10	4.443		3.38	5.56	1.848	0.172
	II	22	5.212	1.360	3.58	9.9		
	III	8	4.635	0.846	3.57	6.19		
Es-Li	I	10	5.447	1.197	3.89	7.74	0.071	0.932
	II	22	5.436	0.789	3.64	6.81		
	III	8	5.594	1.419	3.4	8.13		
Fils-Li	I	10	9.887	1.564	7.79	12.38	0.414	0.664
	II	22	10.427	1.413	7.54	13		
	III	8	10.231	1.927	7.43	12.68		
Gl-Sn	I	10	36.610	4.450	31.57	44.59	1.464	0.244
	II	22	36.684	6.420	30.87	63.52		
	III	8	32.926	3.483	27.25	37.71		
Sn-Mn	I	10	35.116	2.262	30.16	37.77	0.838	0.441

	II	22	35.037	3.353	29.71	40.54	
	III	8	33.428	3.711	26.01	38.03	
Abd Exd a	I	10	36.470	3.554	32.26	42.79	1.643
	II	22	36.080	2.689	30.17	41.14	
	III	8	34.121	2.883	29.92	39.67	
Abe Exe b	I	10	36.446	3.360	31.74	42.76	2.139
	II	22	35.994	2.784	29.91	41.91	
	III	8	33.794	2.706	30.21	39.01	
Zid-Zie	I	10	75.562	6.233	64.58	84.95	0.289
	II	22	74.615	6.131	57.99	91.36	
	III	8	73.358	5.926	65.87	84.28	
God-Goe	I	10	61.965	7.050	48.69	71.92	0.596
	II	22	59.955	6.149	47.64	76.39	
	III	8	58.774	6.212	50.25	67.03	
Exd-End	I	10	16.793	1.903	14.84	21.08	0.172
	II	22	16.725	1.640	13.02	21.3	
	III	8	16.380	0.980	15.18	18.22	
Exe-Ene	I	10	16.562	2.244	14.04	21.07	0.957
	II	22	16.731	1.458	13.28	20.26	
	III	8	15.813	0.967	14.84	17.9	
End-Ene	I	10	18.556	2.569	14.84	22.77	3.461
	II	22	16.987	1.705	14.06	21.56	
	III	8	16.471	0.809	15.26	17.9	
Facail height N-Me	I	10	65.972	5.200	56.69	74.62	0.803
	II	22	65.505	4.931	57.85	76.97	
	III	8	63.290	3.823	56.96	69.57	
Middle face Gl-sn	I	10	36.610	4.450	31.57	44.59	1.464
	II	22	36.684	6.420	30.87	63.52	
	III	8	32.926	3.483	27.25	37.71	
Lower face Sn-Me	I	10	35.116	2.262	30.16	37.77	0.984
	II	22	35.190	3.254	29.71	40.54	
	III	8	33.428	3.711	26.01	38.03	
Superior facail width	I	10	75.562	6.233	64.58	84.95	0.289
	II	22	74.615	6.131	57.99	91.36	
	III	8	73.358	5.926	65.87	84.28	

(Last column p-values: Abd Exd a 0.207; Abe Exe b 0.132; Zid-Zie 0.751; God-Goe 0.556; Exd-End 0.843; Exe-Ene 0.393; End-Ene 0.052; Facail height N-Me 0.456; Middle face Gl-sn 0.244; Lower face Sn-Me 0.383; Superior facail width 0.751)

In (Table 4), all the differences of means were statistically non-significant except for the sn-U1 FILS, which is statistically significant. All three groups have UN equal facial thirds

Discussion

According to the Indian inconometry, face height was used as the module of both sariputra and alekhyalaksana proportional system which closely reflected the natural relation parts of the body to each other. Leonardo da vinci in ca 1490, torso of man in profile has studied the proportions of the face and head [15]. Regarding the attractiveness results as show in (Tab.1), more than half of the sample (55%) was classified as esthetically acceptable group which is the more predominant group this comes in agreement with many studies [6, 17, 19]. The esthetically pleasant group is the smallest group and this disagrees with Melo et al [19] but agree with Morosini et al [6].Study this due to racial differences.

In this study the width of mouth is more in aesthetically pleasant group this come the same as in Morosini et al [6] considering the mouth width in the aesthetically pleasant group with narrower nose, also the Han Chinese patients had relatively wider nose [20] and the beauty pageant queens' had significantly a larger nose [21].

So in contrast with Asian population our sample had less width of nose, mouth even face than in the Asian population [22]. Melo et al [19] show that during the clinical estimation and patients classification for diagnosis and treatment when the nose, mouth, and chin indicated as esthetically unpleasant should be given more interest. The facial aperture modified angle and V angle has higher values in pleasant faces group which indicates that horizontal growth pattern and rounding of the face of a europrosopic pattern which is a pleasant feature of female faces, while low values of both angles indicates long thin faces due to increased lower facial height, add to that the right and left symmetry angels are almost equal in pleasant faces group which explain the natural beauty of symmetries among pleasant ,this agree with Morosini et al [6].

Add to that; the facial asymmetry in unpleasant photographs group was higher as detected by the facial EMG due to increase the facial reaction at the left side than in the right side [23], but in contrast ;the present unpleasant photographs group had

displayed higher left and right symmetry than another groups, this come due to different methods which depended in the symmetry measuring in both studies ,therefore the method and the sample size used should be considered when comparing the results of our study with other studies. Swaddle and Cuthill [24] suggested that normal faces with varying asymmetries are preferred to perfectly symmetric versions, whereas another studies found that perfectly symmetric faces were more attractive than the original slightly asymmetric faces [25],while Scheib et al [26].Show that the facial beauty it is not necessarily related to the attractive symmetric faces. Our findings showed that the aesthetically pleasant group had higher mean of the facial proportion of the middle and lower facial thirds this agree with Morosini *et al* [6].

Furthermore in some studies like in Milutinovic et al [27], Johnston and Franklin's[28]and Alley and Cunningham [29] come in accordance with our study where the facial thirds in aesthetically pleasant group were unequal but in contrast with Hashim et al [30] study in which the facial thirds were equal in the neoclassical norms and Matoula and Pancherz [31] did not find differences between attractive and unattractive females with regard to face height.

The inter-ethnic variability plays an important role in these differences of facial components [32]. In Fortes et al [33] there were a statistically different between the pleasant and unpleasant groups regard the

distance of the lower lip to the S line while in our study there was a higher statistically significant differences of sn-U1 FILS distance between three groups which is higher in the aesthetically unpleasant group and this can be explained as non-aesthetic singe. Orthodontic treatment should not aim to establish numeric values other than depending on proportional values, harmony and balance [34].Our study limited by only orthodontist evaluated the photographs where is in many previous studies Laypeople tend and craniofacial surgeons participated in the evaluation, remove, individual factors that may affect the facial pleasant ,furthermore the facial evaluation in this study only focused on female facial attractiveness while many studies should proceed with more concentrate on the male facial attractiveness also.

Conclusion

- The sample was characterized by 10 individuals esthetically unpleasant 25%), 22 esthetically acceptable (55%) and 8 esthetically pleasant (20%), indicating dominance for the esthetically acceptable standard.

- In the evaluation of facial measurements, it was observed that there were statistically non-significant except for the sn-U1 FILS, which is statistically significant.

- The photographic evaluation requires more than one evaluator in different specialties to give more reliable judgment.

- The facial analysis influenced by, age, gender, cultural and racial factors.

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