RESEARCH ARTICLE

Facial Profile Characteristics Evaluation in a Population of Central Romania Region

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Objectives: The aim of the study was to evaluate the variables that define the facial profile of a sample of the population in the centre of Romania, and to compare male's and female's soft tissue profile. These values could be useful in elaborating the aesthetic objectives for treating the population in this area.

Material and methods: Fifty subjects were included in the study — patients and students of the University of Medicine and Pharmacy of Tîrgu Mureș (29 females and 21 males) between 18 to 28 years of age, having dental class I and a balanced profile. The photographs were taken in the natural head position (NHP). The anthropometric points were recorded and four of the angles that characterize a harmonious profile were traced and measured: the nasofrontal angle (G-N-Nd), the nasolabial angle (Cm-Sn-Ls), the mentolabial angle (Li-Sm-Pg), and the facial angle (G-Sn-Pg).

Results: The values obtained for the two sexes were compared using the t-student test. All angles had values that were larger for females (nasofrontal: females 137.1 degrees, males 135.79 degrees, p = 0.0019; nasolabial: females 105.3 degrees, males 102.19 degrees, p = 0.00002; mentolabial angle: females 126.07 degrees, males 118.27 degrees, p = 0.000009; facial angle: females 170.32 degrees, males 168.85 degrees, p = 0.0033).

Conclusions: Differences between the two sexes were obtained, all angles were statistically significant larger in females. These results show that for the population in the centre of Romania the treatment objectives are different for females and for males. The angular values range between those that characterize the Caucasian population.

Keywords: facial profile, photographic examination, facial angles

Introduction

A person's preoccupation with beauty is a life constant, irrespective of the time in history they live in. The dental-facial aesthetics has a series of social implications, because human beings associate beauty with success or happiness, the aesthetic reason being the main factor for which a patient looks for treatment [1].

Normality in orthodontics can be defined within a range of variations around the average or the most frequent form. The notion of "normal" is also linked to the aesthetic ideal specific to each epoch [1].

Determining the attractiveness of a face is dominated by subjectivity and in close correlations with age, sex, ethnicity and the level of culture and professional development. In order to evaluate the aesthetics of the face, different methods were used: anthropometric, photographic, cephalometric, computer imaging.

Profile photographs have received an increasing attention because they are non-invasiveness and inexpensive compared with lateral cephalograph. New models of lateral photograph analysis continue to be developed [2].

The profile examination of the face is one of the components in evaluating the facial aesthetics and highlights the

ratio that exists between the protrusion of the forehead, the nose, the chin and the proportion of the lips. A profile is considered beautiful if there is a balance between all the aforementioned references. Ever since 1958 and 1959 respectively, Burston and Subtenly respectively, defined various parameters and anthropometric points in analysing the soft facial parts [3,4].

An analysis of these parameters based on the profile photograph was developed, successively, by several authors: Stoner (1955) [5], the Peck brothers (1970) [6], Arnett and Bergman (1993) [7,8]. They used the nasolabial angle measured on photographs taken in NHP.

Legan and Burston (1980) described the profile angle or the facial angle formed by the cutaneous Glabela, Subnasal and Pogonion points [9]. Its normal value is 170 degrees [10]. Powell analyses four angles: nasofrontal (G-N-Nd) with a normal value of 130 degrees, nasofacial, nasomental and mentocervical to describe an ideal profile [11].

An other measured angle on the profile photograph is the mentolabial angle (Li-Sm-Pg). This angle expresses the turn-over degree of the inferior lip towards the mentonier protrusion and consequently, towards the super-mentonier groove. This angle varies with age according to Peck, quoted by Firu. Between 20–39 years it is 104 degrees, between 40–59 it is 120 degrees and over the age of 60 years it reaches 134 degrees [12].

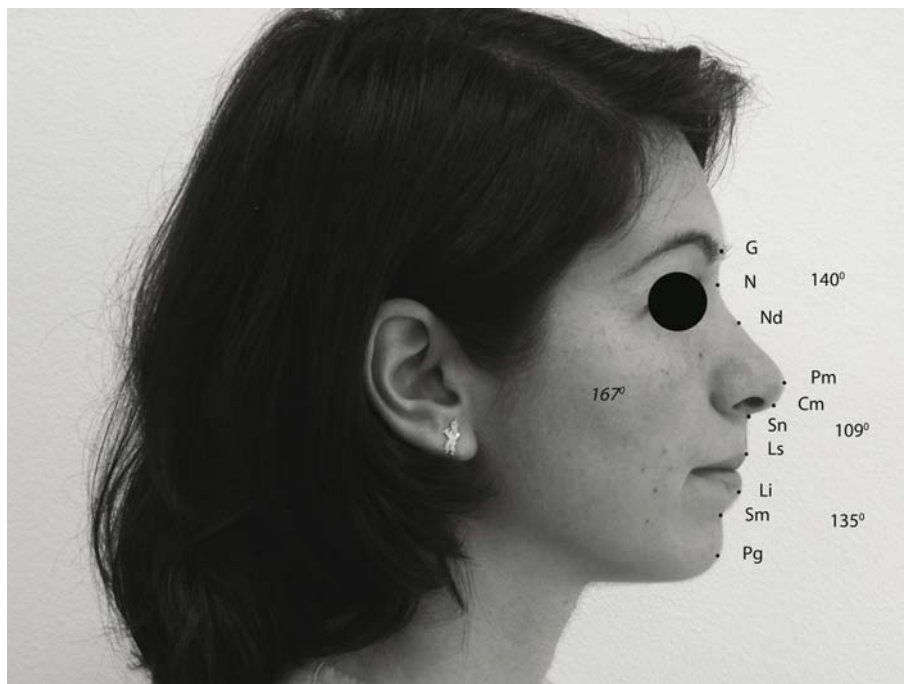Correspondence to: Manuela Chibelean
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Fig. 1.   The Landmarks: Glabela (G), Nasion (N), Nasal Dorsum (Nd), Pronasale (Prm), Columella (Cm), Subnasale (Sn), Labiale Superior (Ls), Labiale Inferior (Li), Supramentale (Sm), Pogonion (Pg). Angular measurements: nasofrontal angle, nasolabial angle, mentolabial angle, facial angle.

The aim of this study was to measure the angular variables that define the cutaneous profile of a sample of the population in the centre of Romania, and to compare male's and female's soft tissue profiles. These values could serve to elaborate the specific aesthetic objectives of treatment for the population in this area.

Material and method

We carried out a prospective longitudinal study.

Inclusion criteria: Fifty subjects were included in the study – patients and students of the University of Medicine and Pharmacy of Tîrgu Mureș (29 females and 21 males) with ages ranging from 18 to 28 years, with ended cranio-facial growth, having dental class I occlusion with normal overjet and overbite, all permanent teeth present and fully erupted up to third molar and a balanced profile. The balanced profile was judged by all of the authors. The patients didn't have orthodontic or surgical treatment in the past.

Exclusion criteria: orthodontic or surgical treatment in antecedents.

We use the profile photos with the whole of the right side of the face clearly visible. The photos were taken with a digital camera. To capture the patient's profile, he/she was placed against a neutral background, at a large enough distance so that no shadows are formed. The photographs were taken in a natural position of the head (NHP), which was obtained by placing a mirror in front of the subject at a distance of 120 cm, the patients being asked to look into their own eyes in the mirror, with relaxed lips and their forehead and ears visible. The camera was placed horizontally on an adjustable tripod according to each patient's

height. The photographic records were analysed. The following cutaneous points were marked on the photographs: Glabela (G), Nasion (N), Nasal-dorsum (Nd) ,Pronasale (Prn), Columella (Cm), Subnasale (Sn), Labiale superior (Ls), Labiale inferior (Li), Supramentale (Sm), Pogonion (Pg) (Figure 1). The following angles were traced and measured: the nasofrontal angle (G-N-Nd), nasolabial angle (Cm-Sn-Ls), mentolabial angle (Li-Sm-Pg), and the facial angle (G-Sn-Pg) (Figure 1). All these measurements were made by the same operator.

Statistical analysis

To compare the angles measured for females and males, the t-student test was used. The statistical data are presented in Table I. The descriptive statistical analysis was carried out with Statistic Analysis in Microsoft Excel.

Results

The values obtained for the two sexes were compared. As observed in Table I, the facial angles had the following values: for the nasofrontal angle (G-N-Nd) average values were 137.1 ± 1.53 degrees for females and 135.79 ± 1.2 degrees for males, the difference being statistically significant, $p = 0.0019$. For the nasolabial angle (Cm-Sn-Ls) average values were for females 105.3 ± 2.71 degrees and for males 102.19 ± 1.55 degrees, indicating a statistically significant difference, $p = 0.00002$.   For the mentolabial angle (Li-Sm-Pg) average values were 126.07 ± 3.0 degrees for females and 118.27 ± 7.73 degrees for males. We found the greatest variability for this angle in males. In this case, too, we recorded a statistically significant difference between males and females, $p = 0.0000097$.

Table I.   Patient characteristics

	Mean	SD	Mean ± SD	Sample Variance	Standard Error	Sample Size	Confidence Level (95%)	Median	Range	´p value
Nasofrontal angle										
Female	137.10	1.52	137.1 ± 1.52	2.31	0.28	29	0.55	137.1	5.8	<0.05
Male	135.78	1.21	135.79 ± 1.21	1.47	0.26	21	0.51	136	4.6	
All patients	136.55	1.53	136.55 ± 1.53	2.35	0.21	50	0.43	136.3	6.9	
Mentolabial angle										
Female	126.06	3.03	126.07 ± 3.03	9.20	0.56	29	1.10	126.2	13.1	<0.05
Male	118.27	7.73	118.27 ± 7.73	59.75	1.68	21	3.30	119	24.7	
All patients	122.79	6.68	122.79 ± 6.68	44.74	0.94	50	1.90	124.85	29.4	
Facial angle (G-Su-Pg)										
Female	170.31	2.09	170.32 ± 2.09	4.39	0.38	29	0.76	170	12.3	<0.05
Male	168.84	0.70	168.85 ± 0.7	0.49	0.15	21	0.29	168.9	2.7	
All patients	169.7	1.80	169.7 ± 1.80	3.24	0.25	50	0.51	169.5	12.3	

For the facial angle (G-Ns-Pg) average values are 168.85±0.7 degrees for males and 170.32±2.09 degrees for females. The difference between the genders was again statistically significant p = 0.003. All angles had values that were higher for females.

Discussions

The purpose of this study was to measure and evaluate the values of four of the angles that define the soft parts of the facial profile for a sample of the population of the centre of Romania, and to compare male's and female's soft tissue profiles. Similar studies have also been made by other authors, all of them using profile photographs taken in NHP (Yuen and Hiranaka, 1989 [13]; Arnett and Bergman, 1993[7,8]; Fernandez –Riviero et al., 2002, 2003 [14]).

The nasofrontal angle (G-N-Nd) of the investigated population has the following values: 137.1±1.53 degrees for females and 135.79±1.2 degrees for males, unlike Epker (1992) [15] who didn't find differences between the values of the nasofrontal angle for females and for males (130 degrees). The differences arise from racial and age differences, and they are statistically significant, p = 0.0019.

The nasolabial angle (Cm-Sn-Ls) depends on the anterior-posterior position of the superior frontal group. Its value is important because it indicates the position of the superior lip and it influences the decision to treat some cases by extraction or non-extraction. The value of this angle for Caucasians is 90–100 degrees for males and 95–105 degrees for females according to Nanda [16]. According to Bergman (1999) [17] its value should be 102±8 degrees. In this study, the values we obtained values we obtained were the average for females 105.3±2.71 degrees and for males 102.19±1.55 degrees, indicating a great difference, which is statistically significant p = 0.00002. Legan and Burston (1980) [10] have found values of 102±8 degrees for both sexes.

The mentolabial angle (Li-Sm-Pg) presents a great variability. It reflects the position of the inferior incisors. The average value obtained by Burston (1967) [18] was 122±11.7 degrees. In our study we obtained values of 126.07±3 degrees for females and 118.27±7.73 degrees for males. In this case, too, we recorded a statistically significant difference between males and females, p = 0.0000097. Fernandez-Riviero et al. (2003) [14] and McNamara et al. (1993) [19] found higher values both for females and for males (129±9.0 degrees for males and 134.5 ±9.0 degrees for females). Lines et al. (1978) [20] reported values between 120 and 130 degrees, in accordance with the values measured by us. In conclusion, males have a smaller labiomentonier angle, which corresponds with a labiomentonier angle deeper for males than for females, with a more pronounced menton.

The facial angle (G-Ns-Pg) has a normal value of 170 degrees. We obtained values of 168.85±0.7 degrees for males concordantly with the values obtained by Fernandez-Riviero et al (2003) [14] of 168±5 degrees and Arnett and Bergman (1993 a,b) [7,8] of 169.4±3.2 degrees. The values for females were 170.32±2.09 degrees and they were in relative agreement with the values found by Arnett and Bergman (199.3a,b).[7,8]; 169.3±3.4 degrees, the difference between the sexes being also statistically significant p = 0.003. Similar gender differences were obtained in other studies [21].

These measurements can serve as a comparison guide in determining the diagnosis and in elaborating the individualized treatment plan. The orthodontist has to take into account the beauty norms specific to each patient and the differences between the sexes. The bigger values of the angles measured in this study can be explained by the fact that females have a gentler contour of the soft parts than the males, especially in the area of the nose, lips and chin.

The numerous analyses made to the soft facial parts have shown different values of the angles, the differences resulting from the criteria of including the patients in the study, by the racial differences, by age, by the existence of malocclusions, by the measurement methodology, by the orientation of the head when taking the photographs. Firu [12] said that the facial profile angles calculated on the anthropologic photography of the patient have rough values and their values differ from the values of the cranial angles measured on the profile x-ray. Nevertheless, in the orthodontic treatments the thickness of the soft parts is taken

into account, as these can compensate for the unaesthetic profiles of the bone relief.

The photographic examination is a valuable complementary examination which, together with the cephalogram, brings physiognomic and dimensional values that are useful in determining an orthodontic treatment. It is a document that highlights the physiognomic and aesthetic values in the orthodontic treatment.

Conclusions

The values of the angles obtained in this study can be used as standard values in comparing the subjects with the same racial and ethnic characteristics that have dental class 1. They can constitute reference values in determining the objectives of the orthodontic treatment. We have to also take into consideration the differences between the sexes, females having a less defined profile than males, especially in the area of the nose, lips and chin. These values could serve to elaborate the specific aesthetic objectives of treatment for the population in this area.

Acknowledgement

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