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LATERAL CEPHALOMETRIC EVALUATION OF LIP POSITION IN A BAHRAINI SUB POPULATION: A RETROSPECTIVE STUDY

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KEYWORDS

Cephalometric, soft tissue, lip analysis

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ABSTRACT

Introduction: An ever-increasing number of individuals are seeking orthodontic treatment, mostly to enhance facial aesthetics for attractive facial and smile features. Achieving a suitable and functional occlusion combined with an esthetically pleasing facial appearance which is more challenging to the orthodontist and desires of patients' esthetic self-perception. **Aim:** This study aimed to assess and determine the sagittal lip positions of the normal faces in a Bahraini sub population from various unidentified lateral cephalograms and compere them with other ethnicities. **Subjects and methods:** One hundred and seven unidentified lateral cephalographs of good quality selected from the archive of medical center, Kingdom of Bahrain, with the teeth in occlusion and lips in a relaxed position. Nine measurements calculated from the cephalograms. Four angular, four linear, and one ratio-related measurement were examined for the soft tissue analysis. **Results:** In Bahraini population, Upper and lower lips of males and females were protrusive according to Burstone's B line. Upper lip was more protrusive than the lower lip. According to form and position of lips were no significant differences found between males and females Bahraini adult. **Conclusion:** Differences regarding the antero-posterior position of lips were found. These differences should be considered in diagnosis of orthodontic and orthognathic treatment plan for Bahraini population.

INTRODUCTION

An ever-increasing number of individuals are seeking orthodontic treatment, mostly to enhance facial aesthetics for attractive facial and smile features[(1)]. Achieving a suitable and functional occlusion combined with an esthetically pleasing facial appearance which is more challenging to the orthodontist and desires of patients' esthetic self-perception. In the field of orthodontics, soft tissue profile has always played a substantial role as appearance has a major psychosocial effect society's perception of acceptance and apparent success[(2)]. For the longest time, harmonious facial esthetics has been a prominent goal of orthodontic treatments. ST profile has always been and will potentially continue to be one of the most significant aspects of diagnosis and treatment planning for clinical orthodontists. Lip position has become one of the most important soft tissues because of its influence from tooth stability, malocclusions, and facial esthetics.

The orthodontic literature exposes numerous research including cephalometric and profile standards of American, Chinese, and Japanese populations but little for Arabs and these norms do not suit the profile or be appropriate for the diagnosis and treatment planning of patients from different ethnic groups. Knowledge of the normal dento-facial pattern for each ethnic group will elevate treatment success as well as establish optimal facial harmony. Furthermore, orthodontists should be aware and cognizant of the native ethnic feature characteristics to allow better communication with patients and having a more realistic expectation of the process and outcome of orthodontic treatment.

SUBJECTS AND METHODS

Research Design: The retrospective study was constructed at the Faculty of Dentistry of Suez Canal University after approval of the study protocol by Ethical Research Committee of the Faculty of Dentistry of Suez Canal University (438/2022).

Sample size calculation: According to analyses of previous researches, a sample size calculation was undertaken via G*power (version 3.1.9.2, Franze Faul, Kiel University,Germany).. The total size of the calculated sample was ninety-seven, in case, since the population number is unknown. The actual sample size attained has been augmented by around 10% to assure that could make up for any missing data and margin of error.The cephalograms were originally obtained to reach the sample size with the needed inclusion criteria nine hundred case.

Sample distribution: Lateral cephalographs of good quality has been selected from the archive of Elite medical center at Al Juffair area, Kingdom of Bahrain. Sample characteristics: All these cephalographs had been taken by same cephalostat with the teeth in occlusion.

Inclusive criteria:

1. Unidentified lateral cephalograms.
2. Bahraini national adults between the ages of 15 to 30 years.
3. All the cephalograms should have normal faces.
4. Skeletal class I
5. ANB angle between 2º and 4º.

Exclusive criteria:

1. Any surgery involving the jaws (e.g., jaw fractures).
2. Craniofacial anomalies (e.g., cleft lip or palate).
3. Any image magnification and distortion.

Methodology:

In this study, nine measurements; Four angular, four linear, and one ratio-related measurement were examined for the soft tissue analysis. For the linear measurements the analysis for the position of the upper and lower lip in relation to the Sn-Pg line (known as Legan and Burstone analysis), the length of the upper lip (Sn-Ls), length of the lower lip (Li-Me), depth of mentolabial sulcus Si to (Li-Pg'), and vertical lip-chin ratio (Sn-Stms/Stmi-Me') [3].

Angles for evaluation of the subject's skeletal type:

- SNA angle: Sella-Nasion-A point angle.
- SNB angle: Sella-Nasion-B point angle.
- ANB angle: A point-Nasion-B point angle.

Statistical analysis

All data were collected, calculated, tabulated, and statistically analyzed.Descriptive statistics were calculated in the form of Minimum, maximum,median, mean ± Standard deviation(SD)

and Standard error (E).One-way ANOVAs was used to compare between the different populations for all measurements. Independent sample t-test was used to assess the difference between males and females groups.The level of confidence was at 95% with the probability ($P \leq 0.05$). SPSS (Statistical Package for Social Science) software version 26, Armonk, NY: IBMCorp).

RESULTS

The findings of this study including the maximum, minimum, median and mean group values of the ST variables for the total Bahraini males and females. No much variation is observed between the maximum and minimum of all data except for the naso-labial angle (table 1).

Comparison of lip position and form between Bahraini adults and Egyptian population

Cephalometric values of the normal Bahraini adults are compared with the Egyptian population group, the values of Egyptians obtained from previous study[4]. There is an increase in the Nasolabial angle in Bahraini than Egyptian, while the upper and lower lip protrusion, and mentolabial sulcus depth are more increased in Egyptian than Bahraini.

The vertical lip-chin relation is almost the same for both populations (table 2).

Table (1) *Descriptive statistics for the soft tissue measurements in Bahraini*

Variables	Min.	Max.	Median	Mean	SD±	SE
Nasolabial angle	85.00	115.00	102	103	6.77	0.654
Upper lip protrusion	2.23	5.40	4.12	3.97	0.77	0.074
Lower lip protrusion	1.92	5.00	2.90	3.11	0.67	0.065
Mentolabial sulcus depth	2.22	5.40	4.21	4.13	0.60	0.058
Vertical lip-chin relation	0.39	0.50	0.47	0.47	0.02	0.002

SD: Standard deviation, SE: Standard error

Table (2) *Comparison of lip position and form between Bahraini and Egyptian population*

	Egyptian		Bahraini		T-test	P value
Variables	Mean	SD±	Mean	SD±		
Nasiolabial angle	95	10.4	103	8.0	4.301	<0.001**
Upper lip protrusion	4.7	1.8	3.97	1.0	4.97	<0.001**
Lower lip protrusion	3.8	2.4	3.11	1.0	3.25	<0.001**
Mentolabial sulcus depth	5.92	2.43	4.13	2.0	5.94	<0.001**
Vertical lip-chin relation	0.47	0.05	0.47	0.02	2.14	<0.001**

*T test, $p < 0.05$, ** High significance*

DISCUSSION

Nowadays, all over the world, large numbers of adult patients are seeking orthodontic treatment as orthodontics and orthognathic surgery. Hence, it is crucial to determine soft tissue cephalometric norms for this particular ethnic group and to base our treatment plans accordingly. As of present and up to our knowledge, no such published study has been carried out on Bahraini population. This study was designed to determine the sagittal lip positions of Bahraini sub population in relation to the B- reference line (Legan–Burstone analysis) and evaluate the cephalometric features to establish the norms and compare them with the other ethnic groups. Legan– Burstone analysis was used in this study because it is widely used and presents the soft tissue in more detail with simplicity, and directness in mind.

The sample included adult subjects of age 15 to 30 years as most of the facial growth is usually completed by 16 to 17 years of age and the vast majority of orthodontic patients are young adults [5]. The subjects were selected from those individuals who had a lateral cephalometric radiograph taken for diagnosis purposes. For respecting patient privacy as it is a right of patients and their families, which confirmed and stipulated by the health system in the Kingdom of Bahrain and other countries, we made sure to use unidentified radiograph.

The selection criteria for this study were Bahraini skeletal class I, ANB angle between 2° and 4° while the exclusive criteria were any surgery involving the jaws (e.g., jaw fractures), craniofacial anomalies (e.g., cleft lip or palate) and any image magnification and distortion. Many authors have concluded their studies that the normative values for a certain population differ from one another. Ethnic and racial differences have been reported in evaluating the horizontal lips position in relation to the chin and the nose. [6] reported that the distance from the lower lip to the B line should be about 1 mm less than the upper lip to B line, and this finding is consistent with the upper and the lower lip protrusion values (3.5 mm and 2.2 mm, respectively) by Burstone [7]. The lips are integral components of facial aesthetics and symmetry.

Studies have shown that wider, fuller lips and greater vermillion height are one of the signs of attractiveness in females [8]. The present study showed no gender differences in the adult Bahraini for soft tissue measurements. When the lip form was assessed according to Legan Burstone analysis, the upper lip as well as lower lip protrusion found no statistical difference. Also, the nasolabial angle, mentolabial sulcus depth and vertical lip-chin relation was statistically insignificant. The Bahraini adults had more protrusive lips according to B line. The upper lip was found to be more protrusive than the lower lip.

The result is similar to a study conducted among Saudi in the Middle East as the upper lip was relatively protrusive than the lower lip. This opposite to the results made by the same author in comparison with Nigerian where the lower lip was significantly more advance relative to the upper lip. This recognizes the diversity of human facial contours based on ethnicity and genetics [9].

Lip protrusion and mentolabial sulcus depth are increased more in Egyptian than Bahraini. The vertical lip-chin relation is almost the same for both populations. The racial, soft tissue and skeletal characteristics of the patient play a critical role in orthodontic treatment planning. So, upon this observation, consideration should be given during treatment and care should be taken when we try to apply these esthetic norms. It should be kept in mind that each treatment has to be preceded by an open, clear and uninhibited discussion with the patient. The orthodontic treatment, orthognathic or plastic surgery must be individualized and planned according to individual needs.

CONCLUSION

Bahraini Upper and lower lips were protrusive according to Burstone's B line. , Upper lip was more protrusive than the lower lip. There were no significant differences found between males and females. Regarding the antero-posterior position of lips significant differences were found between Bahraini and the other ethnic groups. These differences should be considered in diagnosis of orthodontic and orthognathic treatment plan for Bahraini population.

RECOMMENDATIONS

Every ethnic population has distinct cephalometric features and this should be consider during the diagnosis and treatment plan.

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