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Assessment Of Soft Tissue Facial Profile Among Patients of Different Age Groups Among Patients Reporting to Orthodontic Treatment

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Abstract:

Introduction:

Evaluation of the soft tissue profile and esthetics is a key factor during orthodontic diagnosis and treatment planning. This study was undertaken to determine the facial profile characteristics of individuals at different age groups in patients reporting for orthodontic treatment.

Material & Methods:

Archived records of 89000 patients reporting to the dental clinic between June 2019 to march 2020 were screened. Patients with skeletal class I malocclusion without prior history of orthodontic treatment with balanced profile and pleasing profile were identified. 88 patients who meet the inclusion criteria were included in the study. They were divided into two groups. One group with patients less than 19 years of age and the other group with patients greater than 19 years. Their preoperative profile photos were examined and facial analysis done. Ricketts E plane of upper and lower lip, naso labial & facial convexity angle were measured by tracing the profile pictures of patients and marking the reference points and using protractor to measure the angle. Lateral cephalograms were not traced. This data obtained was tabulated. Statistical analysis was done using SPSS software version 25. An Independent T Test was done to compare the difference between the two groups.

Result:

The upper lip to E Plane in patients less than 19 years was -0.02mm ± 2.06mm and those more than 19 years as -0.86 mm ± 2.04mm.The lower lip to E plane in patients less than 19 years was 2.25mm ± 1.95mm and those more than 19 years was 0.84 mm ± 2.52mm. Nasolabial angle in patients less than 19 years was 99.97 ^{o} ± 14.09 ^{o} and those more than 19 years was 100.59 ^{o} ±

14.71 ^{0}. Facial convexity angle in patients less than 19 years was 165.47 ^{0} ± 4.77 ^{0} and those more than 19 years was 169.54 ^{0} ± 6.48 ^{0}.

Conclusion:

There was a statistically significant difference between the two groups with regard to lower lip to E plane and facial convexity with p= 0.004 and p= 0.001 respectively. There appears to be an increase in the angular and linear measurements indicating a progressive flattening of the face with increasing age.

Introduction:

The facial features and components of the human face can be used as a biometric tool for identification [1]. Use of facial recognition software can also be used in the field of forensic for identifying suspects and victims using photographs or digital scans [2]. The common drawback arising from the use of facial recognition software is changes occurring in an individual's appearance due to aging. These are commonly seen in ID cards issued by the government usually remain valid only for a few years since photographs of the same person after several years will show changes [3]. These changes that arise due to the passage of time are called temporal changes and when they cause effects like aging it’s called temporal performance degradation[4][5][6]. The challenge is to understand how progression of time affects the craniofacial region. This can be done by using facial analysis as it deals with soft tissue landmarks on skeletal points.The changes arise in the craniofacial region of the human body with age due to bone movement and loss of muscle strength[7].

Due to the difference in races, esthetic preference such as colour, complexion and hair line tend to mask the actual age of an individual. Hence the idea to find a standard method using the facial features to assess age of an individual is a promising field of research.

With the progression of age, a person undergoes various changes especially in the craniofacial region. Notable soft tissue and skeletal changes arise due to aging and are more common in the dentoalveolar region. The aim of the study is to find the difference in various soft tissue parameters in patients less than and greater than 19 years of age.

Materials and methods :

Archived records of 2100 patients reporting to the dental clinic between June 2019 to march 2020 were screened. Patients with skeletal class I malocclusion without prior history of orthodontic treatment with balanced profile and pleasing profile were identified. 88 patients who meet the inclusion criteria were included in the study. They were divided into two groups. One group with patients less than 19 years of age and the other group with patients greater than 19 years. These two groups were chosen to delineate between growing individuals and adult patients. Their preoperative profile photos were examined and facial analysis done. Ricketts E plane of upper and lower lip, naso labial & facial convexity angle were measured by tracing the profile pictures of patients and marking the reference points and using protractor to measure the angle. Lateral cephalograms were not traced. This data obtained was tabulated. Statistical analysis was done using SPSS software version 25. An Independent T Test was done to compare the difference between the two groups.

Results :

55.8% of the patients were females and 44.2% were male (graph-1). The mean age of the patient was in 15.55± 2.25 one group and 25.48 ± 5.87in the other. The upper lip to Ricketts E plane in individuals less than 19 years was found to be -0.02mm ± 2.06mm and for individuals more than 19 years found to be -0.86 mm ± 2.04mm. The lower lip to Ricketts E plane for individuals less than 19yrs was found to be 2.25 mm ± 1.95mm and lower lip to Ricketts E plane for individuals more than 19 years was found to be 0.84 mm ± 2.52mm. Nasolabial angle for individuals less than 19 years has a mean value of $99.97^0 \pm 14.09^0$ and for individuals more than 19 years was found to be mean of $100.59^0 \pm 14.71^0$. Facial convexity angle for individuals less than 19 years has a mean value of $165.47^0 \pm 4.77^0$ and for individuals more than 19 years has a mean value of $169.54^0 \pm 6.48^0$ (Table-2). There was a statistically significant difference between the two groups with regard to lower lip to E plane and facial convexity.

Discussion:

Several studies have been conducted in the field of orthodontics to understand the biomechanical principles, efficacy of orthodontic bonding, recycling method for orthodontic brackets etc.[8][9][8,10][11][12][13][14]. Extensive in-vitro and in-vivo study has been conducted[15][16][17][18][19]. Craniofacial studies using anatomical landmarks on the skull to determine age as well as soft tissue changes due to age progression have not been frequently studied[20][21][22].

From the results of this study one can infer that older patients have higher values of E- plane of upper and lower lip, facial convexity angle and nasolabial angle. There appears to be a flattening of the facial with increase in age. This is due to the fact that aging causes loss in muscle elasticity, depletion of subcutaneous tissue all of which causes drooping of eyebrows and

wrinkling of forehead especially in the upper third [23]. It results in giving the appearance of an old and tired facial appearance. In the middle third of the face fat deposits in the cheek fade. The ligaments holding the fat pad shifts causing the cheek region to appear hollowed out or sunken and exaggeration of the nasolabial folds. The nose of patients also moves forward and downward with age [24]. In the lower third of the face wrinkling occurs above the vermilion border due to thinning of the skin. Drooping of the cheek was also found to be a common finding in older individuals due to loss of fat and volume and gravity induced shift. The upper lip was found to increase in length and droop with the progression of age[25][26].

Conclusion:

There was a statistically significant difference between the two groups with regard to lower lip to E plane and facial convexity. There appears to be an increase in the angular and linear measurements indicating a progressive flattening of the face with increasing age.

Author contributions:

- Design - Shunmugam Kumar Mangal, A.SumathiFelicita
- Intellectual content - A.SumathiFelicita
- Data collection - Shunmugam Kumar Mangal
- Data analysis - A.SumathiFelicita
- Manuscript writing - Shunmugam Kumar Mangal

- Manuscript editing - A.SumathiFelicita, VigneshRavindran

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Conflict of interest:

The authors declare that there are no conflicts of interest.

Reference:

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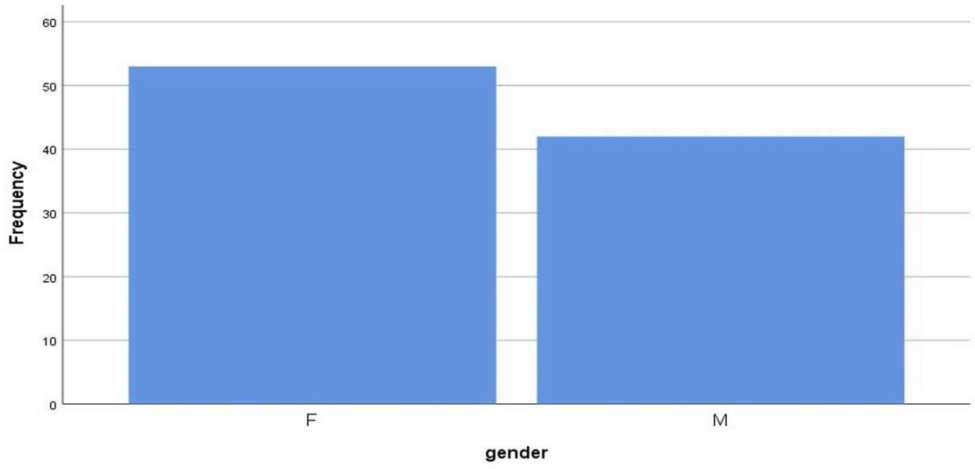


Graph-1: Bar chart showing frequency distribution of study participants based on gender (X-axis shows gender,Y-axis shows number of respondents). Higher number of respondents were females with a total number of 53 while males were 42

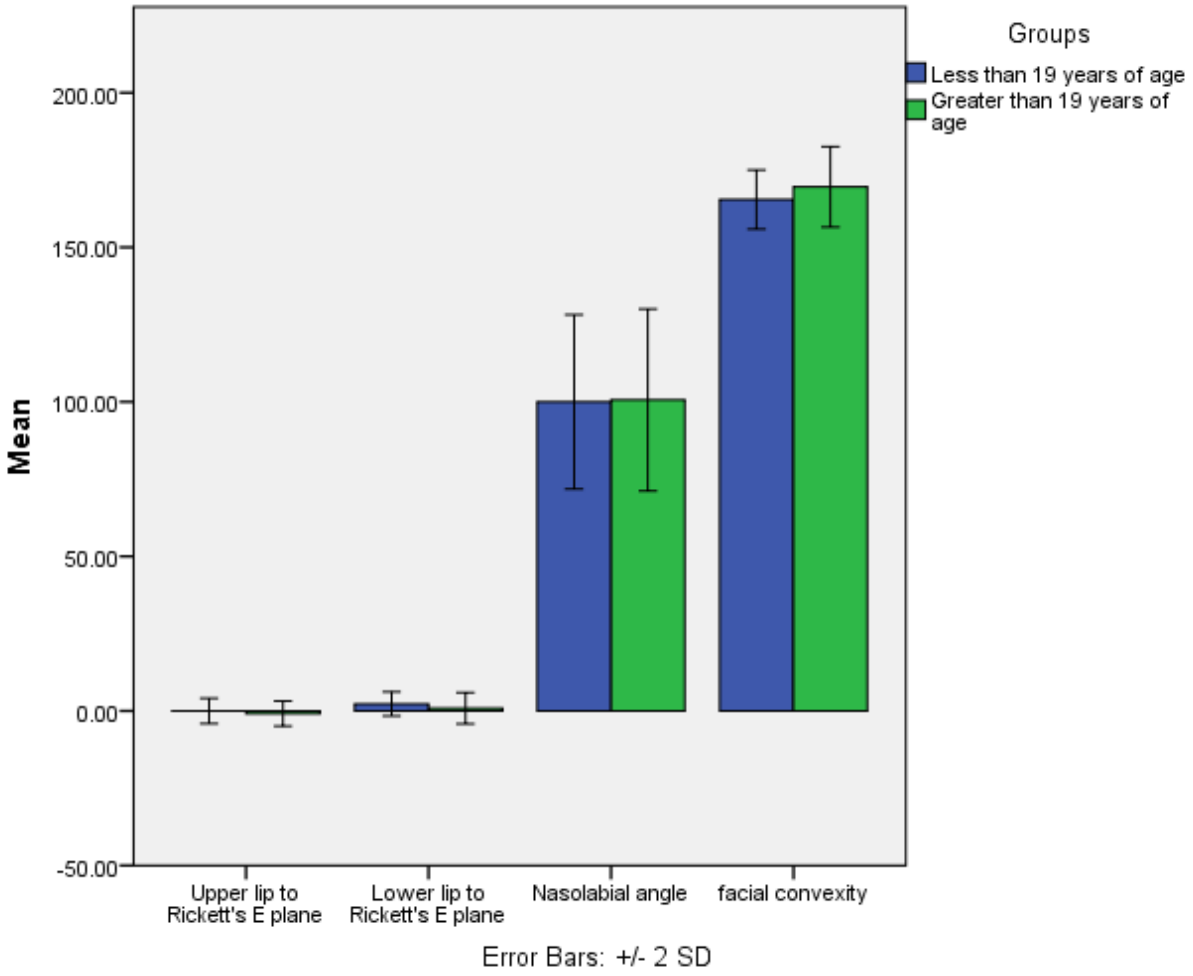
Table 1- Mean and standard deviation of age of the patients in both the groups one less than 19 years of age and the other greater than 19 years of age

Age	N	Mean	SD
less than 19 years	44	15.5455	2.24597
greater than 19 years	44	25.4773	5.87264

Table 2 - shows the resultsof the Student t-test with comparison of the different soft tissue parameters between the two groups one less than 19 years of age and the other greater than 19 years of age with mean, standard deviation and p value

	Groups	N	Mean	Std. Deviation	p-value
Upper lip to Rickett's E plane	less than 19 years	44	-.0227	2.06283	.058
	greater than 19 years	44	-.8636	2.04133	
Lower lip to Rickett's E plane	less than 19 years	44	2.2500	1.95442	.004
	greater than 19 years	44	.8409	2.52378	
Nasolabial angle	less than 19 years	44	99.9773	14.09022	.842
	greater than 19 years	44	100.5909	14.71642	
facial convexity	less than 19	44	165.477	4.77634	.001

	years		3		
	greater than 19 years	44	169.545	6.48954	
			5		



Graph 2 shows the mean and standard deviation on the various soft tissue parameters namely upper lip to Rickett's E plane, Lower lip to Rickett's E plane, nasolabial angle and facial convexity between the two age groups one less than 19 years of age and the other greater than

19years. There was a statistically significant difference between the groups with respect to the lower lip to Ricketts E plane and facial convexity with p= 0.004 and p= 0.001 respectively with an increase in the measurements of all four soft tissue parameters with age indicating a flattening of the face.