Photographic Study of Lip Anthropometric Pattern Development in the Fars Family in Mashhad

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A B S T R A C T

Introduction: Anthropometry (morphometry of the human) is measurement of linear and angular dimensions of the human body. Since the anthropometric parameters which are based on age, sex, geographical location and ethnic characteristics of the human species are different, therefore, anthropometric studies of population by age and sex should be done separately.

Methods: In this study, anthropometric measurements lips and different patterns of lip line were studied in 133 males (4-40 years) with Persian ethnic who were living in Mashhad. These persons had no inflammation, herpes, malformations such as cleft lip, and surgery history in lib and jaw. Lip full-face photos were taken using a digital camera (Nikon, 12.3 Mega Pixels). Anthropometric measurements of mouth width (ch-ch); width of philtrum (cph-cph); height of the total lip ((ls-li;) the entire lip area (total area) were measured on computer by MIP software. Data were evaluated statistically using SPSS, polynomial regression and ANOVA models (P<0.001).

Results: There was a significant correlation between age and parameters of the mouth width, lips height to nose and total area of the lip.

Conclusion: Considering significant relationship between the quantities investigated and age, we can use anthropometric data of lips in many fields including medical, criminal, etc. By comparing this study with other studies, it can be concluded that there is the most similarity in the size of lip of Persian men in Mashhad with men living in India. It is hoped that in the similar future studies, extensive statistical societies be prepared in each races of Turks, Baluchis, Kurds in order to complete anthropometric database of lip in Iranian Persian ethnics.

1. Introduction

Anthropometric term is composed of two Greek words; Anthropo meaning man and meter which means measure. Anthropometric is a branch of biometrics that includes only human. Its general concept is to obtain and measure the size of the body [1, 3, 7, 11]. Anthropometric analysis the quantity features of the line-angle size which is obtained from the human body. Anthropometric is the most important policy to analysis the quantity of hard and soft tissues of the body. Not only it studies normal and abnor-

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mal development of bones quantitatively and qualitatively and determines the size of the buildings in every nation and race for applying in medical diagnosis, evaluation and treatment of abnormalities contribute, but also it helps scientists identify nations, races and characterization of human [5, 2]. Various factors such as ecological (ecological), botany, nutrition, race, age and sex have influenced size and dimensions of human body. So we can't generalize and extend all anthropometric studies of different areas of the world and ethnic groups together [4].

The study of genetic patterns and anthropometric characteristics of lips in different ages gives us different criteria that can be used in repairing abnormalities. Knowing the different anthropometric changes in the lips of all ages not only can be used in the treatment plan, the surgery and the type of surgery, but also it may be effective in anticipation of the next change in the area of surgery. In addition, in oral and maxillofacial surgery (orthognathic), it is necessary to have clear standards for soft tissues such as the lips. On the other hand the study of lip genetic and morphology patterns will be important in the study of biological anthropology. Since the anthropometric parameters based on age, sex, geographical location and human traits are different, thus, anthropometric studies should be done individually for each population on basis of age and sex and race [3]. Given the fact that in Iran there have been sufficient anthropometric studies on lip and ethnic characteristics in comparison with other countries of the Gulf, so the aim of this study was to evaluate the anthropometric dimensions of lips in Iranian males who were living in Mashhad.

2. Materials & Methods

Materials and equipment

Digital Camera (Nikon models), With 12.3 mega pixel lens, questionnaire, meter or ruler and softwares such as Mip, Spss, Excel were used in this study.

Investigated population

According to the subject of the study, 133 males aged between 4-40 years old who were residing at Mashhad were studied. In this study, participants were classified into age groups without overlap: For people younger than 18 years, the interval was 2 years (17-16, 15-14, 13-12, 11-10, 9-8, 7-6, 5-4), while larger intervals (18-30, 31-40) was used for adults [19].

Methods

In this study, samples were chosen randomly. For this study, a digital camera (Nikon models, With 12.3 mega pixel lens) was used for taking full-lips pictures. The participants were asked to sit down and look to distant with no gesture (smile or scowl). Photographs were taken in NHP mode. NHP (Natural Head Position): It is the standard position of the normal state of head that has high repeatability. SoIf it is done correctly in a person, record of head position will be about 2 degrees relative to the real vertical or horizontal line. In comparison with the standard deviation, intracranial reference lines in different people is negligible [3, 8]. After obtaining photos, they were categorized and photos of various ages were placed in a special file. After transferring photos to the computer, anthropometric landmarks on the lips were punctuated by using MIP software [3]. After the completion of this phase, anthropometric parameters on the face were measured by software MIP. Then, the obtained data were put at SPSS software and Excel for statistical analysis. Polynomial regression models and Anova tests were used for data analysis. The results were plotted in graphs for different variables at different ages [19].

Landmarks lips

In anthropometrics it is essential to determine the anatomical precise location on the head and face surfaces. Landmarks act as determiner of the linear distances and angles (Figure 1).

1) Cheilion (ch): Point at the corner of the lips.

2) Cph (crista philtri) is a point on prominent spot of philtrum located on the top line margin Vermelion of upper lip (the border between the lips and skin mucus which extends from one corner to the other corner of the lip).
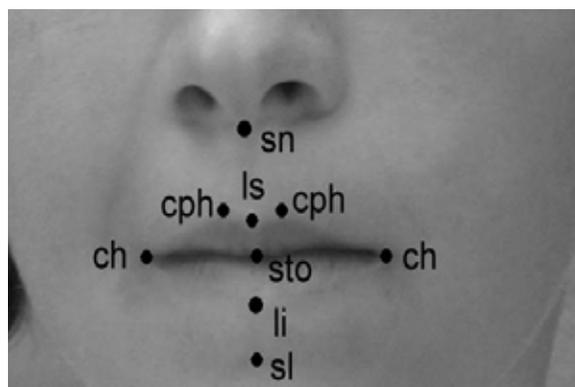
Figure 1. Landmarks of the mouth [19].

Table 1. Descriptive statistics of variables by age.

Variables			Age (year)								
		4_5	6_7	8_9	10_11	12_13	14_15	16_17	18_30	31_40
Wide mouth (cm)	Number	13	31	16	26	6	3	6	20	12
	Average	3.6208	3.8748	4.3281	4.3892	4.5200	4.1400	3.4450	4.6410	4.6300
	Standard error	0.07639	0.08514	0.16720	0.05325	0.20411	0.11590	0.23378	0.13074	0.22044
	Minimum	3.27	2.38	2.34	3.65	3.94	3.95	2.91	3.14	3.10
	Maximum	4.06	4.56	4.83	4.80	5.10	4.35	4.23	5.75	5.62
Width philtrum (cm)	Number	13	31	16	26	6	3	6	20	12
	Average	0.9962	1.0923	1.1806	1.3088	1.3833	1.4500	1.1267	1.4985	1.5425
	Standard error	0.03778	0.03819	0.05807	0.13437	0.07437	0.09292	0.12494	0.06504	0.13562
	Minimum	0.75	0.72	0.65	0.71	1.11	1.32	0.88	1.04	0.71
	Maximum	1.21	1.54	1.49	4.51	1.63	1.63	1.70	2.15	2.26
Total height of the lip (cm)	Number	13	31	16	26	6	3	6	21	12
	Average	1.2831	1.3794	1.3688	1.5885	1.5417	1.1567	1.2550	1.4948	1.6250
	Standard error	0.04107	0.04464	0.09363	0.04717	0.12287	0.11348	0.09777	0.10359	0.12890
	Minimum	1.02	0.92	0.84	1.01	1.16	1.01	0.99	0.00	0.93
	Maximum	1.59	2.06	2.18	1.98	1.88	1.38	1.55	2.21	2.18
The height of the lip to the nose (cm)	Number	13	31	16	26	6	3	6	20	12
	Average	1.2938	1.4248	1.3675	1.4565	1.4283	1.5967	1.3067	1.7930	2.1975
	Standard error	0.10310	0.04326	0.06460	0.04330	0.10672	0.04256	0.16307	0.27414	0.61189
	Minimum	0.18	0.85	0.94	1.13	1.17	1.54	0.74	0.95	0.95
	Maximum	1.77	1.90	1.74	1.88	1.82	1.68	1.89	6.90	8.84
The total area of the lip (cm²)	Number	13	31	16	26	6	3	6	19	11
	Average	3.4615	4.1910	4.8331	5.5296	5.5000	3.7000	3.2917	5.9526	5.9536
	Standard error	0.15391	0.19880	0.42410	0.19130	0.52631	0.37581	0.45287	0.35764	0.67812
	Minimum	2.37	1.60	1.81	3.21	3.76	2.97	2.22	1.57	2.01
	Maximum	4.37	7.05	7.55	7.69	7.41	4.22	4.73	8.39	8.82

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3) Stomion (sto) is a theoretical point that is located at the intersection of vertical and horizontal fissure and midline of labial lips, while the teeth are normally on each other.

4) Labial superius (Ls): is midpoint on the upper Vermelion line.

5) Labial inferius (Li): is a midpoint, which is located on the lower Vermelion line.

6) Sn (sub nasale): the point where they intersect the border of the upper lip and nasal septum [3].

Parameters of evaluate: the distances measured in this study include: width of the mouth (ch-ch); width of philtrum (cph-cph); height of the lip (ls-li); the distance between the lip and nose (sn-ls); the entire lip area (total area)

3. Results

Checking the relationship between age and the characteristics of the lip

Considering that variables of age are abnormal, but variables of the lips are normal, we used Spearman correlation test to determine the linear relationship between them. Ac-

Table 2. Test of correlation between variables and age.

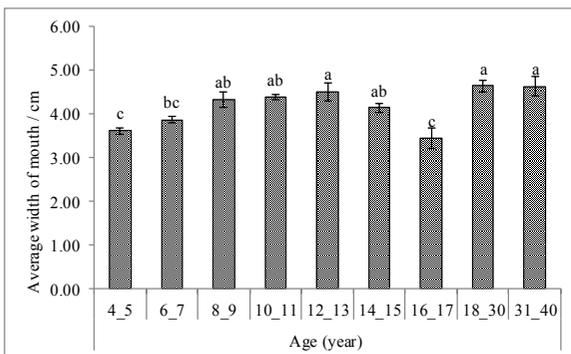| Variables	Amount R_s	Significant level (sig)
Age and mouth width	0.496	0.000**
Age and philtrum width	0.522	0.000**
Age and height of the lip	0.280	0.001**
Age and height of the lip to the nose	0.238	0.006**
Age and area of the lip	0.451	0.000**

Test level **: 1 percent

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cording to the results in Table 2, there is a significant relationship about 1 percent within the mouth variables such as Philtrum width, the height of the lip, the height of the lip to the nose and whole mouth area. Spearman correlation coefficient values which have been reported in Table 2, show a poor direct correlation between these variables and age.
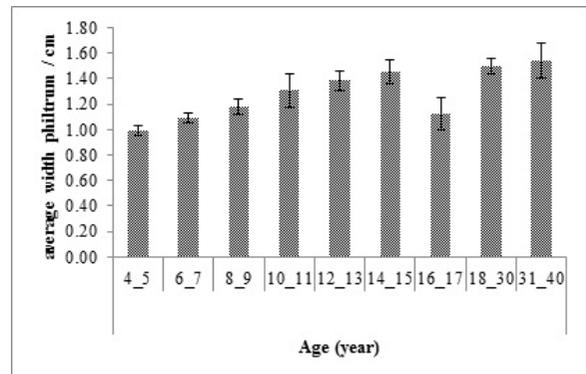
According to Table 2, there is a significant difference in mouth width in different age groups. So we used the Duncan test to determine the difference between the levels of age factors. The results are given in Figure 1.

Bars with same letters show that the average between them are not significantly different. Therefore, the width of the mouth in 8-15 age groups and 18-40 age group are not significantly different (groups including A). Also, the width of the mouth at 6-11 age groups and 14-15 age groups are not significantly different (groups including B). The growing patterns of mouth width at age groups between 4-7 and 16-17 are not significantly different (groups including C). According to Table 2, the difference of Philtrum width among different age groups are significant. Hence, we used Duncan test to determine precise difference between the age-factor levels. The results are given in the Figure 2.

Bars with same letters show that they are not significantly different from the others. So the width of the philtrum at


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Figure 2. Checking the philtrum width average (cm) by age.

age groups of 8-40 are not significantly different (groups including A). Also, the mouth width at the age groups of 6-30 years are not significantly different (groups including B). The mouth width at age groups of 4-13 and 16-17 are not significantly different (groups including C). According to Table 2, the total height difference of lip is significant in the different age groups. One of the variance analysis assumptions is homogeneity of variance in groups. If this condition is not satisfactory, then we use Dunnett test. The result is given in Figure 3.

Bars with same letters are not significantly different from the others. As it can be seen, the total height of lips have only significant difference in two age groups of 4-5 and 10-11, and in others the variation average is not significant. According to Table 2, the difference between the total area of the lips of people in different age groups is significant. Homogeneity of variance is an assumption of variance analysis. If this condition is not satisfactory, we use Dunnett test. The results is given at Figure 4.

Bars with same letters are not significantly different from the others. Thus, the total area of lip are not significantly different at 4-9, 12-17 and 31-40 age groups (groups including B). The width of the mouth are not significantly different at 8-12, 8-15 and 18-30 age groups (groups including A). Also the width of the mouth are not signifi-

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Figure 1. Checking the average of mouth width (cm) by age.
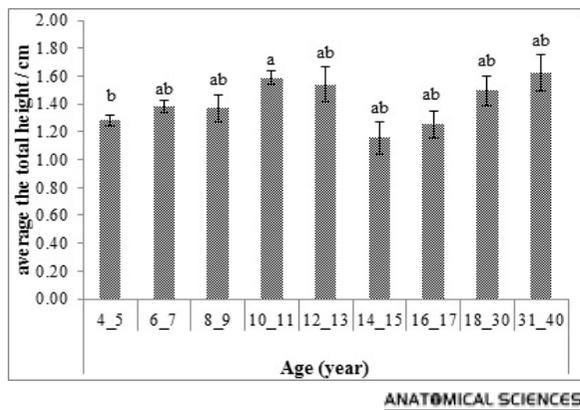
Figure 3. Checking of average the total height of lip according to age segregation.

cantly different at 10-11 and 16-17 age groups (groups including C).

4. Discussion

Ethnic diversity is a considerable factor that can impress anthropometric data and areas of application. Accordingly, most countries have made great efforts in order to create and develop a database for different groups, such as residents, military personnel, students and workers [10]. The term Ethnicity refers to a group that has basic features such as language, customs and historical heritage but they are distinct from other social groups with ethnic cohesion and solidarity.

Iran is among the countries that enjoys the diversity in their population structure. Various ethnic groups in Iran, including Persians, Azeris, Kurds, Lurs, Baluchis, Turkmen and Arab have scattered as identified minorities in the different regions and provinces. Nevertheless more than 9% of the Iran population are Fars (Pars) that have the most frequency among other nations in Iran [18]. Thus, considering the above factors, in present research, we measured size of the lips and checked its size changes process in males between 4-40 years old who were residing in Mashhad. It is worth noting that in this study, in the same line with researches of Sforza et al, different parts of the lip show various degrees of growth. It means that all parts of the lips don't grow with a fixed pattern at all ages, rather some sections grow more and some section grow less [19].

Growth and development of the lips isn't a maturation process and it happens gradual and for many years. This phenomena requires different changes but in tune with the lip and on the other hand it is related to age. Shape and size of the lips are different in ethnic groups and have a lot of diversity. Thin lips are seen at European Caucasian, thick or very thick lips are seen in black people and combina-

tional lips are usually seen in Orientals. The middle lips are the most common type with average size of 8-10 mm [13].

According to the results in Table 1, it is observed that there are the similarities and differences in the average size of variables such as width of the mouth, width of the philtrum, height of the lips and the distance between the lip and nose, and in comparison with other similar studies among countries and races, the similarities and differences were observed. In this study, the age average of the individuals are 13.70±0.840 years old, but in most similar studies the sample population are adults. Therefore, we must also consider this point in our comparison.

According to Table 2 and Figure 1, there is a meaningful relationship between the width of the mouth and age of the people. It means that as age increases, the width of the mouth also significantly increases. The average of mouth width is 4.20±0.054 cm in sample group and according to Table 1, the average of mouth width in adults is 4.63 cm. Farhoosh and colleagues (2011) with a similar study, reported that the average width of the mouth of Iranian men (Imam Khomeini hospital in Tehran) is 4.59±4.2 cm which is consistent with this study [6]. Azami and colleagues reported the average width of the mouth equal to 3.96 cm in 4-11 years old who were living at Kurmanj in Bojnord in 2011, And when we compared it with the present study, we found out that the results were very close to the result of the present study (4.07 cm). Dharap and colleagues examined the width of the mouth between 51 male and 117 female in 2013.

These individuals were selected from the Arabs of Middle East countries, Bahrain, Saudi Arabia and Kuwait. The average width of the mouth was 5.29 cm in all male samples. The average was reported 5.36 cm in Bahraini men, 5.26 cm in Saudi men and 25.5 cm in Kuwaiti men. Also,
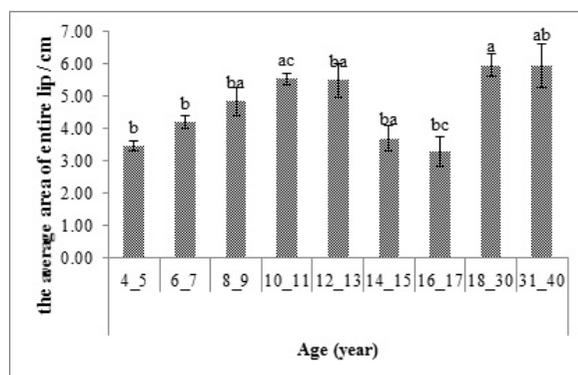
Figure 4. Checking total area of the lip (cm) by age segregation.

in this paper the mean of mouth width was compared with other populations: The average of mouth width in Europe is 5.50, 5.00 in Turkey and 4.68 in northern India [14]. Emelike and colleagues investigated 100 men and 100 women from the Igbo population in Maiduguri in 2012.

The results showed that the average of mouth width in the male population living in Igbo is 5.37±0.52 cm (15). Khandekar and colleagues reported the average of mouth width of adult men in china (6.5 cm), Caucasian (3.6 cm) and blacks (2.7 cm) in 2005. In all of these populations men had more width of mouth comparing with present research [17]. Accordingly, it seems that the average mouth width of the Persian cases are more similar and closer to men from northern India, which may be due to impact of racial, nutritional, economic and cultural factors. According to Table 2 and Figure 2, there are significant relationship between the width of the philtrum and old age.

This means that the more the age, the more the width of philtrum, and the lower the age, the smaller the width of the philtrum. In this study the average width of the philtrum is 1.26±0.036 cm. By comparing this value with adult men living in North India (1.30 cm), Chinese (1.20 cm), Caucasian (1.50 cm) and blacks (1.20 cm), we observed that even the closest average value over the philtrum individuals males Gulf nations are men from northern India. However, there is no very differences from the other races [17]. In a recent study according to Table 2, there was a significant correlation between the height of the lip and age. This means that as age increases, the height of the lip significantly goes higher, and the younger, the total height of lips is lower, but the connection is poor.

It seems that by comparing these results with a similar study that was carried out by Farkas and colleagues on men and women of 18-25 years old at North America in 1994, it can be concluded that the height of the lip (li-sl) in the Persian male relatives is more than whites in the North America [16]. According to Table 2, there is a meaningful relationship between the height of the lip to the nose and old age. This means that as age increases, the height of the lip to the nose also comes significantly higher, and the more is a person younger, the lower is the height of lip to nose, but this relationships is poor.

The average distance of lip to noise in present study is 0.074±1.530 cm. Farkas and his colleagues analyzed length of the philtrum (sn-ls) at 18-25 year-old women and men in North America and reported that it is 1.67 cm in 1994. Accordingly, the average length of philtrum in Persian individuals (1.530±0.074 cm) is lower than whites in North America. Daenecke and colleagues reported that

the average length of philtrum of Brazilian men aged 11-7 is 29.1 cm in 2006 [12] that in comparison to the Persian men are lower than Brazilian. But perhaps the younger age groups show lower sizes, and the age of sexual maturity, sexual secretions and the development of male testis has influence on this difference.

According to Table 2, there was a significant correlation between the total area of the lip and age. This means that as age increases, the total area of the lip also significantly increases and in younger individuals, the total area of lips is lower, but the relationship is not strong. The total average area of the lip is 14.0±885.4 cm square.

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