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Lip morphometric study on Iraqis and its clinical application

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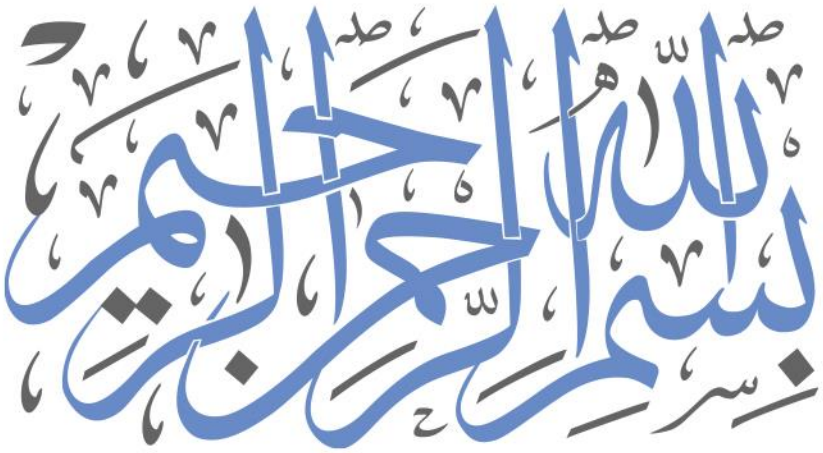


((يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ))

سورة المجادلة - الآية 11

Dedication

We dedicated this search to the Almighty God, thank you for the guidance, strength, power of mind, protection and skills and for giving us a healthy life. All of these, we offer to you This study is also wholeheartedly dedicated to our beloved parents, who have been our source of inspiration and gave us strength when we thought of giving up, who continually provide their moral, spiritual, emotional, and financial support.

To our brothers, sisters, relatives, mentor, friends, and classmates who shared their words of advice and encouragement to finish this study.

Those who, after God, were credited with this achievement, the doctors and In particular, our research supervisors, Prof. Dr. Ameer Hamdi Al-Ameedee and Leacher. Dr. Jamila Abdul Sahib and professors of the College of Dentistry, University of Babylon

List Of Content

Lip morphometric study on Iraqis and its clinical application

Abstract

Introduction: Anthropometry (morphometry of the human) is the 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.

The aim: was to determine the normal average values of lip liner measurements and to determine any significant sex differences that exist in Iraqi people.

Methods: In this study, anthropometric measurements lips and different patterns of lip line were studied The study group consisted of (15male , 15female) people with 10-15 years , (30male, 30female) people with18-35 years , (30male ,30 female) people with40-65years ،These persons had no inflammation, herpes, malformations such as cleft lip, and surgery history in lib and jaw. Lip. 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;). Data were evaluated statistically using SPSS.

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

1. Introduction

The aesthetic perception of facial features is greatly influenced by the lower third of the face [1]. Among these features, the lips play a key role in facial aesthetics, as they contribute substantially to facial expressions such as smiling or frowning[2]. Drake et al., 2005 explain the upper lip is characterized by a shallow vertical groove known as the philtrum, which ends in a slight tubercle encircled by lateral ridges[3]. On the other hand, the lower lip displays a small midline depression corresponding to the tubercle [4].

Various factors, including age, sex, ethnicity, socioeconomic status, environment, and region, affect lip anthropometric parameters [5].The size and curvature of the exposed red lip surface exhibit considerable individual, sex, and ethnic variation [6].Furthermore, the depth of the skin-red lip junction at the center of the lower lip varies significantly among individuals [4]. Typically, the lower lip is larger than the upper lip vertically[7].

In the 2014, there were almost 16 million cosmetic procedures performed in the United States alone [8]. The number of cosmetic procedures has nearly doubled since the early 2000s, with 92% of these procedures conducted on women in 2014, up from 88% in the 2001 [9] . The popularity of cosmetic procedures is not limited to one racial or ethnic group in the USA, as the demand has increased among various ethnicities, including; African-Americans, Asian Americans, Hispanic Americans, and Caucasian Americans. Additionally, in Asia, countries like China and India have emerged as major markets for cosmetic surgeries[10].

Facial anthropometry is widely utilized in medical fields to analyze facial morphology. Farkas et al various studies have been conducted [13]. in different ethnic groups, with extensive research in Caucasians and African Americans. However, limited studies exist for Asian Americans [11]. It is important to note that the results of studies conducted on specific ethnic groups or regions may not be applicable to populations elsewhere , underscoring the need for systematic studies within each ethnic group or region.

While lip anthropometric measurements have been studied in Indian populations within India, there is a paucity of research on Indian Americans. Establishing normal reference values for lip anthropometry in Indian Americans is essential for procedures like labiaplasty and lip enhancement surgeries.

This study aims :

To contribute to scientific research on lip proportions among Iraqis and provide baseline data for forensic odontologists, plastic surgeons, and orthodontists treating this population in Iraq. The primary objective of this study is to determine the average values of lip liner measurements in Iraqi people and explore any potential differences in measurements between sexes.

2. Methodology

The methodology of this study includes several steeps as show in figure 1.

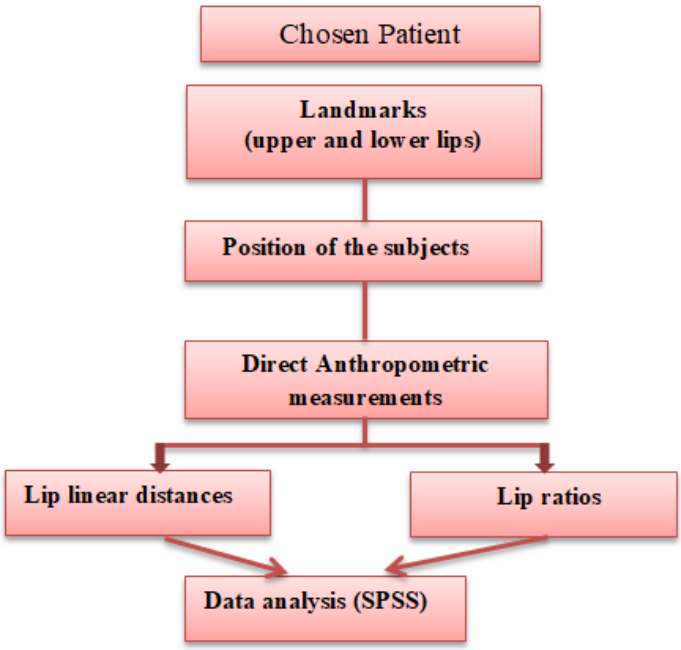


Figure 1. The pathway of methodology steps

3. Materials and Methods

3.1. Subjects

The present study was conducted on 100 patients chosen by a simple random method including 100 males (No.50) and females(No.50) within aged between 9 and 67 years, with an equal number of men and women, having full dentition.

The methodology used in this research involved direct lip anthropometric measurements using a digital caliper, Landmarks on the lips were identified and marked on the face for measurement. Lip linear distances and ratios were calculated and compared between the sexes and ages using statistical analysis. The results were compared with previous studies for different Iraqi and Foreign people such as (Indian Americans, Malaysian Indians, and North American Whites). The study was done in the Medical clinics at the College of Dentistry, University of Babylon, this text discusses a lip morphometric study on an attended patient at a college clinic.

Individual	Man (No.)	Woman (No.)
Child	**15**	**15**
Young	**30**	**30**
Adult	**30**	**30**
Total	**75**	**75**

Patient Selection:

Chosen patient The patient must be in normal health and free of any disease.

Exclude the following cases from the study

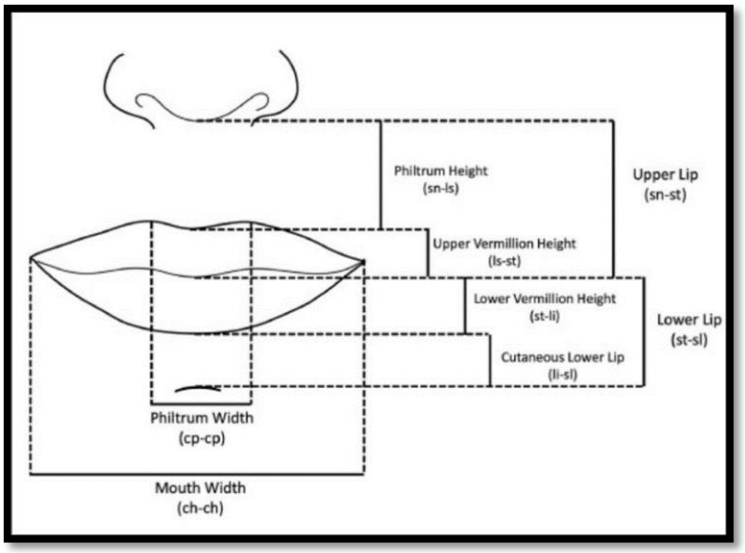
1. Previous history of developmental and neurological defects of the facial region.
2. Cosmetic treatment of mouth and lip region.
3. Cranio-Facial trauma.
4. Facial surgery.
5. Bi-racial ethnic origins.
6. Inflammation, such as herpes, malformations such as cleft lip, and surgery history in lib and jaw.

Theoretical Background

This text discusses a lip morphometric study on Iraqi patient, focusing on determining the normal average values of lip measurements and any significant sex differences that may exist.

3.2. Landmarks (upper and lower lips)

Midline landmarks: sn, subnasale; superius labiale; st, stomion; labiale inferius; sublabiale. Paired landmarks: ch, cheilion as shown in Figure 1.



For this study, all parameters were taken with a digital sliding Vernier Calliper. The study was modeled upon the methods of Singh and Bhasin.7 For taking measurements, the following somatometric landmarks were selected (Figure 1):

Sub-nasal (Sn) – the point where the lower margin of the nasal septum meets the integument of upper lip; Chelion (Ch) – the point on the mouth opening where the lateral ends of the upper and lower lip meet, i.e. corners of the mouth; Labial Superior (Ls) – the point on the upper margin of the upper lip in the mid-sagittal plane; Labial Inferior (Li) – the point on the lower margin of the lower lip in the mid-sagittal plane; Stomion (Sto) – the point where the slit of mouth with close lips cuts the mid-sagittal plane; Sub Labial (Sl) – the midpoint of the horizontal.

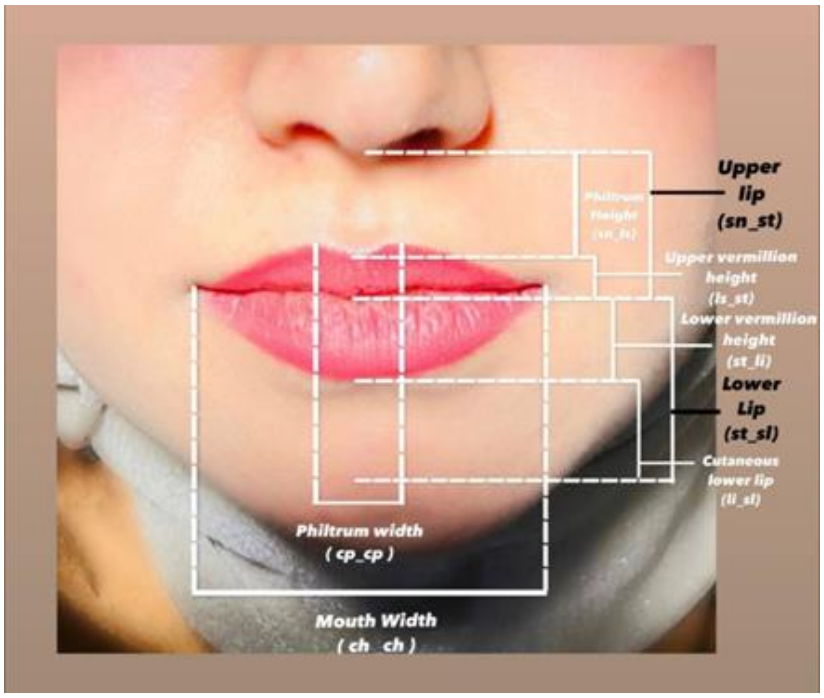


Figure 2.The photograph shows the lip anthropometric landmarks

Table 1: Anthropometric lip land marks

Terms	**Name**	**Description**
sn	subnasale	midpoint at the union of the lower border of the nasal septum and the upper lip
ls	Labiale superius	midpoint of the vermilion line of the upper lip
st	stomion	midpoint of the horizontal labial fissure
li	labrale inferioris	midpoint of the vermilion line of the lower lip
sl	sublabiale	In the midline of the nasolabial sulcus
ch	cheilion	labial commissura

Those with anomalies, malformation, deformities, inflammation, trauma, and surgical scars (operations for cleft lip) of or around the lips were excluded.

Subjects above 40 years were excluded because most of the measurements showed a decline after the fifth or sixth decade.6 Written consent was obtained from all the subjects after explaining the content of the study to them. For this study, all parameters were taken with a digital sliding Vernier Caliper. The study was modeled upon the methods of Singh and Bhasin (7). For taking measurements, the following somatometric landmarks were selected (Figure 1).

- : Sub-nasal (Sn) – the point where the lower margin of the nasal septum meets the integument of upper lip;
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- Stomion (Sto) – the point where the slit of mouth with close lips cuts the mid sagittal plane;
- Sub Labial (Sl) – the midpoint of the horizontal

3.3 Position of the subjects

Subjects were asked to sit in an upright relaxed position "natural and normal" erect posture of head and shoulders, with both arms hanging free beside the trunk for the linear measurements of the face.

3.4 Direct Anthropometric measurements (Manual measurement):

After analyzing the lengths, the following ratios were calculated:

- 1.ls-st/li-st: The ratio of the upper vermillion height (ls-st) to the lower vermillion height (li-st).
- 2.sn-ls/ls-st: The ratio of the philtrum length (sn-ls) to the upper vermillion height (ls-st).
- 3.li-sl/li-st: The ratio of the cutaneous lower lip height (li-sl) to the lower vermillion height (li-st).
- 4.sn-st/st-sl: The ratio of the upper lip height (sn-st) to the lower lip height (st-sl).
- 5.cp-cp/ch-ch: The ratio of the philtrum width (cp-cp) to the mouth width (ch-ch).
- 6.ls-li/ch-ch: The ratio of the upper vermillion height (ls-st) and lower lip height (st-sl) to the mouth width (ch-ch).

4. Statistical analysis:

The normal distribution of data was tested using Kolmogorov–Smirnov test, and Mann–Whitney tests, and independent sample t-tests were used to compare the variables in two independent groups. SPSS 12.0 software was used for analysis, The lip linear distances were presented as range, mean, and standard deviation (SD). The lip linear distances were compared between sexes by using an "Independent t-test". Values of $p < 0.05$ were considered as significant**, Facial lip ratios were also calculated.**

Table 2. The parameters of lip morphometry in Iraqi men and women.

SN	Parameter in millimeter	Men (n=)		Women (n=34)		p Value	Significant
		mean	(SD)	mean	(SD)		
1	Cutaneous height of upper lip (philtrum (sn–ls))	11.41	2.97	11.85	2.41	0.2380	Non-Sg
2	Vermilion height of the upper lip (ls-st)	4.88	1.53	3.25	0.81	0.00044**	Sg
3	Upper lip height (sn-st)	16.29	3.54	9.53	2.80	0.1840	Non-Sg
4	Cutaneous height of lower lip (li-sl)	9.79	2.59	6.06	1.33	0.000238**	Sg
5	Vermilion height of the lower lip (st-li)	7.09	3.20	4.08	0.77	0.008**	Sg
6	Lower lip height (st-sl)	16.74	4.16	9.86	2.17	0.000319**	Sg
7	Total vermilion height (ls-li)	12.03	3.46	7.89	2.00	0.001**	Sg
8	Total lips height (sn-sl)	34.82	6.93	21.53	6.91	0.9840	Non-Sg
9	Outer intercommisural (mouth) width (ch-ch)	50.26	5.46	46.92	3.46	0.0104*	Sg
SN - serial number; SD - standard deviation; ***Highly significant (p<0.0001); **Significant (p<0.001)							

5. Comparison with Other Research:

This study on lip morphometry in Iraqi people adds valuable data to the field of facial anthropology and aesthetic surgery. The study compares well with other research conducted on different ethnic groups, such as Indians, Caucasians, and North American Whites. By directly measuring lip anthropometric data in Iraqi men and women, the study provides important information for surgical procedures like labiaplasty and lip enhancement surgeries.

6.1. strengths:

One of the strengths of the study is the inclusion of a larger number of cases compared to previous studies. Additionally, the study conducted direct measurements, which are more reliable than photographic data used in some earlier studies. The findings highlight the importance of considering racial characteristics and sexual dimorphism in surgical procedures.

6.2. weakness

A weakness of the study is the potential influence of factors like climate, diet, and environment on the parameters measured. Further research is necessary to establish more precise standards for cosmetic surgery in diverse populations.

6.3. implications for medical practice

Knowledge of the proportions between the upper and lower lips helps in surgical correction of the lower face region. The study has provided vital data that will be helpful in reconstructive surgery. Surgeons can determine the goal preoperatively by:
1.Calculating proportion indices and whether they lie in the ethnic range or not.
2. Identifying areas with disproportion and defining the extent of changes needed in the numerator or denominator of the index.

It is impossible to specify any distinct characteristic exclusively to a particular race, but careful examination of physical, skeletal, and dental structures may collectively support the racial identity of an individual. The recognition of inherited racial characteristics is essential in forensic investigation for determining personal identification. It is expected that this study will provide useful information to the forensic, plastic surgeons, and forensic experts. In other words, it can be useful for cosmetic correction purposes as well as for identification.

All of these bear different proportions to each other in the two sexes, which may be useful for cosmetic surgeons. However, these represent average values and not the optimal ones that make the face attractive. One should not forget that every individual is a unique creature. Reconstructive surgeons may use

these parameters, but at the same time must be familiar with the methods of objectively judging facial harmony and proportion. They need to know how to arrange linear distances, inclinations, and proportions of the area undergoing surgery while allowing some asymmetries.

	Present study		Indian American	
	Men(mean)	Women(St)	Men(mean)	Women(St)
(sn–ls)	0.66	0.26	0.62	0.59
(ls-st	0.4	0.11	0.38	0.41
sn-st	0.32	0.31	0.63	0.73
li-sl	0.79	0.19	0.64	0.71
st-li	0.55	0.19	0.46	0.43
(ls-li)	0.34	0.31	0.54	0.57
(sn-sl	0.99	0.27	1.23	1.46
(ch-ch)	0.6	0.49	0.84	0.77

Results

There were 100 participants in this study, with 50 men and 50 women. The average age of women was 27.47 ± 4.76 years, whereas the average age of men was 30.13 ± 3.35 years. Statistically significant differences were found between the genders (p=0.007). The study was conducted on 100 Iraqi students using direct lip anthropometric measurements. Results showed differences in lip measurements between men and women, with higher values in men. The study provides valuable data that can be useful for labiaplasty, lip enhancement surgeries, and establishing baseline data for forensic odontologists, plastic surgeons, and orthodontists treating Iraq . The research highlights the importance of considering ethnic and racial differences in cosmetic surgery practices and the need for further studies in different ethnic groups to establish specific norms for different populations.

Overall, the key findings of this study on lip morphometry in Iraqi patients include:

1. Lip measurements showed higher values in men compared to women.
2. Cutaneous height of the upper lip was higher than the lower lip in both sexes.
3. The vermilion height of the lower lip was higher than the vermilion height of the upper lip in both sexes.
4. Lip ratios were reliable for most parameters except for vermilion-cutaneous height in both upper and lower lips.
5. These findings provide valuable data that can be used for cosmetic surgeries, forensic identification, and orthodontic treatments specific to Iraqi people.

7. Conclusion

The lip anthropometric measurements of Iraq men showed higher value when compared to women.

- ✓ On comparing cutaneous height of upper and lower lips, it was found to be higher in the case of upper lips in both sexes.
- ✓ The lower lip height was higher when compared to upper lip height in both sexes.
- ✓ The vermilion height of the lower lip was higher when compared to vermilion height of the upper lip in both sexes.

Iraqi men and women differ significantly in certain parameters from Indian American, and it concludes that the same standards cannot be used on different populations for cosmetic surgery. The present study's lip anthropometric data can be used as a reference value for Iraq which can be made use of if they need to undergo surgical reduction and reshaping of the labia and surgical improvement of lips' fullness through enlargement in the Iraq.

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