"EVALUATION OF SHAPE AND MORPHOLOGY OF NASO-LABIAL FOLD DURING SMILE, WITH STANDARDIZED PHOTOGRAPHY- A DESCRIPTIVE STUDY"

By

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Dissertation

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MASTER OF DENTAL SURGERY
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Under the Guidance of

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DEPARTMENT OF

ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

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KAHER, BELAGAVI, KARNATAKA.

2018 - 2021

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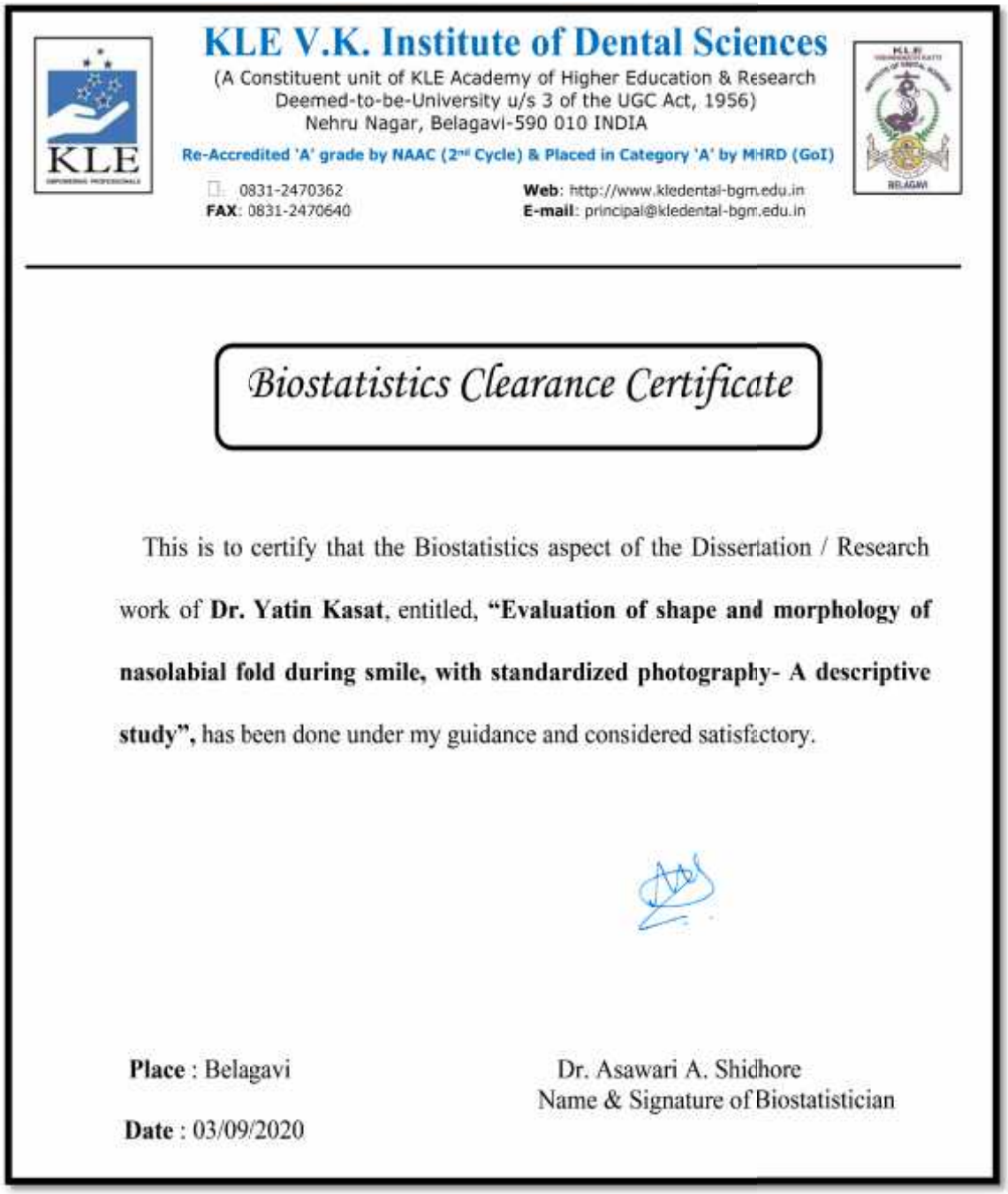

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Place: ***Belagavi***

LIST OF ABBREVIATIONS:

NLF	:	Naso-Labial Fold
FVC	:	Frontal view classification
PVC	:	Profile view classification
U	:	Upper
L	:	Lower
Sn	:	Subnasale
Ls	:	Labralesuperius
G	:	Glabella
N	:	Nasion
Pog	:	Pogonion
x1 and x3	:	Points marked perpendicular to the N-Pog plane definitely opposite to Sn on left and right side respectively.
x2 and x4	:	Points marked perpendicular to the N-Pog plane definitely opposite to Ls on left and right side respectively.
AFG	:	Alar Facial Groove
LC	:	Lip Commisure
X5	:	Point opposite to AFG on the vertical plane
X6	:	Point opposite to LC on the vertical plane.
X7	:	Point of intersection of the NLF curve on the vertical plane

ABSTRACT

Aim and objectives: The purpose of this study was to evaluate the shape and morphology of the Naso-Labial Fold during smile, with standardized photography and to generate new code and criteria for the classification of Naso-Labial Fold based on shape and morphology.

Materials and Methods: A descriptive study was carried out on a sample of 260 participants aged between 18-25 years, with an approximately equal number of males (132) and females (128), respectively. Video recording (frontal and profile view) followed by shortlisting of the smiling photos and quantitative analysis was done using MAKHTER facial analysis software.

Results: The Naso-Labial Fold was classified in I) Front view a) Depending on the extent of convexity of Naso-Labial Fold (NLF1 and NLF2); b)According to mathematical shape; and c) According to its morphology.

II) Profile view 1) Depending on the extension of its concavity horizontally in the upper and lower compartment, 2) by comparing its extent of the upper and lower compartment in the vertical dimension. Angle of convexity of Naso-Labial Fold (degrees) was introduced and correlated.

Conclusion: This was presumablythe first study in which classification of Naso-Labial Fold was done with respect to orthodontic perspective in frontal and profile view respectively. A positive correlation was found between Angle of convexity associated with NLF and facial profile. Vertical and horizontal extension of NLF in profile view also showed a positive correlation with each other.

Keywords: Naso-Labial Fold; classification; morphology; shape; Angle of convexity.

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INTRODUCTION

Research has shown that physical attractiveness is associated with stereotyping. Attractive people are usually adjudged more positively than unattractive ones; they are recognized to have more social appeal, more interpersonal competence, and better adjusted than unattractive individuals.[1,2]

Various body characteristics determine physical attractiveness, but facial appearance seems to be the most important component of physical attractiveness [3,4]and in that smile is the cornerstone of the social interactions. [5] The smile is essential to express sociability, agreement, and appreciation and convey compassion and understanding, which should not be ignored in diagnosis and treatment planning.[6]

The re-emergence of the soft-tissue paradigm in clinical orthodontics has made smile analysis and designing the essential elements in diagnosis and treatment planning.[7] Muchattention is given in clinical examination to the display zone of the smile, which is decided by lip thickness, Inter-labial gap, Inter-commissural width, smile index**, Naso-Labial Fold** and gingival architecture.[8]

The Naso-Labial Fold is the keystone for the smiling mechanism. It is also a very unusual structure, as it is absent at birth, present at the death, and subside with facial nerve damage. There is a saying in cosmetic surgery that despite all advances in technology, the Naso-Labial Fold "remains undefeated". [9]

The Naso-Labial Fold is made up of the following:

a. Dense fibrous tissue

b. Muscle fibres branching from the elevators of the upper lip muscles.

c. Elevators of the upper lip muscles passing through the fold on the way to the upper lip vermillion, and

d. Muscle fibres originating in the labial-fold fascia (fold musculature)[10]

Each muscle is made up of 75-150 fibrils, with each fibril "wired" to a filament of the seventh cranial nerve. Each fibril can contract independently, like a finely tuned instrument in a symphony, and can create movements that reveal emotions of the individual. [11]

The Naso-Labial Fold is supported by muscular and Tonic Modiolus and SMAS(Superficial Musculoaponeurotic System) in youth. The fat presented laterally to the Naso-Labial Fold cannot "cross" it due to the dense fascia to dermis adherence within the fold. The morphology of the Naso-Labial crease is determined principally by the skeleton in rest, implying it can be altered by Orthopaedic or orthodontic correction. [(10)]

Thus far, Naso-Labial Fold is classified according to Wrinkle Severity Rating Scale, and improvement is assessed by the standard of the Global Aesthetic Improvement Scale (GAIS), considering Naso-Labial Fold a type of a wrinkle.[11, 12] However, Naso-Labial Fold is not simply a wrinkle; it is a special anatomical region that requires many factors for collective assessment.[13] Lu Zhang *et al*[13;] classified Naso-Labial Fold according to their anatomical and histological features. There is no classification of Naso-Labial Fold with respect toorthodontic diagnosis and treatment planning. Therefore there is a need for a more specific and scientific classification system related to Orthodontics and Dentofacial Orthopaedics.

Stebel*et al*[1] concluded that 3D images appear to be better than 2D photos for ranking Naso-Labial aesthetics, but raters should become comfortable with them

before scoring. Working with 2D images decreases radiation exposure by 3D imaging and also the cost as compared to 3D imaging. 2D photos are the primary diagnostic tool for orthodontic treatment planning and can be easily made available than 3D photos for analysis.

Christine M. Jones *et al*[14] concluded that using three-dimensional images for the subjective rating of Naso-Labial aesthetics was not more reliable than 2-dimensional images in a study.

Therefore, the study aims to evaluate the shape and morphology of Naso-Labial Fold during a smile using standardized photography.

AIMS AND OBJECTIVES

AIM OF THE STUDY: To study the shape and morphology of Naso-Labial Fold during a smile, with Standardized Photography.

OBJECTIVES:

1. To generate a new code and criteria for the classification of Naso-Labial Fold based on shape and morphology.
2. To incorporate Naso-Labial Fold as a parameter in Orthodontic treatment and Orthognathic surgical planning.

REVIEW OF LITERATURE

Lu Zhang *et al*[13] (2014) studied the classification of Naso-Labial Folds in 900 Asian patients who sought facial rejuvenation treatment in Shanghai 9th people hospital and concluded that the anatomical and histological characteristics of a Naso-Labial Fold classify the Naso-Labial Fold into five forms, namely the type of tissue, type of fat layer, type of muscle, type of bone retrusion and type of combination that is hybrid.

Leonard R. Rubin[10] (1998) studied the anatomy of Naso-Labial Fold in 1000 patients surgically. It concluded that the lip elevator muscles form the Naso-Labial crease. In contrast, work before this article had assumed that the crease was formed by the insertion of the superficial musculoaponeurotic system.

EuiSeonBaek*et al*[15] (2018) studied quantitative and perceived visual changes of the Naso-Labial Fold following orthodontic retraction of lip protrusion on 39 adult women using computed tomography images retrospectively for measuring NLF1 and NLF2 landmarks and using the same concluded that orthodontic retraction induced quantitative and perceived visual changes of the NLF.

Wolfgang G. Phillip-Dormston*et al*[25] (2017) perceived the naturalness of facial expressions after fillers to Naso-Labial Folds with standardized video and photography at three sites in Germany(a multicentre clinical trial). It concluded that naturalness and attractiveness could be assessed using video recordings and photography.

Yi Lin *et al*[24] (2016) studied three-dimensional smile analysis based on dynamic evaluation of facial curve contour on 80 students in Chinese youth. It concluded that morphologies of the zygomatic area and the superior part of the Naso-Labial crease

were determined largely by the skeleton in rest, implying the latter can be altered by orthopedic orthodontic correction and the former was improved on the attractiveness of smile through cosmetic procedures.

Christine M. Jones *et al*[14] (2018), conducted a study to determine whether Naso-Labial is present in unilateral cleft lip and palate patients is scored with comparable results and reliability on 3-dimensional stereo-photogrammetric facial images versus normal clinical photography (2-dimensional) and concluded that the use of three-dimensional images for a subjective rating of Naso-Labial aesthetics was not more reliable than 2-dimensional images in the study.

Stebel*et al*[1] (2015) conducted a study to compare the reliability of rating Naso-Labial appearance on 3D images and standard 2D photographs in pre-pubertal children and concluded that 3D images appear to be better than 2D photos for ranking Naso-Labial aesthetics. Still, raters should become comfortable with them before scoring.

Philipp Metzler *et al*[26] (2014) conducted a study to analyze Naso-Labial changes following Le Fort I advancement using 3D photometric measurements. It concluded that Le Fort I advancement significantly impacts the Naso-Labial soft tissue envelope, and the 3D soft tissue changes are predictable and similar for any advancement up to 10mm.

Donald S. Mowlds*et al*[27] (2017) conducted a study on 77 patients evaluating before and after injection of the cheeks with Hyaluronic acid filler using a three-dimensional camera system and concluded filling the cheek with 3cc of volume does not create traction forces or move the skin between the site of injection and the Naso-Labial crease but this lead to a perceived improvement in the Naso-Labial Fold.

David E. Lluncor*et al*[28] (2014) did a study which determined the utility of methods in image processing and statistical analysis to quantify the structure of Naso-Labial Fold automatically and concluded that by using computer technology, Naso-Labial Folds could be classified almost as accurately as dermatologists use grading, indicating that computer technology can be a useful tool for grading Naso-Labial Folds because a computer is consistent at all times.

TomonobuEzure*et al*[29] (2011) conducted a study to clarify the mechanism of Naso-Labial Fold formation, and to establish grading criteria for severity and explored the influence of dermal elasticity and subcutaneous adipose mass for the same and concluded Naso-Labial Fold severity increases with decreasing dermal elasticity and with an increment of the subcutaneous fatty layer.

Gerhard Sattler *et al*[30] (2016) evaluated 12-month effectiveness and safety of VYC-17.5L hyaluronic acid to treat moderate to severe Naso-Labial Fold and concluded that it was effective well-tolerated for one-year treatment of mild to serious NLFs.

Leslie Baumann *et al*[31] (2017) compared the efficacy and safety of HA gel (Hyaluronic acid) with lidocaine and HA gel without lidocaine in the treatment of moderate to severe Naso-Labial Folds. It concluded that the effectiveness and safety profiles of both were comparable.

Vinod Krishnan *et al*[5] (2008) attempted comprehensive evaluation of smile characteristics with evaluation by perception followed by quantification of smile characteristics with the smile arc, buccal corridor measurements, and a modified smile index, concluding that there was a high correlation between right and left buccal corridor spaces in men and women.

Marcus C. C. Lim *et al*[32] (2009) conducted a study with 126 patients belonging to the age group from 21-79 years to measure the Naso-Labial Fold angle (NFA), using optical coherence tomography for measurement and concluded that NFA decreases with age and increases in males.

Jiajun Wu *et al*[33] (2016) investigated the 3-dimensional (3D) anatomical structure of the muscles associated with the appearance of the upper lip and lower part of the nose. It indicated that the Orbicularis Oris and Nasalis are closely associated with the appearances of the upper lip and the lower part of the nose, the results may aid the plastic surgeon in performing cleft-lip correction surgery.

MATERIALS AND METHODS

STUDY DESIGN: Descriptive study

SAMPLE COLLECTION:

A total of 260 study participants from KLE VK Institute of Dental Sciences and Research center, Belagavi, Karnataka, India, from 2018-2020, were included in this descriptive study.

INCLUSION CRITERIA:

- Participants with no gross facial deformity.
- Participants with equal number of males and females.
- Participants between age group of 18-25years.

EXCLUSION CRITERIA:

- Participants who have undergone any facial surgical procedure.
- Participants with Facial skeletal asymmetry.
- Participants who had a history of Orthodontic treatment.
- Participants with a history of smoking or Diabetes*
- Participants with apparent scars and pigment patches on the face.
- Participants previously treated with Facial Botox.
- Participants with facial nerve damage. (eg. Trigeminal Neuralgia, Facial Palsy, etc.)

*it accelerates the aging process and Naso-Labial Fold morphology changes with the aging process.

THE PROCEDURE:

A total of 260 study participants from KLE VK Institute of Dental Sciences and Research center, Belagavi, Karnataka, India, from 2018-2020, were included in this descriptive study. Of these, a pilot study was conducted on 10 participants. The study was approved by the Ethical committee of KLE VK Institute of Dental Sciences, Belagavi. The inclusion criteria included an equal number of males and females belonging to the age group 18-25 years. Subjects having any history of facial surgical procedure, previous Orthodontic treatment, patients treated with Facial Botox, smokers, patients having apparent scars and pigment patches on the face, patients with facial nerve damage, and patients with facial skeletal asymmetry were excluded from the study.

Each patient was asked to wash their face (there were chances of sweat and dust accumulation in the nasolabial fold undercut) and then be seated on the height-adjustable chair with their back and shoulders straight, with the normal head position under standard environmental and adequate light conditions. Two DSLR (Canon EOS 1200D, Lens-90mm) cameras were mounted on the tripod stand, and the tripods were kept at 5ft distance from the subject, one in front of the subject (frontal view) and other lateral to the subject (profile view). The measurement tape was stuck at the center of the forehead. The second measurement tape was stuck on the lateral side of the face with a 10mm distance from the Naso-Labial Fold emergence, to eliminate magnification error.

The participants were given instructions before the Videography. The participants had been told to smile from the rest position of the lip then back to the rest position. The video was captured in standard settings, and the subject smiling was

recorded. The soft tissue analysis was done using MAKHTER*- Facial Analysis Software. The video was captured and split in photographs by using the same software. The best three photos were selected, and the change in the Naso-Labial Fold was analyzed.

*To split the captured video, Custom software (MAKHTER Facial Analysis Software;) was used. The programme allowed us to capture images and frames of various phases of the smile. With a 0.01 second interval, the software can capture frame shots. For printing high-resolution images, these captured frames can be used. This software was developed and introduced by Dr. Akhter Husain and Dr. Parmanand G. Makhija. (sponsored by Yenepoya Dental College, Yenepoya University,Deralakatte, Mangalore, India).

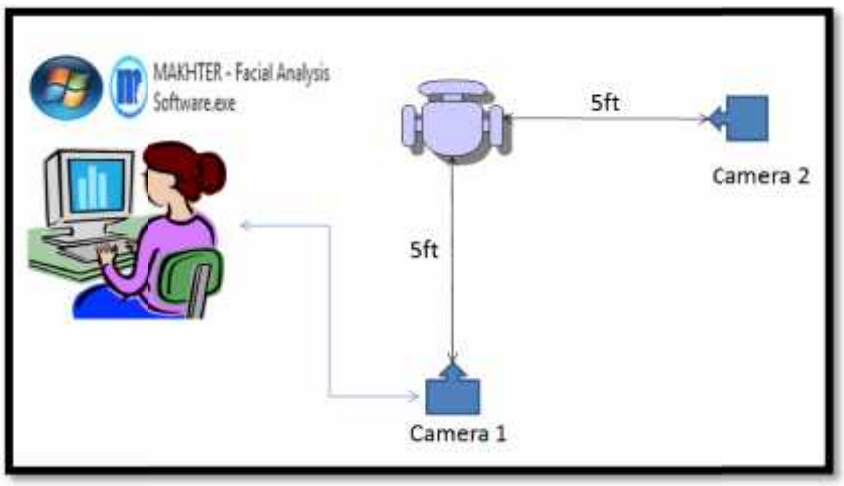


Fig.1 The Procedure

MAKHTER- Facial Analysis Software

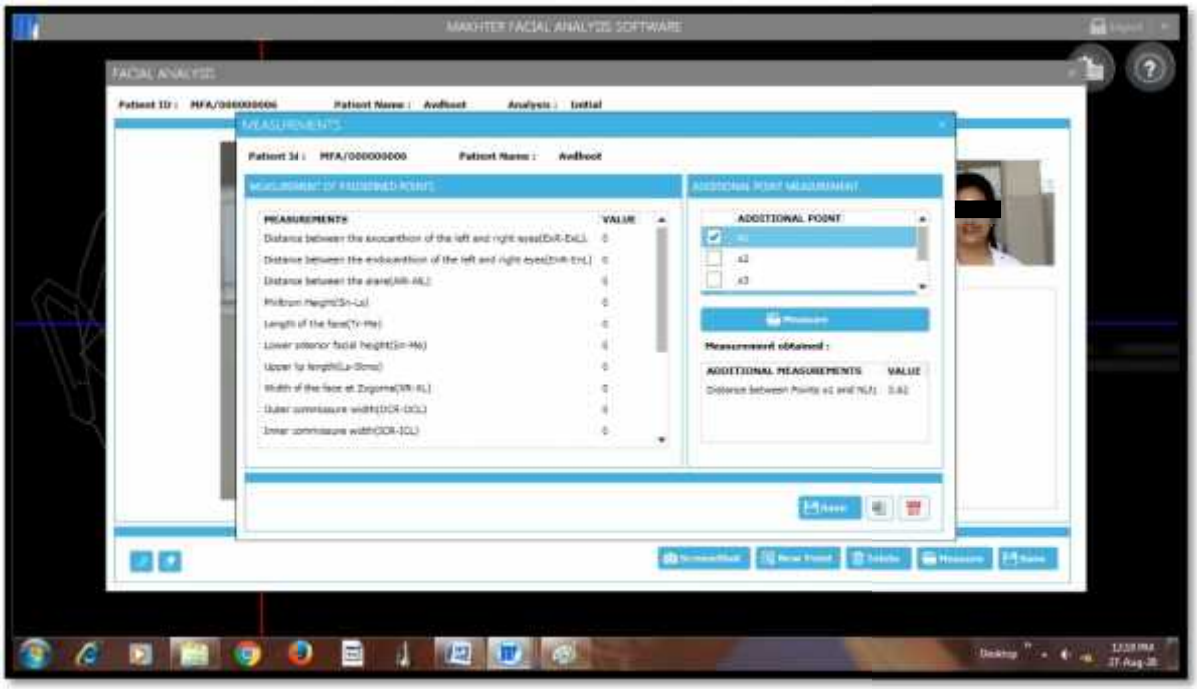
1. Homepage display of the MAKHTER Software

2. The entry of participant details

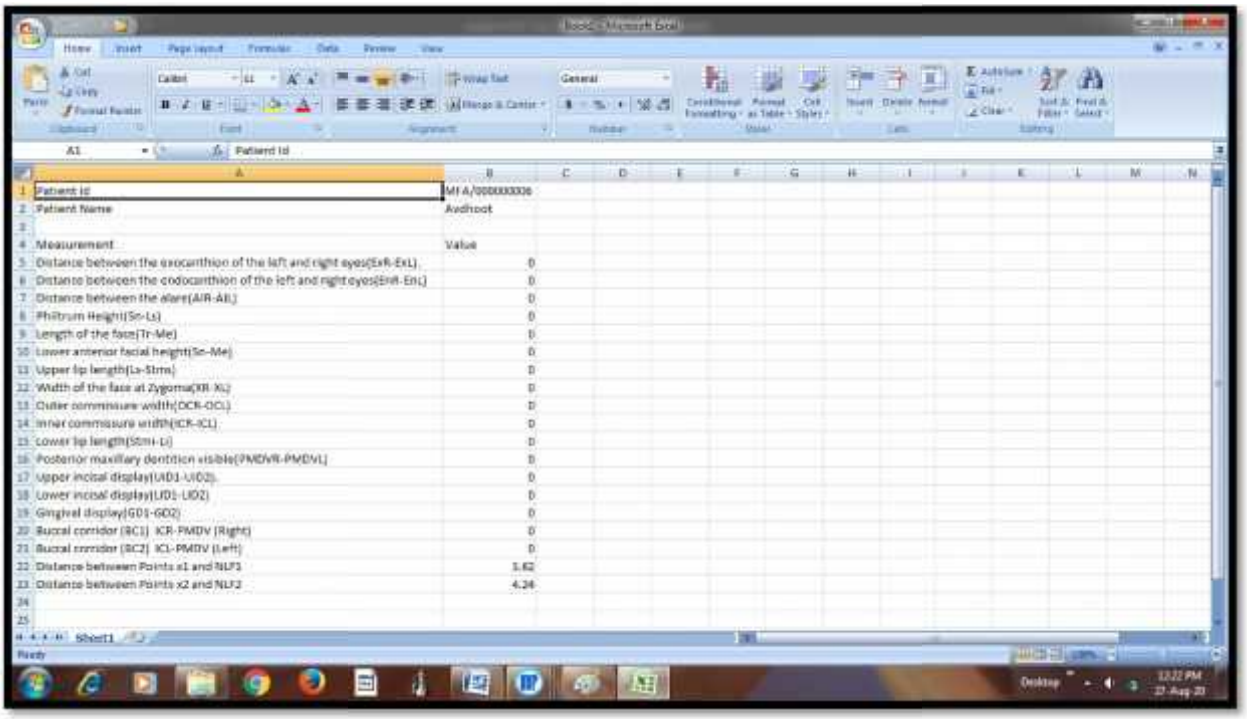
2. Marking of Ruler points on measurement tape to eliminate magnificationerror.

3. Marking of soft tissue landmarks

4. Measuring the distance between two soft tissue landmarks



5. Direct access for entry into an excel sheet



Analysis

1. Extent of the Naso-Labial Fold

A. Frontal view:-

1. Distance of Naso-Labial Fold (NLF1* and NLF2*) from the mid-sagittal plane was measured.

* NLF1: At the horizontal level of the initial Subnasale, the deepest point on the Naso-Labial Fold.

*NLF2: At the horizontal level about 15mm below initial Subnasale**,** the deepest point on the Naso-Labial Fold[13]or at horizontal level of the Labrale superius, point denoting the vermillion border of upper lip.

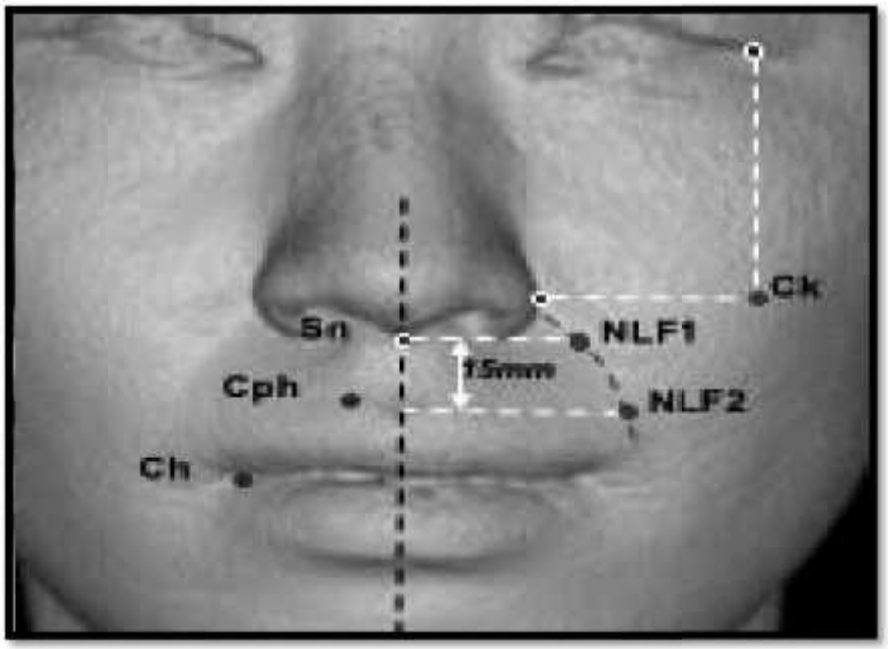


Fig. 2 Three-dimensional facial soft tissue landmarks

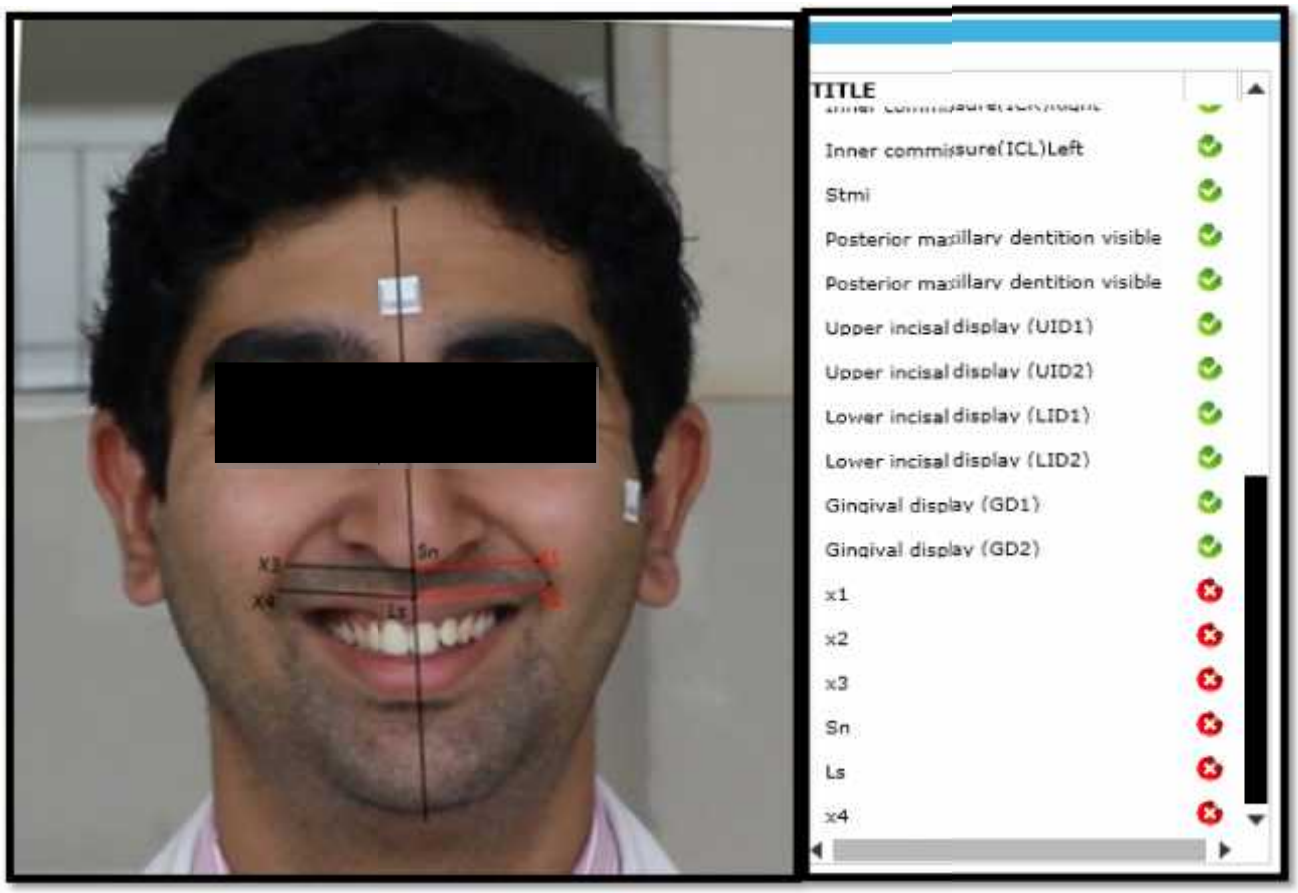


Fig. 3 Marking and measurement of points. (Sn: Subnasale; Ls: Labralesuperius; x1 and x3: Points marked perpendicular to the N-Pog plane exactly opposite to Sn on left and right side; x2 and x4: Points marked perpendicular to the N-Pog plane exactly opposite to Ls on left and right side respectively

Accordingly, measurements were obtained of NLF1 and NLF2,both left side (x1 to Snand x2 to Ls) and right side(x3 to Sn and x4 to Ls), respectively.

B. Profile View:-

It was classified in the form of concavity; the Naso-Labial Fold appears like a concavity when the participant smiles.

Decreasing	**Increasing**
Concave up	Concave up
Concave down	Concave down

Table A Different types of Concavity

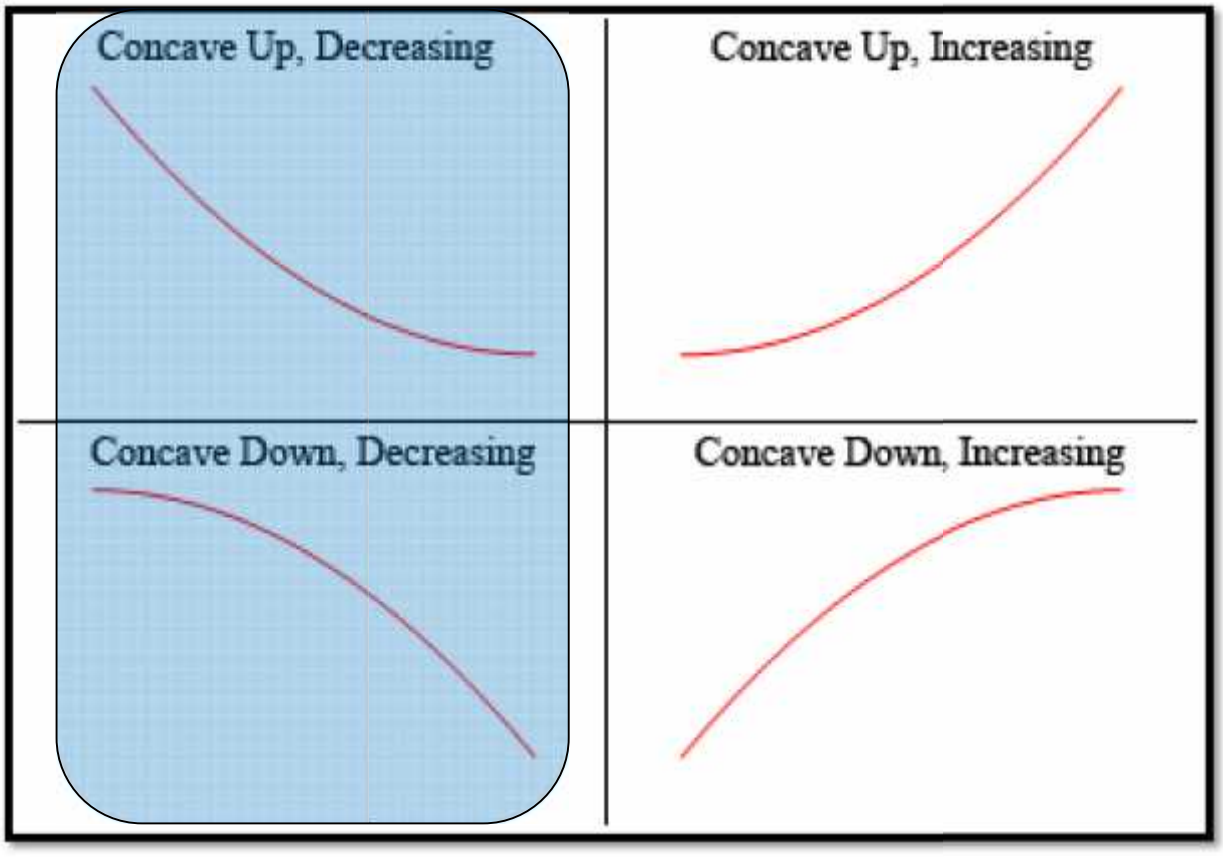


Fig. 4 Types of curves. The blue highlighted portion is the prime area of focus for the classification of Naso-Labial Fold.

In the profile view analysis, a horizontal ala tragus line was drawn. A vertical line was drawn from the center of the pupil, perpendicular to the ala tragus line. The soft tissue landmarks, AFG (Alar Facial Groove): the junction between the nose and cheek; LC (Lip Commissure): corner of the mouth where the vermillion border of superior labium meets the inferior labium; X5: the point opposite to AFG on the vertical plane; X6: the point opposite to LC on the vertical plane.

The distance AFG to X5 and LC to X6 is measured perpendicular to the vertical plane and denotes the extent of the concavity of the upper and lower compartment of Naso-Labial Fold,respectively.

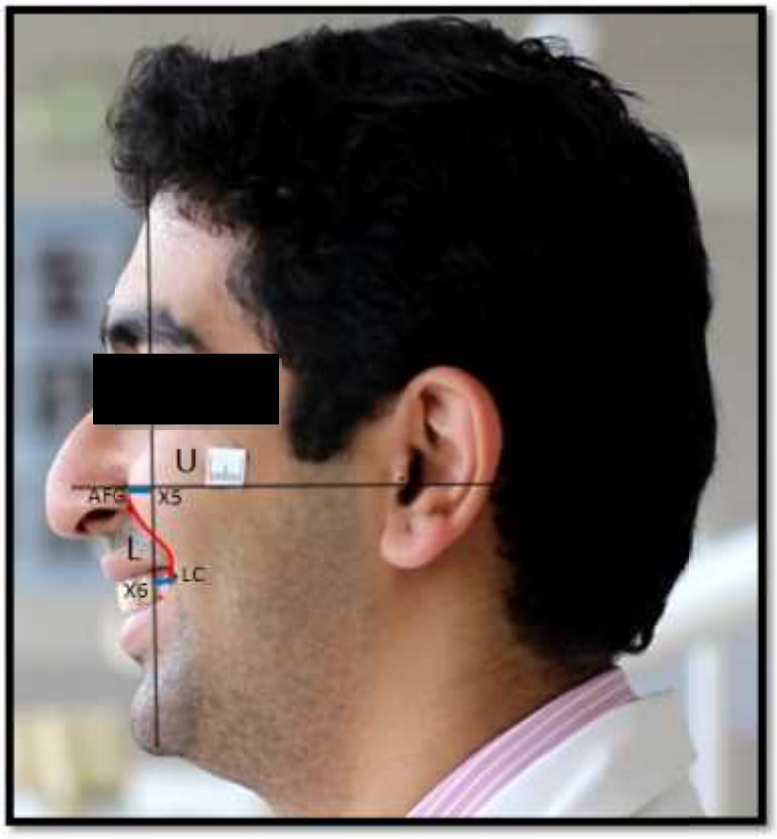


Fig.5 Profile view: Measurement of the extent of the concavity of the Naso-Labial Fold in the upper (U) and lower region (L), respectively. The distance between AFG (Alar Facial Groove) and X5 is the extent of concavity in the upper compartment. The distance between LC (Lip Commissure) and X6 is the extent of concavity in the lower compartment.

The vertical extent of Naso-Labial Fold in the profile view can be calculated by including the X7 point landmark. The X7 point is marked at the intersection of the Naso-Labial Fold curve on the vertical plane. The distance between X5- X7 and X6-X7 denotes the extent of vertical component in the upper and lower compartment of the Naso-Labial Fold.

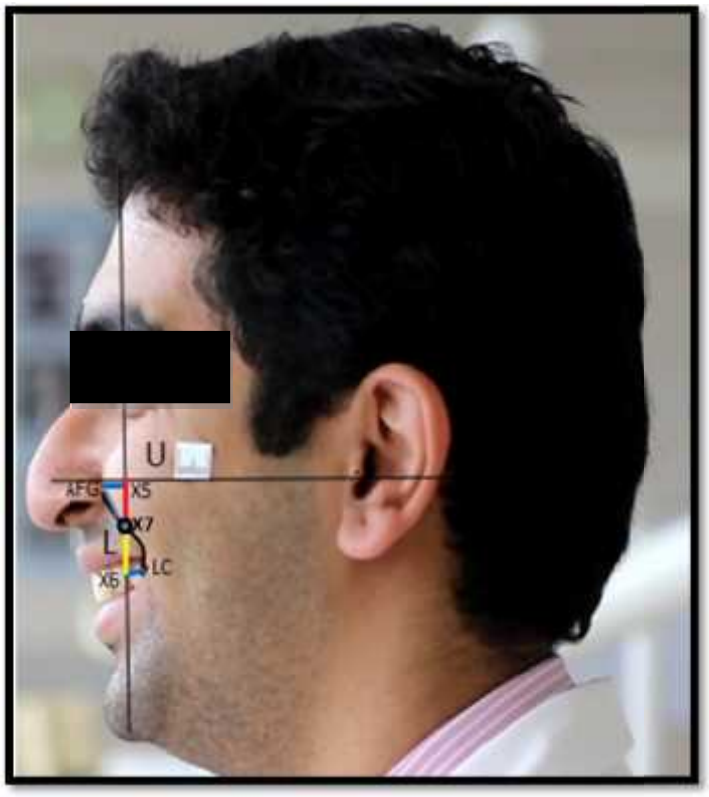


Fig. 6 Distance between X5-X7, denoted by red color, and between X6-X7, denoted by yellow color, are the extent of vertical component in the upper and lower compartment of the Naso-Labial Fold curve.

2. Shape of the Naso-Labial Fold:

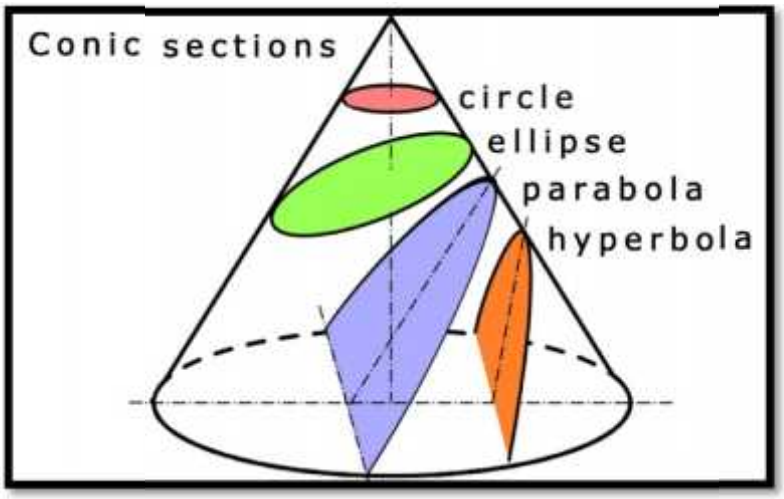
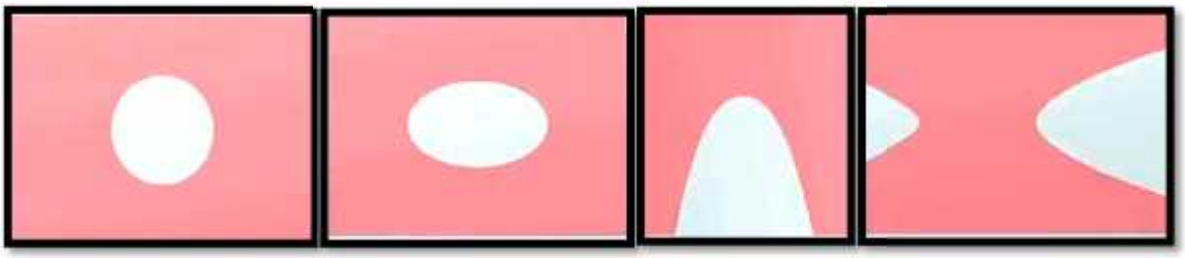


Fig. 7 Conic section depicting circle, ellipse, parabola, and hyperbola according to a different plane of space

The conic section is a curve obtained as the intersection between the surface of a cone and a plane. Hyperbola, parabola, and ellipse are the three forms of conic sections. The circle is a type of ellipse and is considered to be the fourth type of conic section. (Fig. 7)



A B C D

Fig. 8: Different mathematical shapes of Naso-Labial Fold in two planes of space.

A. Circle; B. Ellipse; C. Parabola; D. Hyperbola

Shape	Description
Circle	Circle is defined as a set of points that are equidistant from a certain point.
Ellipse	Ellipse is a regular oval shape. It is a set of all points in a plane, the sum of whose distances from fixed points in the plane is constant.
Parabola	Parabola is a symmetrical, mirror plane curve and is approximately U-shaped.
Hyperbola/Triangular	The hyperbola is two curves resembling infinite bows. It is somewhat triangular in form.
Indistinct	The curve that is neither even, straight, or smooth.

Table B: Classification of NLF according to mathematical shape

3. Morphology of the Naso-Labial Fold:

Sr.no.	Type	Features
1.	Simple skin type	Fine wrinkles; Naso-Labial Fold exhibited as deep furrow.
2.	Fat pad type	Thick fat pad or plump zygomatic area
3.	Muscular type	High tension resulting from muscular contraction; Naso-Labial Fold displayed as a deep furrow.
4.	Bone retrusion type	Retrusion of bone tissue around the pyriform aperture; the upper segment of Naso-Labial Fold manifested as concave.
5.	Complex type	Combination of two or more of the above types.

Table C. Classification of NLF according to its morphology

4. Convexity of Naso-Labial Fold:

It is defined as the angle between the G-pog plane and the resultant of two tangents drawn from the respective upper and lower concavity of Naso-Labial Fold.

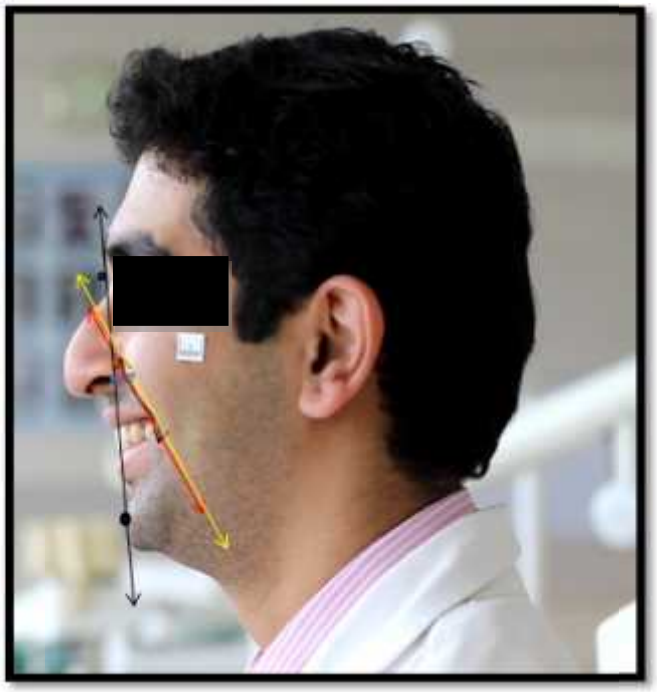


Fig.9 Profile view photo. Glabella to soft tissue Pogonion plane (black); Two tangents with respect to upper (red) and lower (yellow) concavity.

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Sample Size Estimation:

Based on the pilot study results,

Standard deviation=S= 4.35=σ

Mean=μ=14.02=ẋ

Relative precision=ϵ=5%

$$N = \frac{Z^2 \alpha S^2}{\epsilon^2 \dot{x}^2}$$

N=256≈260

= 2.58 at 99% confidence

Hence the sample size using the above-mentioned equation was 256≈260

Statistical analysis

The sample size was determined using the pilot study, which was performed on 10 study participants. Based on NLF1 values, the standard deviation was 4.35, with a mean of 14.02 and a relative precision of 5%; the sample size calculated was 256≈260 with a 99% confidence interval. Descriptive statistics were performed for this study. An intra-group comparison was performed using an independent t-test. To identify correlations among quantitative changes of NLFs and convexity of Naso-Labial Fold, Pearson's correlation was analyzed. Generalized estimating equations were used to compare the distribution of different shapes of Naso-Labial Fold, and the odds ratio was calculated. All the measurements were statistically calculated using SAS version 9.3.

RESULTS

1. Distribution of the study participants according to Gender:**(Table 1) (Graph 1)**

The study included two hundred and sixty subjects. One thirty-two subjects (50.76%) were male and one hundred twenty-eight subjects (49.24%) were female.

2. The mean age of the participants in the study:**(Table 2)**

The mean age was 21.23 years, where the minimum age was 18 years and the maximum age was 25 years respectively (Table 2). The age group related to this study consisted of a small interval (18-25years). The likelihood that this age group was associated with a change in the Naso-Labial Fold was therefore negligible.

3. Distribution of study participants according to Facial type:**(Table 3) (Graph 2)**

Amongst the patients included in the study, 67.7% were of Mesoprosopic facial type (176 patients) followed by 20.4% Euryprosopic (53 patients) and 11.9% Leptoprosopic (31 patients) respectively.

4. Distribution of study participants according to Facial profile:**(Table 4) (Graph 3)**

There was a statistically significant distribution of study participants according to facial profile ($p=0.02$; $p<0.05$), while the convex profile (47.3%) contributed to the majority of the study participants, followed by straight (41.5%) and concave profile (11.2%) respectively.

A. Frontal view classification:

1. According to the values obtained, the NLF1 and NLF2 values ranged between 18-36 mm and 22-44 mm respectively. Therefore the Naso-Labial Fold was classified as:

NLF1	
Measurement	**Type**
18-24mm	Mild
24.1-30mm	Moderate
30.1-36mm	High

NLF2	
Measurement	**Type**
22-30mm	Mild
30.1-37mm	Moderate
37.1-44mm	High

Table D: Classification of NLF1 and NLF2

*If the NLF1 and NLF2 classification varies in a patient (Eg.1 High in NLF1 and Moderate in NLF2) then for the overall classification of the Naso-Labial Fold, the NLF2 value should be considered. (Eg.1 High in NLF1 and Moderate in NLF2 then Moderate will be the correct classification)

Mild Convexity
NLF 1= 18-24mm
NLF 2= 24-30mm

Moderate Convexity
NLF1= 24.1-30mm
NLF2= 30.1-37mm

Severe Convexity
NLF1= 30.1-37mm
NLF2= 37.1-44mm

Fig.10 Classification of the Naso-Labial Fold depending upon the extent of its convexity: Frontal View

5. Descriptive statistics of Naso-Labial Fold (NLF) on the right and left side of the study participants:**(Table 5) (Graph 4)**

The mean of left and right NLF1 values was 27.83mm (p=0.00) and 27.93mm (p=0.017) respectively, which were statistically significant. (p<0.05). The mean of left and right NLF2 values was 34.05mm (p=0.01) and 33.63mm (p=0.00) respectively, which were statistically significant. (p<0.05).

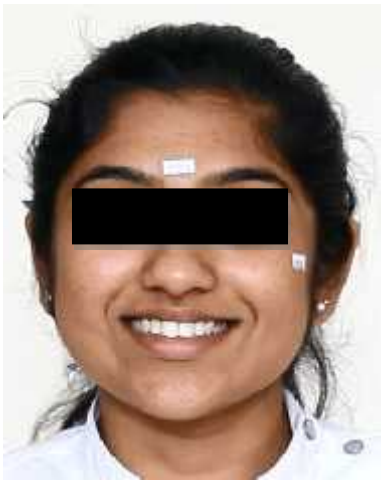
6. Distribution of study participants according to Facial view classification: **(Table 6) (Graph 5)**

7. The distribution of the Naso-Labial Fold according to its classification was statistically significant considering the extent of the fold in the frontal view (p=0.01; p<0.05). Of the patients included in the study, 53.8 % (140 patients) belonged to the moderate convexity group, followed by 29.6 % (77 patients) of the high convexity group and 16.5 % (43 patients) of the mild convexity group.

8. Distribution of study participants according to Shape:**(Table 7) (Graph 6)**

The distribution of the study participants according to the shape was statistically significant (p=0.47; p>0.05). In descending order, 23.8% of patients (62 patients) had a parabolic shape of Naso-Labial Fold, succeeded by 23.5% elliptical (61 patients); 21.2% triangular (55 patients); 18.5% Indistinct type (48 patients), and 13.1% of circular (34 patients) shape of Naso-Labial Fold respectively.

Classification according to the shape visible clinically:



CIRCULAR

TRIANGULAR/

HYPERBOLIC

ELLIPTICAL

PARABOLIC

INDISTINCT

Fig.11 Classification of NLF according to shape

C. Profile view classification:

1. Depending on the extent of upper and lower concavity the Naso-Labial Fold was classified into

UPPER (Concave up)	
Measurement	**Type**
0-4 mm	Low/Mild
4.1- 8 mm	Moderate
8.1-12 mm	High/severe

LOWER (Concave down)	
Measurement	**Type**
0-4 mm	Low/Mild
4.1- 8 mm	Moderate
8.1-12 mm	High/Severe

Table E: Classification of NLF in the upper and lower compartment in profile view

A specific Naso-Labial Fold can therefore be categorized as, for example, a participant measures 9.1 mm and 3.5 mm in the upper and lower compartment respectively, hence the classification was **High Concave up; Mild Concave down**

8. Descriptive statistics of Horizontal profile view: Upper and Lower compartment of the study participants :**(Table 8)**

Given the extent of its concavity in the upper and lower compartments, the distribution of study participants (Horizontal profile view) was statistically significant. ($p<0.05$) with a mean of 7.59mm in the upper and 4.39mm in the lower compartment respectively.

9. Distribution of study participants according to Horizontal profile view: Upper compartment:**(Table 9) (Graph 7)**

Considering the upper compartment, 48.8 % (127 patients) had a moderate concave type of Naso-Labial Fold, followed by 47.7 % (124 patients) with a

high concave type and only 3.5 % (9 patients) with a low/mild concave type of Naso-Labial Fold. The distribution of study participants according to the severity of concavity was statistically significant. ($p=0.000$; $p<0.05$)

10. Distribution of study participants according to Horizontal profile view: Lower compartment:**(Table 10) (Graph 8)**

Considering the lower compartment, 52.3% (136 patients) had a low/mild concave down type of Naso-Labial Fold, followed by 44.2% (115 patients) with a high concave down type and only 3.5% (9 patients) with a high concave down type of Naso-Labial Fold. The distribution of study participants according to extent of its concavity was statistically significant. ($p=0.001$; $p<0.05$)

11. Descriptive statistics of Vertical profile view: Upper and Lower compartment and Total of the study participants:**(Table 11) (Graph 9)**

The distribution of upper and lower vertical profile views (percent) was statistically significant ($p>0.05$), where the upper compartment contributed significantly to the study population, with an average of 14.42 compared to a lower average of 6.50 respectively. The total mean adding the values of the upper and lower compartment was 20.92.

12. Percentage comparison of Vertical profile view: Upper and Lower compartment from the Total:**(Table 12)**

The percentage distribution in the vertical dimension of the upper and lower compartments indicated that the upper compartment contributed 68.8% of the total compared to the lower compartment contributing (31.1%).

13. Distribution of study participants according to Profile view classification type:

(Table 13) (Graph 10)

The distribution of study participants comparing the extent of the concavity of the upper and lower compartments of the Naso-Labial fold in profile view was statistically significant ($p=0.00$; $p<0.05$). 70.4% (183 patients) of patients had Type I (U>L) Naso-Labial Fold, followed by 18.8% (49 patients) had Type II (U≈L) Naso-Labial Fold and 10.8% (28 patients) had the least Type III (U<L) Naso-Labial Fold.

14. Distribution of study participants according to Morphological classification:

(Table 14) (Graph 11)

The distribution of the study participants according to the morphological classification was statistically significant. ($p=0.032$; $p>0.05$).In the distribution, the complex form (45.4 %) contributed primarily, while the form of simple skin type(5.6 %) was least seen. Accordingly, bone retrusion type (28%), fat pad type (13.8%), and muscle type (8.1%) contributed to the distribution.

D. Depending on the extent of the concavity of the upper compartment relative to the extent of the concavity of the lower compartment, the Naso-Labial Fold was divided into three types. (PVC-Profile View Classification)

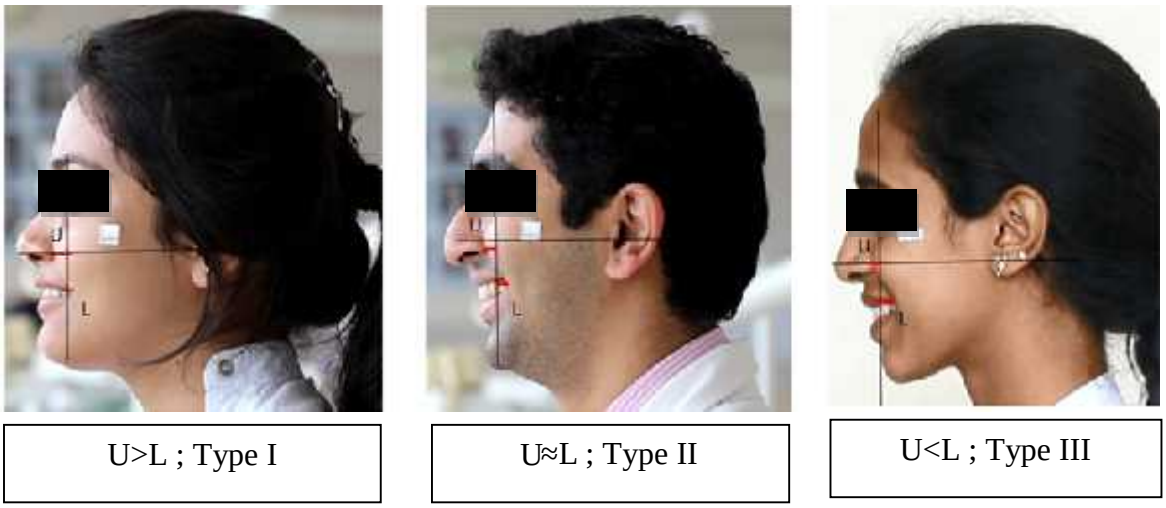
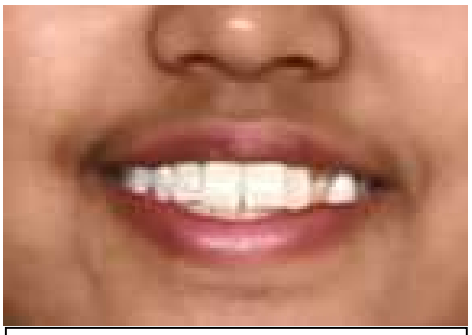


Fig 12 Classification of NLF according to its extent of the upper and lower compartment in the vertical dimension

- When the extent of the concavity of the upper compartment was more than the lower compartment (U>L), the Naso-Labial Fold was classified as **Type I.**
- The Naso-Labial Fold was graded as **Type II** if the concavity of the upper compartment was approximately equal to the lower compartment (U≈L) or the upper and lower compartment values differed by less than 1 mm. (For example if a patient had U= 5.3mm and L= 5.8mm then it was classified as Type II)
- When the extent of the concavity of the upper compartment was less than the lower compartment (U<L), the Naso-Labial Fold was classified as **Type III.**

E. Classification according to the morphological of NLF:

Skin Type



Fat pad Type

Muscular Type

Bone Retrusion Type

Complex Type

Fig 13 Classification of NLF according to its morphology

F. **CONVEXITY OF NASO-LABIAL FOLD:**

It was classified depending on the extent of convexity of the Naso-Labial Fold with respect to the facial plane.

Amount of convexity (in degrees)	**Type**
5-20°	Low convexity
20-30 °	Moderate convexity
30-45 °	High convexity

Table F: Classification of the angle of convexity

15. Distribution of study participants according to Angle of Convexity:

(Table 15)(Graph 12)

The distribution of the participants in the study according to the Naso-Labial Fold convexity angle in the profile view was statistically significant. ($p=0.003$; $p<0.05$)

The highest 53.1% patients (138) accounted for the moderate type of convexity, followed by 29.6% (77), which indicated low/mild convexity and 17.3% (45) which suggested high convexity type of Naso-Labial Fold respectively.

Correlations:-

a.) NLF classification correlation:

16. Comparison between Mean difference NLF Right side and Left side:

(Table 16) (Graph 13)

There was no statistically significant comparison between the right and left sides of the Naso-Labial Fold (NLF1 and NLF2) ($p>0.05$).

17. Correlation between NLF Right side and Left side and Gender: **(Table 17) (Graph 14)**

There was a statistically significant correlation between right and left (NLF1 and NLF2) and gender (NLF1; $p=0.003$; $p<0.05$), (NLF2; $p=0.021$; $p<0.05$).

In males, the NLF1 value on the right side (28.56) was slightly more than the left side. (28.54) and again NLF2 value on the right side (34.68) was slightly greater than the left side(35.14) respectively.

In females, the NLF1 value on the right side (27.28) was slightly more than the left side (27.09) and the NLF2 value on the left side (32.92) was slightly greater than the right side (32.55) respectively.

18. Correlation between NLF Classification and Gender:**(Table 18) (Graph 15)**

In the frontal view classification, the correlation of the extent of NLF with gender was statistically significant. ($p=0.009$; $p<0.05$), where the majority of the high type was distributed in males (64.93%) compared to females (35.07%) and most of the mild type was distributed in females (60.46%) as compared to males (39.54%). The maximum number of male and female participants contributed to a moderate type of Naso-Labial Fold.

19. Correlation between NLF Classification and Facial type:**(Table 19) (Graph 16)**

The correlation of NLF classification with facial type was statistically significant (p=0.00; p<0.05), in which most of the high type belonged to the Mesoprosopic facial type (74.02%) and the mild type considerably belonged to the Euryprosopic facial type (51.16%). All the facial types accounted maximally for the moderate type of nasolabial fold.

20. Correlation between NLF Classification and Shape:**(Table 20) (Graph 17)**

The correlation of NLF classification with the shape of Naso-Labial Fold was statistically significant (p=0.00; p<0.05), in which the maximum number of high type was seen with elliptical shape (68.29%), a considerable amount of mild type was seen with circular (48.8%) and parabolic shape (46.6%) respectively. The maximum number of moderate types was concentrated in indistinct (30.82%) and parabolic shape (30.82%) respectively. The circular and parabolic type had none of the high types whereas elliptical and hyperbolic had none of the mild types of Naso-Labial Fold.

21. Correlation between NLF Classification and Morphological classification:

(Table 21) (Graph 18)

The NLF classification correlation with the morphological classification was statistically significant. (p=0.00; p<0.05), where the maximum number of high (41.3%), moderate (38.5%), and low (78.5%) was concentrated in a complex type of Naso-Labial Fold. Fat pad type(4%) and simple skin type (4%) had a minimum number of high type Naso-Labial Fold, whereas simple skin type (2.3%), muscular type (4.6%), and bone retrusion type (7.1%) had least

number of mild Naso-Labial Fold respectively. Muscular type (2.1%) was seen least in moderate Naso-Labial Fold.

22. Vertical profile: Upper compartment (%) and NLF classification: **(Table 22) (Graph 19)**

The NLF classification correlation with the vertical profile-upper compartment (%) was statistically significant. ($p=0.00$; $p<0.05$), where the upper compartment contributes a maximum 77%-96% in the moderate type, followed by 57%-76% in mild type and least 36%-56% in high type respectively.

23. Correlation between NLF classification and Horizontal profile: Upper compartment:

(Table 23)(Graph 20)

The correlation of the NLF classification with the classification of the horizontal profile-upper compartment ($p=0.00$) and lower compartment (0.005) was statistically significant. ($p<0.05$) where all three horizontal classification types, i.e. mild, moderate and high, are maximally distributed in the moderate classification of the NLF typeNone of the high and mild NLF classification types belong to the horizontal profile lower compartment classification of the low/mild type.

24. Correlation between NLF classification and Horizontal profile: Lower compartment:**(Table 24) (Graph 21)**

And all three types of horizontal classification i.e mild, moderate, and high were maximally distributed in moderate type NLF classification.

None of the high and mild types of NLF classification belonged to a high type of horizontal profile lower compartment classification.

b.) Shape classification correlation:

25. Correlation between Gender and Shape classification: **(Table 25) (Graph 22)**

The correlation of shape with gender was statistically significant.($p=0.009$; $p<0.05$), in which the male population contributed maximally to elliptical type (40.1%) and the female population accounted maximally for triangular/hyperbolic type. (36.7%) respectively. Male participants contributed least to circular (4.5%) and triangular type (6%) whereas female participants contributed least to elliptical type. (6.2%)

26. Correlation between Facial type and Shape classification:**(Table 26) (Graph 23)**

The correlation of shape with facial type was statistically significant ($p=0.000$; $p<0.05$), in which Euryprosopic facial type accounted for all circular type NLFs, while Leptoprosopic facial type accounted for the maximum number of elliptical (54.8%) and triangular/hyperbolic type (45.1%) and Mesoprosopic facial type accounted mostly for parabolic type (46%) respectively. Euryprosopic facial type was devoid of elliptical and indistinct shape whereas, Leptoprosopic was devoid of circular, Indistinct, and parabolic shape followed by Mesoprosopic devoid of circular shape.

27. Correlation between Facial profile and Shape classification:**(Table 27) (Graph 24)**

The correlation of shape with facial profile was statistically significant.($p=0.000$; $p<0.05$), in which concave profile accounted in parabolic (62%) and hyperbolic/triangular shape (38%), whereas convex profile was distributed in all shapes, seen more in triangular/hyperbolic (35.7%) and elliptical shape (32.5%) followed by straight profile seen mostly in parabolic

(36.1%) and indistinct shape. (28.7%). The concave profile lacked circular, elliptical, and indistinct shape whereas the straight profile lacked triangular shape.

28. Correlation between Morphological classification and Shape classification:

(Table 28) (Graph 25)

The correlation of shape with morphological classification was statistically significant. ($p=0.000$; $p<0.05$), in which complex type was most common in circular (35.2%), elliptical (55.3%), and parabolic shape. (67.7%). Bone retrusion was common in indistinct (68%) and triangular/hyperbolic shape (48.2%) respectively. Parabolic shape was not seen in bone retrusion, muscular, and simple skin type. The indistinct shape was not visible in fat pad type and simple skin type, whereas the fat pad type was devoid of elliptical shape and the muscular type was devoid of circular shape respectively.

c.) **Morphological classification correlation:**

29. Correlation between Gender and Morphological classification:**(Table 29) (Graph 26)**

The correlation of morphology of nasolabial fold with gender was statistically significant.($p=0.000$; $p<0.05$), in which male participants contributed maximally to complex and muscular type whereas female participants contributed considerably to Bone retrusion, fat pad, and simple skin type respectively.

30. Correlation between Facial type and Morphological classification: **(Table 30) (Graph 27)**

The correlation of morphology of nasolabial fold with facial type was statistically significant. ($p=0.000$; $p<0.05$), in which bone retrusion (76.7%),

fat pad (55.5%), and complex type (74.5%) was most commonly found in Mesoprosopic facial type, whereas muscular type (57.1%) was most commonly seen in Leptoprosopic and simple skin type (58.3%) was most commonly seen in Euryprosopic facial type respectively. Euryprosopic was devoid of muscular type and Leptoprosopic was devoid of fat pad type.

d.) Horizontal profile view correlations:

31. Correlation between Gender and Horizontal profile: Upper compartment:

(Table 31) (Graph 28)

The correlation of the upper compartment (Horizontal profile) of the nasolabial fold with gender was statistically significant.($p=0.000$; $p<0.05$), in which male participants dominated in moderate type (55.1%) whereas female participants dominated maximally in mild (88.8%) and slightly in high type (50.8%) compared to male participants respectively.

32. Correlation between Gender and Horizontal profile: Lower compartment:

(Table 32) (Graph 29)

The correlation of the lower compartment (Horizontal profile) of the nasolabial fold with gender was statistically significant.($p=0.000$; $p<0.05$), in which male participants dominated in moderate type (61.7%) whereas female participants dominated maximally in high (88.8%) and slightly in mild type (55.8%) compared to male participants respectively.

33. Correlation between Facial type and Horizontal profile: Upper compartment:

(Table 33) (Graph 30)

The correlation of the upper compartment (Horizontal profile) of the nasolabial fold with facial type was statistically significant. ($p=0.000$; $p<0.05$),

in which moderate type was commonly seen in Euryprosopic (71.6%) and Leptoprosopic facial type (38.7%). In Mesoprosopic, (56.2%) high type dominated and the mild type was seen only in Leptoprosopic facial type.

34. Correlation between Facial type and Horizontal profile: Lower compartment:

(Table 34) (Graph 31)

The correlation of the lower compartment (Horizontal profile) of the nasolabial fold with facial type was statistically significant. ($p=0.000$; $p<0.05$), where the moderate type was commonly seen in Euryprosopic (58.4%) and Leptoprosopic facial type (54.8%). In Mesoprosopic, (71.9%) mild type dominated and the high type was seen only in Leptoprosopic facial type.

35. Correlation between Facial profile and Horizontal profile: Upper compartment:

(Table 35) (Graph 32)

The correlation of the upper compartment (Horizontal profile) of the nasolabial fold with facial type was statistically significant.($p=0.000$; $p<0.05$), in which the concave profile was seen only in high type. The moderate type was most commonly seen in convex (55.2%) and straight profile (54.6%).

36. Correlation between Facial profile and Horizontal profile: Lower compartment:

(Table 36) (Graph 33)

The correlation of the lower compartment (Horizontal profile) of the nasolabial fold with facial type was statistically significant ($p=0.000$; $p<0.05$), in which the concave profile was seen only in high type. Mild type (47.9 percent) dominated slightly in the convex profile over moderate type (44.75),

while moderate type (55.5 percent) dominated in the straight profile over mild type (45.4 percent).

37. Vertical profile: Upper compartment (%) and Horizontal Upper compartment:

(Table 37) (Graph 34)

The correlation of the upper compartment (Horizontal profile) of the nasolabial fold with vertical profile-upper compartment (%) was statistically significant. ($p=0.00$; $p<0.05$), where the upper compartment contributed a maximum of 36%-56% in the moderate type followed by 57%-76% and 77 % - 96% in high type respectively. Low type was seen only in 36%-56% category.

38. Vertical profile: Upper compartment (%) and Horizontal lower compartment:

(Table 38) (Graph 35)

The correlation of lower compartment (Horizontal profile) of the nasolabial fold with vertical profile-lower compartment (%) was statistically significant. ($p=0.00$; $p<0.05$), where the upper compartment contributed a maximum 36%-56% in the moderate type, followed by 57%-76% and 77 % - 96% in mild type respectively. High type was seen only in a 36%-56% category.

39. Correlation between Angle of convexity and Horizontal profile: Upper compartment:

(Table 39) (Graph 36)

The correlation of the upper compartment (Horizontal profile) of the nasolabial fold with the angle of convexity was statistically significant. ($p=0.00$; $p<0.05$), where moderate (54.3%) and high type (55.6%) were seen mostly in 20-30 degrees moderate convexity. Low type was found only in 5-20 degrees low convexity.

40. Correlation between Angle of convexity and Horizontal profile: Lower compartment:

(Table 40) (Graph 37)

The correlation of the lower compartment (Horizontal profile) of the nasolabial fold with the angle of convexity was statistically significant. ($p=0.00$; $p<0.05$), where low (54.3%) and moderate type (55.6%) were seen mostly in 20-30 degrees Moderate convexity. High type was found only in 5-20 degrees low convexity.

41. Correlation between horizontal profile view and vertical profile view:

(Table 41)

There was a statistically significant correlation between the horizontal profile view and vertical profile view ($p=0.00$; $p<0.05$), where both were positively related to each other with the Pearson's constant for the upper compartment of both ($R=0.484$) and lower compartment of both (0.587) respectively.

e.) Facial profile type correlations:

42. Correlation between Gender and Facial profile:**(Table 42) (Graph 38)**

The correlation of facial profile with gender was not statistically significant. ($p=0.67$; $p>0.05$). The convex profile was predominantly seen in males and females followed by straight profile respectively.

43. Correlation between Facial type and Facial profile: (**Table 43) (Graph 39)**

The correlation of facial profile with facial type was statistically significant ($p=0.00$; $p<0.05$). In the Euryprosopic facial type, a convex profile (49%) was majorly seen followed by a straight profile. (39.6%). InLeptoprosopic, only a

convex profile was seen, while a straight profile (49.4%) dominated in Mesoprosopic facial type.

44. Correlation between Angle of convexity and Facial profile: (**Table 44) (Graph 40)**

The correlation of facial profile with an angle of convexity was statistically significant. ($p=0.00$; $p<0.05$), where the concave profile was seen only in 20-30 degrees moderate convexity category, while convex (42.2%) and straight profile (47.2%) was also predominantly seen in 20-30 degrees moderate convexity followed by 5-20 degrees low convexity and 30-45 degrees high convexity respectively.

e.) The angle of convexity correlations:

45. Correlation between G-Sn-Pog and Angle of convexity:**(Table 45)**

There was a positive correlation between the angle of convexity and G-Sn-Pg which was statistically significant ($p=0.00$; $p<0.05$) with Pearson's constant ($R=0.48$) respectively.

46. Correlation between Angle of convexity and Facial profile:**(Table 46)**

There was a statistically significant correlation between the angle of convexity and the upper and lower compartment vertical profile view (%) ($p=0.001$; $p<0.05$) and there was a positive correlation for the upper compartment with the Pearson's constant $R=0.31$ and the lower compartment with $R=0.51$ respectively.

47. Vertical profile: Upper compartment (%) and PVC type: **(Table 47) (Graph 41)**

The correlation between the type of PVC and the upper compartment of the vertical profile view (percent) was statistically significant ($p=0.00$; $p<0.05$), where Type II and Type III fell entirely into the upper compartment category of 36 %-56 %.

Type I as a whole fell in the 77%-96% category followed by 57%-76% category respectively.

48. Correlation between NLF classification and Profile view classification (PVC type):

(Table 48)(Graph 42)

The correlation between PVC type and NLF classification was statistically significant ($p=0.00$; $p<0.05$), where Type I was majorly distributed in moderate type (60.6%) of NLF followed by mild (20.7%) and then high (18.5%) respectively. Type II was mostly distributed in high type (59.8%) followed by a moderate type. (30.6%) while Type III was equally distributed in the high and moderate type of NLF respectively.

Tables

1. Distribution of the study participants according to Gender:

Gender		Frequency (n)	Percentage (%)
	Male	132	50.76
	Female	128	49.24
	Total	260	100.0

2. Mean age of the participants in the study:

	Minimum	Maximum	Mean	Std. Deviation
Age (in years)	18.00	25.00	21.43	2.20

3. Distribution of study participants according to Facial type:

Facial type		Frequency (n)	Percentage (%)	p-value
	Euryprosopic	53	20.4	.000*
	Leptoprosopic	31	11.9	
	Mesoprosopic	176	67.7	
	Total	260	100.0	

*p-value <0.05 statistically significant

4. Distribution of study participants according to Facial profile:

Facial profile		Frequency (n)	Percentage (%)	p-value
	Concave	29	11.2	.02*
	Convex	123	47.3	
	Straight	108	41.5	
	Total	260	100.0	

*p-value<0.05 statistically significant

5. Descriptive statistic of Naso-Labial Fold (NLF) on right and left side of the study participants:

	Minimum	**Maximum**	**Mean**	**Std. Deviation**	**p-value**
Right NLF1	19.30	35.20	27.93	3.86	.017*
Right NLF2	22.20	42.50	33.63	3.78	.000*
Left NLF1	20.60	36.60	27.83	3.59	.000*
Left NLF2	23.70	41.80	34.05	3.84	.001*

*p-value<0.05 statistically significant

6. Distribution of study participants according to Frontal view classification (NLF classification):

FVC		Frequency (n)	Percentage (%)	p-value
	High	77	29.6	.001*
	Mild	43	16.5	
	Moderate	140	53.8	
	Total	260	100.0	

*p-value <0.05 statistically significant

7. Distribution of study participants according to Shape:

Shape		Frequency (n)	Percentage (%)	p-value
	Circular	34	13.1	.047*
	Elliptical	61	23.5	
	Indistinct	48	18.5	
	Parabolic	62	23.8	
	Triangular	55	21.2	
	Total	260	100.0	

*p-value <0.05 statistically significant

8. Descriptive statistics of Horizontal profile view: Upper and Lower compartment of the study participants:

	Minimum	**Maximum**	**Mean**	**Std. Deviation**	**p-value**
Horizontal profile: Upper	3.30	11.60	7.59	1.85	.010*
Horizontal profile: Lower	.80	8.10	4.39	1.90	.000*

*p-value <0.05 statistically significant

9. Distribution of study participants according to Horizontal profile view: Upper compartment:

Horizontal profile view: Upper compartment		**Frequency (n)**	**Percentage (%)**	**p-value**
	0-4mm Low/Mild	9	3.5	.000*
	4.1-8mm Moderate	127	48.8	
	8.1-12 mm High	124	47.7	
	Total	260	100.0	

*p-value <0.05 statistically significant

10. Distribution of study participants according to Horizontal profile view: Lower compartment:

Horizontal profile view: Lower compartment		Frequency (n)	Percentage (%)	p-value
	0-4mm Low/Mild	136	52.3	.001*
	4.1-8mm Moderate	115	44.2	
	8.1-12 mm High	9	3.5	
	Total	260	100.0	

*p-value <0.05 statistically significant

11. Descriptive statistics of Vertical profile view: Upper and Lower compartment and Total of the study participants:

	Minimum	Maximum	Mean	Std. Deviation	p-value
Vertical Profile Upper	8.10	22.70	14.42	4.03	.000*
Vertical profile Lower	1.30	13.80	6.50	3.34	.001*
Vertical profile Total	14.50	25.50	20.92	2.57	0.02*

*p-value <0.05 statistically significant

12. Percentage comparison of Vertical profile view: Upper and Lower compartmentfrom the Total:

Vertical Profile **(% comparison from Total)**	**Mean percentage**
Upper compartment	68.85%
Lower compartment	31.17%

13. Distribution of study participants according to Profile view classification type:

PVC type		**Frequency (n)**	**Percentage (%)**	**p-value**
	Type I U>L	183	70.4	.000*
	Type II U=L	49	18.8	
	Type III U<L	28	10.8	
	Total	260	100.0	

*p-value <0.05 statistically significant

14. Distribution of study participants according to Morphological classification:

Morphological classification		Frequency (n)	Percentage (%)	p-value
	Bone Retrusion type	73	28.07	.032*
	Fat pad type	36	13.8	
	Complex type	118	45.4	
	Muscular type	21	8.1	
	Skin type	12	4.61	
	Total	260	100.0	

*p-value <0.05 statistically significant

15. Distribution of study participants according to Angle of Convexity:

Angle of convexity		Frequency (n)	Percentage (%)	p-value
	5-20 degrees Low Convexity	77	29.6	.003*
	20-30 degrees Moderate Convexity	138	53.1	
	30-45 degrees High Convexity	45	17.3	
	Total	260	100.0	

*p-value <0.05 statistically significant

16. Comparison betweenNLF Right side and Left side

NLF Right side and Left side comparison		Unpaired t-test		
		Mean Difference	t value	p-value
NLF1	**Right**	.09923	.303	.762
	Left			
NLF2	**Right**	-.41769	-1.248	.213
	Left			

*p-value<0.05 statistically significant

17. Correlation betweenNLF Right side and Left side and Gender

Mean NLF Right side and Left side		Gender		
		Males	Females	p-value
NLF1	**Right**	28.56	27.28	0.003*
	Left	28.54	27.09	
NLF2	**Right**	34.68	32.55	0.021*
	Left	35.14	32.92	

*p-value <0.05 statistically significant

18. Correlation between NLF Classification and Gender:

		NLF Classification			Total	P-value
		High	**Mild**	**Moderate**		
Gender	**Male**	50	17	65	132	.009*
	Female	27	26	75	128	
Total		77	43	140	260	

*p-value <0.05 statistically significant

19. Correlation between NLF Classification and Facial type:

		NLF Classification			Total	P-value
		High	**Mild**	**Moderate**		
Facial type	**Euryprosopic**	0	26	27	53	.000*
	Leptoprosopic	12	0	19	31	
	Mesoprosopic	65	17	94	176	
Total		77	43	140	260	

*p-value <0.05 statistically significant

20. Correlation between NLF Classification and Shape:

		NLF Classification			Total	P-value
		High	Mild	Moderate		
Shape	**Circular**	0	22	12	34	.000*
	Elliptical	56	0	5	61	
	Indistinct	5	2	41	48	
	Parabolic	0	21	41	62	
	Hyperbolic	21	0	34	55	
Total		82	45	133	260	

*p-value <0.05 statistically significant

21. Correlation between NLF Classification and Morphological classification:

		NLF Classification			Total	P-value
		High	Mild	Moderate		
Morphological classification	**Bone Retrusion type**	22	3	48	73	.000*
	Fat pad type	3	9	24	36	
	Complex type	31	33	54	118	
	Muscular type	16	2	3	21	
	Simple skin type	3	1	8	12	
Total		75	42	140	260	

*p-value <0.05 statistically significant

22. Vertical profile: Upper compartment (%) and NLF classification:

		NLF classification			Total	P-value
		High	**Mild**	**Moderate**		
Vertical profile: Upper compartment (%)	**36% - 56%**	43	5	29	77	.000*
	57% - 76 %	34	21	24	79	
	77 % - 96%	0	17	87	104	
Total		77	43	140	260	

*p-value <0.05 statistically significant

23. Correlation between NLF classification and Horizontal profile: Upper compartment:

		Horizontal profile: Upper compartment			Total	p-value
		0-4mm Low/Mild	**4.1-8mm Moderate**	**8.1-12 mm High**		
NLF Classification	**High**	0	52	25	77	.000*
	Mild	0	17	26	43	
	Moderate	9	58	73	140	
Total		9	127	124	260	

24. Correlation between NLF classification and Horizontal profile : Lower compartment:

		Horizontal profile:Lower compartment			Total	p-value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High		
NLF Classification	High	34	43	0	77	.005
	Mild	21	22	0	43	
	Moderate	81	50	9	140	
Total		136	115	9	260	

*p-value <0.05 statistically significant

25. Correlation between Gender and Shape classification:

		Shape					Total	P-value
		Circular	Elliptical	Indistinct	Parabolic	Hyperbolic		
Gender	Male	6	53	32	33	8	132	.000*
	Female	28	8	16	29	47	128	
Total		34	61	48	62	55	260	

*p-value<0.05 statistically significant

26. Correlation between Facial type and Shape classification:

		Shape					Total	P-value
		Circular	Elliptical	Indistinct	Parabolic	Hyperbolic		
Facial type	**Euryprosopic**	34	0	0	4	15	53	.000*
	Leptoprosopic	0	17	0	0	14	31	
	Mesoprosopic	0	44	48	58	26	176	
Total		34	61	48	62	55	260	

*p-value<0.05 statistically significant

27. Correlation between Facial profile and Shape classification :

		Shape					Total	P-value
		Circular	Elliptical	Indistinct	Parabolic	Hyperbolic		
Facial profile	**Concave**	0	0	0	18	11	29	.000*
	Convex	17	40	17	5	44	123	
	Straight	17	21	31	39	0	108	
Total		34	61	48	62	55	260	

*p-value<0.05 statistically significant

28. Correlation between Morphological classification and Shape classification :

		Shape						P-value
		Circular	Elliptical	Indistinct	Parabolic	Hyperbolic	Total	
Morphological classification	**Bone Retrusion**	5	6	34	0	28	73	.000*
	Fat pad	10	0	0	20	6	36	
	Complex	12	31	14	42	19	118	
	Muscular	0	16	2	0	3	21	
	Simple skin	7	3	0	0	2	12	
Total		34	56	50	62	58	260	

*p-value<0.05 statistically significant

29. Correlation between Gender and Morphological classification:

		Morphological classification					Total	P-value
		Bone Retrusion type	Fat pad type	Complex type	Muscular type	Simple skin type		
Gender	**Male**	29	12	67	19	5	132	.000*
	Female	44	24	51	2	7	128	
Total		73	36	118	21	12	260	

*p-value<0.05 statistically significant

30. Correlation between Facial type and Morphological classification

		Morphological classification						
		Bone Retrusion type	**Fat pad type**	**Complex type**	**Muscular type**	**Skin skin type**	**Total**	**P-value**
Facial type	**Euryprosopic**	14	16	16	0	7	53	.000*
	Leptoprosopic	3	0	14	12	2	31	
	Mesoprosopic	56	20	88	9	3	176	
Total		73	36	118	21	12	260	

*p-value<0.05 statistically significant

31. Correlation between Gender and Horizontal profile: Upper compartment

		Horizontal profile view: Upper compartment			Total	P-value
		0-4mm Low/Mild	**4.1-8mm Moderate**	**8.1-12 mm High**		
Gender	**Male**	1	70	61	132	.034*
	Female	8	57	63	128	
Total		9	127	124	260	

*p-value<0.05 statistically significant

32. Correlation between Gender and Horizontal profile: Lower compartment:

		Horizontal profile view: Lower compartment			Total	P-value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High		
Gender	**Male**	60	71	1	132	.001*
	Female	76	44	8	128	
Total		136	115	9	260	

*p-value<0.05 statistically significant

33. Correlation between Facial type and Horizontal profile: Upper compartment:

		Horizontal profile view: Upper compartment			Total	P-value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High		
Facial type	**Euryprosopic**	0	38	15	53	.000*
	Mesoprosopic	9	12	10	31	
	Leptoprosopic	0	77	99	176	
Total		9	127	124	260	

*p-value<0.05 statistically significant

34. Correlation between Facial type and Horizontal profile: Lower compartment

		Horizontal profile view: Lower compartment			**Total**	**P-value**
		0-4mm Low/Mild	**4.1-8mm Moderate**	**8.1-12 mm High**		
Facial type	**Euryprosopic**	22	31	0	53	.000*
	Mesoprosopic	5	17	9	31	
	Leptoprosopic	109	67	0	176	
Total		136	115	9	260	

*p-value<0.05 statistically significant

35. Correlation between Facial profile and Horizontal profile: Upper compartment:

		Horizontal profile view: Upper compartment			Total	P value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High		
Facial profile	Concave	0	0	29	29	.000*
	Convex	9	68	46	123	
	Straight	0	59	49	108	
Total		9	127	124	260	

*p-value<0.05 statistically significant

36. Correlation between Facial profile and Horizontal profile: Lower compartment:

		Horizontal profile view: Lower compartment			Total	P-value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High		
Facial profile	Concave	29	0	0	29	.000*
	Convex	59	55	9	123	
	Straight	48	60	0	108	
Total		136	115	9	260	

*p-value<0.05 statistically significant

37. Vertical profile: Upper compartment (%) and Horizontal Upper compartment:

		Horizontal Upper compartment			Total	P-value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High		
Vertical profile: Upper compartment (%)	36% - 56%	9	68	0	77	.000*
	57% - 76%	0	21	58	79	
	77 % -96%	0	38	66	104	
Total		9	127	124	260	

*p-value<0.05 statistically significant

38. Vertical profile: Upper compartment (%) and Horizontal lower compartment:

		Hori L			Total	P-value
		0-4mm Low/Mild	**4.1-8mm Moderate**	**8.1-12 mm High**		
Vertical profile: Upper compartment (%)	**36% - 56%**	0	68	9	77	.000*
	57% - 76%	74	5	0	79	
	77 % -96%	62	42	0	104	
Total		136	115	9	260	

*p-value<0.05 statistically significant

39. Correlation between Angle of convexity and Horizontal profile: Upper compartment

		Horizontal profile: Upper compartment				
		0-4mm Low/Mild	**4.1-8mm Moderate**	**8.1-12 mm High**	**Total**	**p-value**
Angle of convexity	**5-20 degrees Low convexity**	9	32	36	77	0.03*
	20-30 degrees Moderate convexity	0	69	69	138	
	30-45 degrees High convexity	0	26	19	45	
Total		9	127	124	260	

*p-value<0.05 statistically significant

40. Correlation between Angle of convexity and Horizontal profile: Lower compartment

		Horizontal profile: Upper compartment				P-value
		0-4mm Low/Mild	4.1-8mm Moderate	8.1-12 mm High	Total	
Angle of convexity	**5-20 degrees Low convexity**	33	35	9	77	.000*
	20-30 degrees Moderate convexity	68	70	0	138	
	30-45 degrees high convexity	35	10	0	45	
Total		136	115	9	260	

*p-value<0.05 statistically significant

41. Correlation between horizontal profile view and vertical profile view

	Horizontal profile (Pearson's R)			p-value
		Upper compartment	Lower compartment	
Vertical profile	**Upper compartment**	0.484	-	0.000*
	Lower compartment	-	0.587	0.001*

*p-value<0.05 statistically significant

42. Correlation between Gender and Facial profile:

		Facial profile			Total	P-value
		Concave	**Convex**	**Straight**		
Gender	**Male**	16	59	57	132	.675
	Female	13	64	51	128	
Total		29	123	108	260	

*p-value<0.05 statistically significant

43. Correlation between Facial type and Facial profile :

		Facial profile			Total	P-value
		Concave	**Convex**	**Straight**		
Facial type	**Euryprosopic**	6	26	21	53	.000*
	Leptoprosopic	0	31	0	31	
	Mesoprosopic	23	66	87	176	
Total		29	123	108	260	

*p-value<0.05 statistically significant

44. Correlation between Angle of convexity and Facial profile:

		Facial profile			Total	P-value
		Concave	**Convex**	**Straight**		
Angle of convexity	**5-20 degrees Low convexity**	0	45	32	77	.000*
	20-30 degrees Moderate convexity	29	52	57	138	
	30-45 degrees high convexity	0	26	19	45	
Total		29	123	108	260	

*p-value<0.05 statistically significant

45. Correlation between G-Sn-Pog and Angle of convexity:

		G-Sn-Pog (Pearson's R)	p-value
Angle of convexity	**5-20 degrees Low convexity**	0.484	0.000*
	20-30 degrees Moderate convexity		
	30-45 degrees high convexity		

*p-value<0.05 statistically significant

46. Correlation between Angle of convexity and Facial profile:

		Vertical profile view (%) (Pearson's R)		P-value
		Upper compartment	Lower compartment	
Angle of convexity	**5-20 degrees Low convexity**	0.315	0.551	.010*
	20-30 degrees Moderate convexity			
	30-45 degrees high convexity			

*p-value<0.05 statistically significant

47. Vertical profile: Upper compartment (%) and PVC type:

		PVC type			Total	P-value
		Type I U>L	Type II U=L	Type III U<L		
Vertical profile: Upper compartment (%)	**36% - 56%**	0	49	28	77	.000*
	57% - 76 %	79	0	0	79	
	77 % - 96%	104	0	0	104	
Total		183	49	28	260	

*p-value<0.05 statistically significant

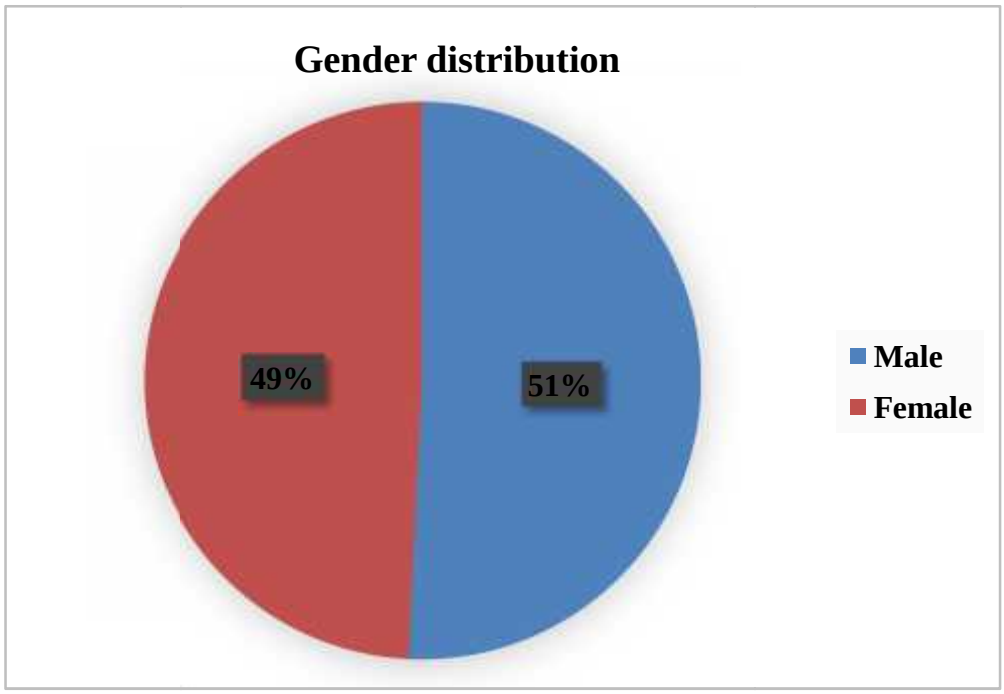
48. Correlation between NLF classification and Profile View Classification type:

		PVC type			Total	P-value
		Type I U>L	**Type II U=L**	**Type III U<L**		
NLF Classification	**High**	34	29	14	77	.000*
	Mild	38	5	0	43	
	Moderate	111	15	14	140	
Total		183	49	28	260	

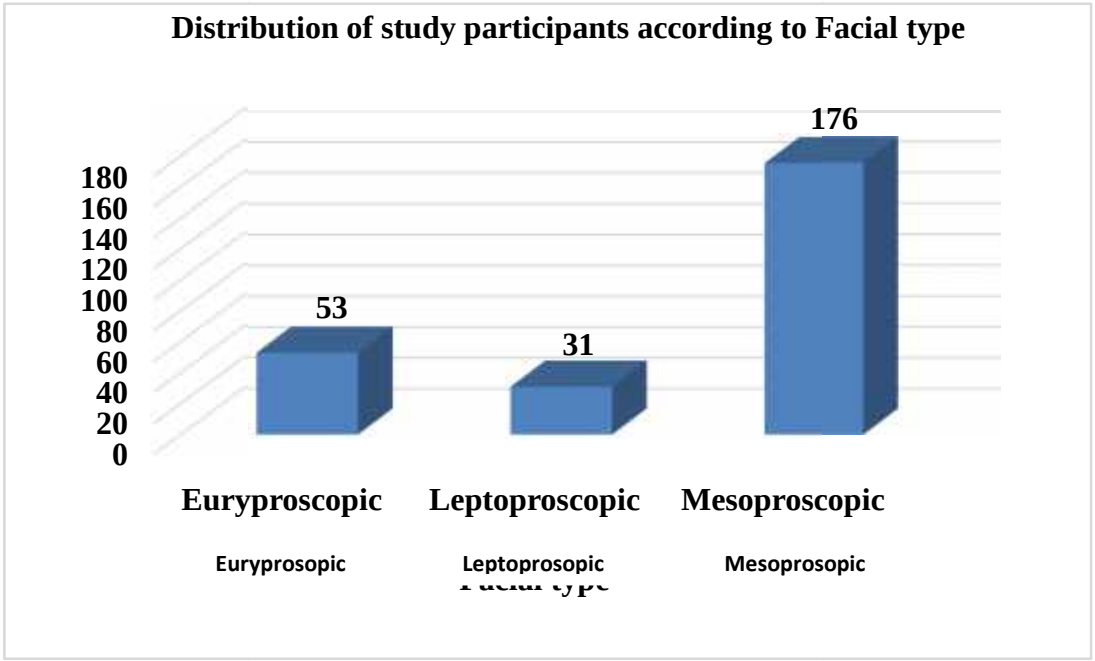
*p-value<0.05 statistically significant

Graphs and charts

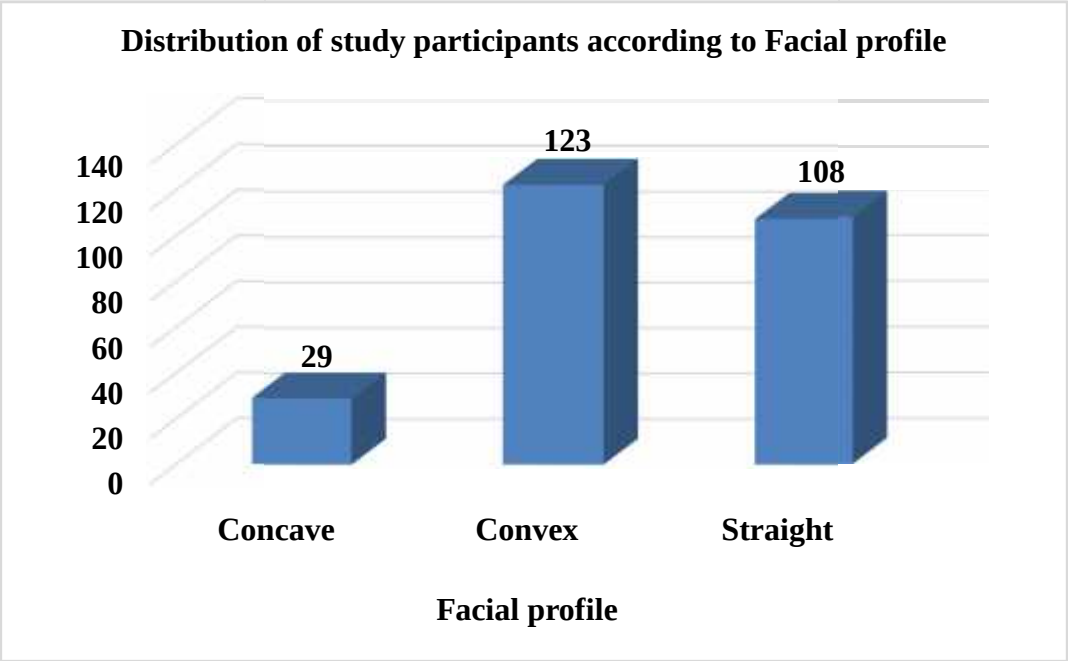
1. Gender distribution



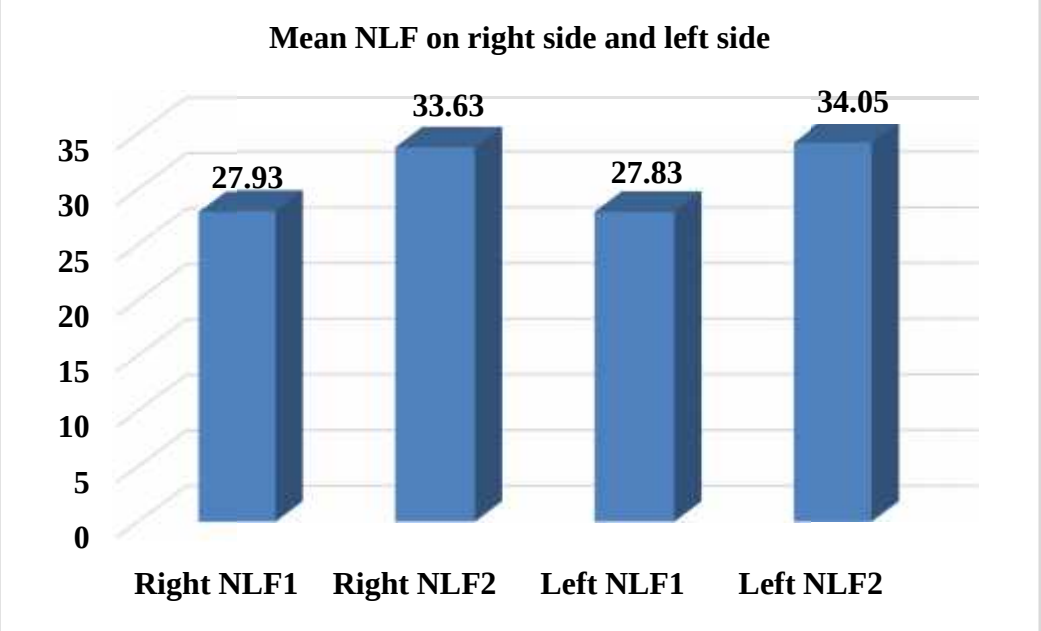
2. Distribution of study participants according to Facial type:



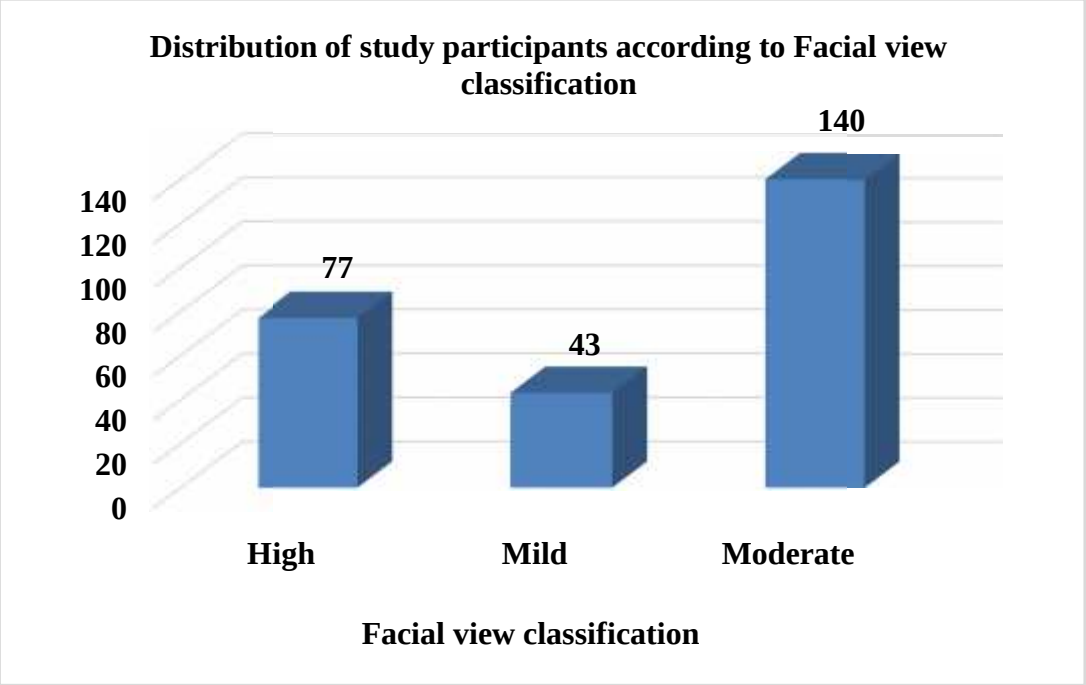
3. Distribution of study participants according to Facial profile:



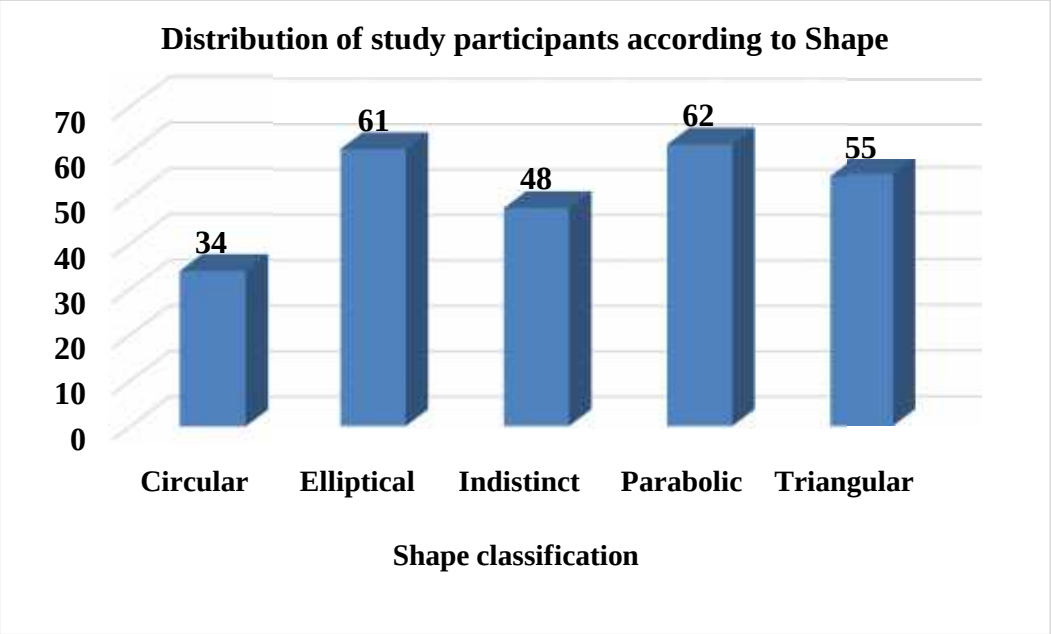
4. Mean NLF on the right side and left side:



5. Distribution of study participants according to Facial view classification:

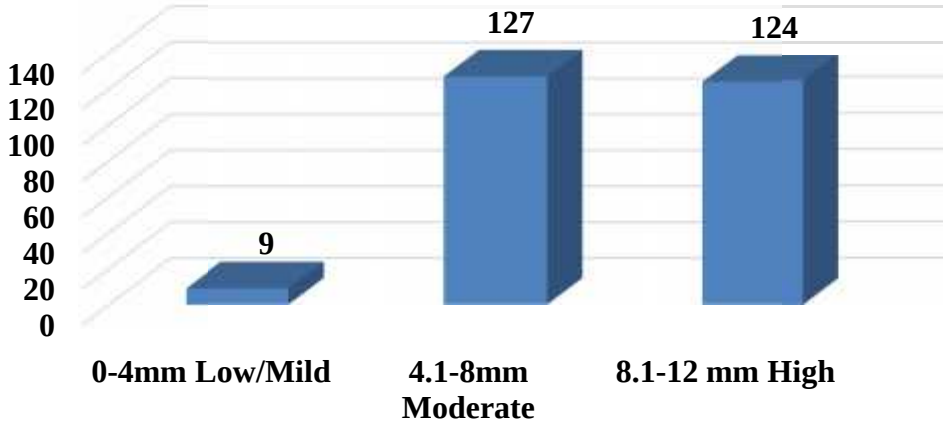


6. Distribution of study participants according to Shape:



7. **Distribution of study participants according to Horizontal profile view: Upper compartment**

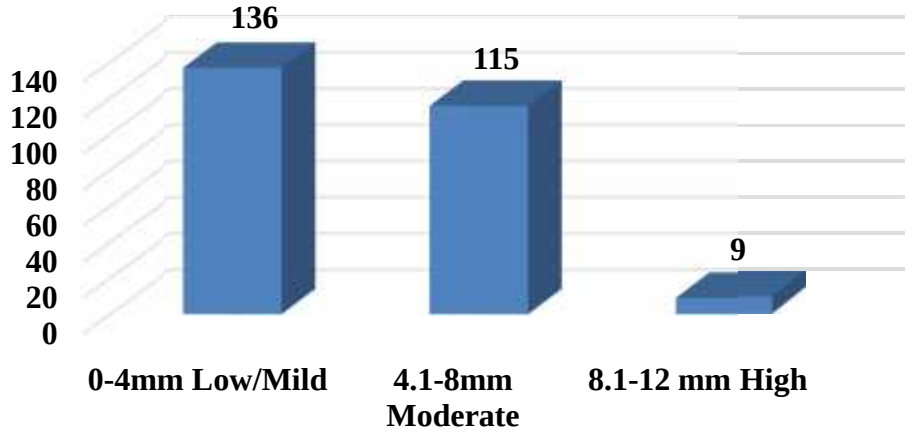
Distribution of study participants according to Horizontal profile view: Upper compartment



Horizontal profile view – Upper compartment

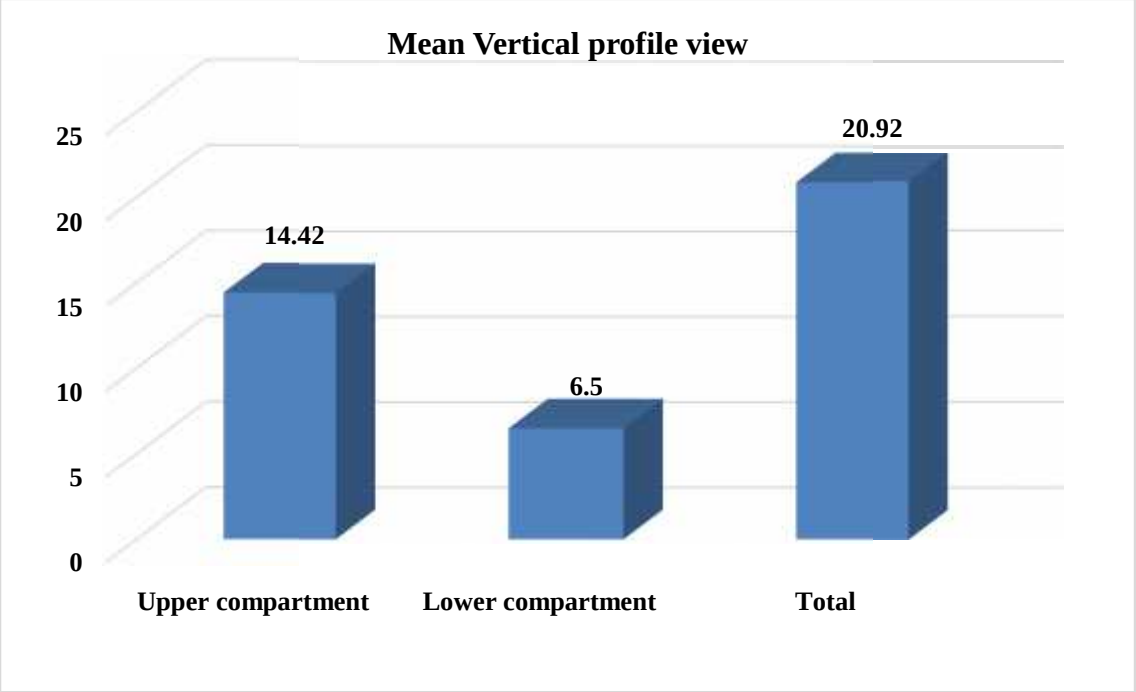
8. **Distribution of study participants according to Horizontal profile view: Lower compartment**

Distribution of study participants according to Horizontal profile view: Lower compartment

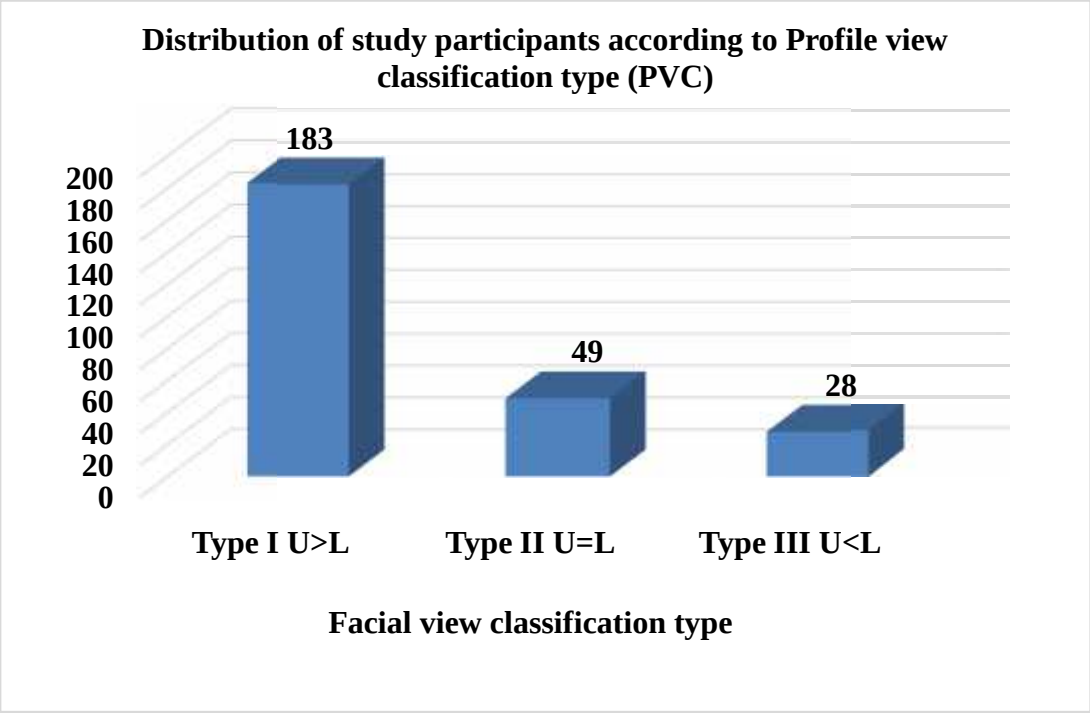


Horizontal profile view – Lower compartment

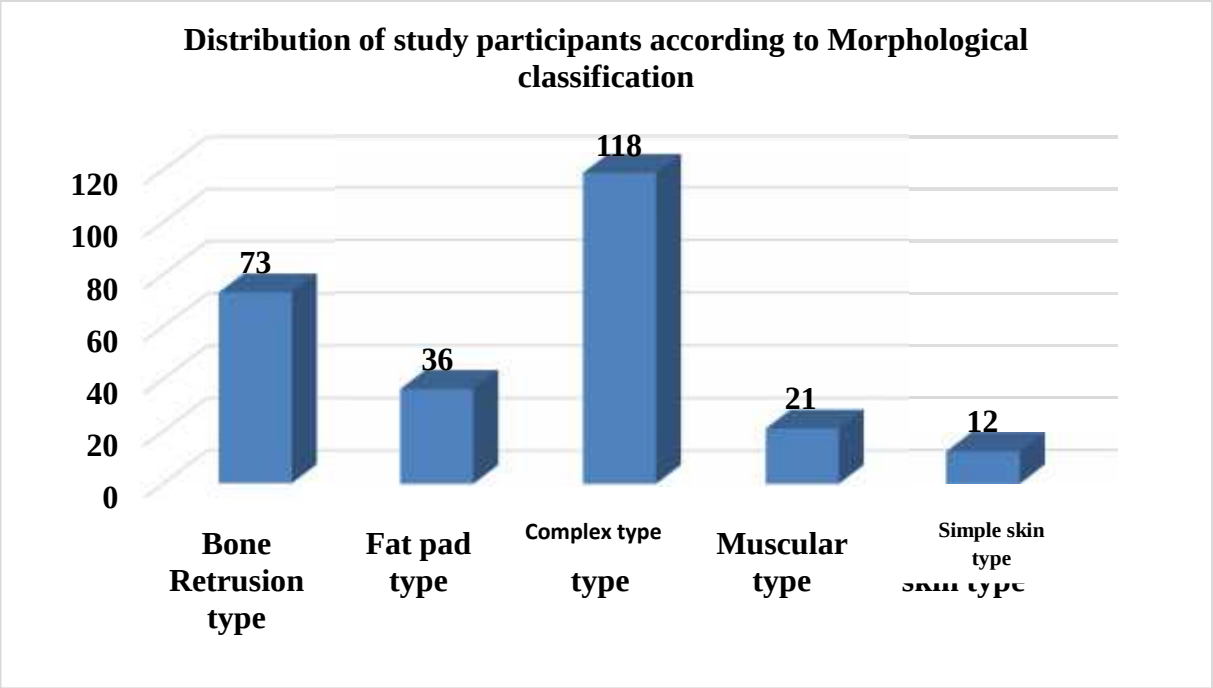
9. Mean Vertical profile view:



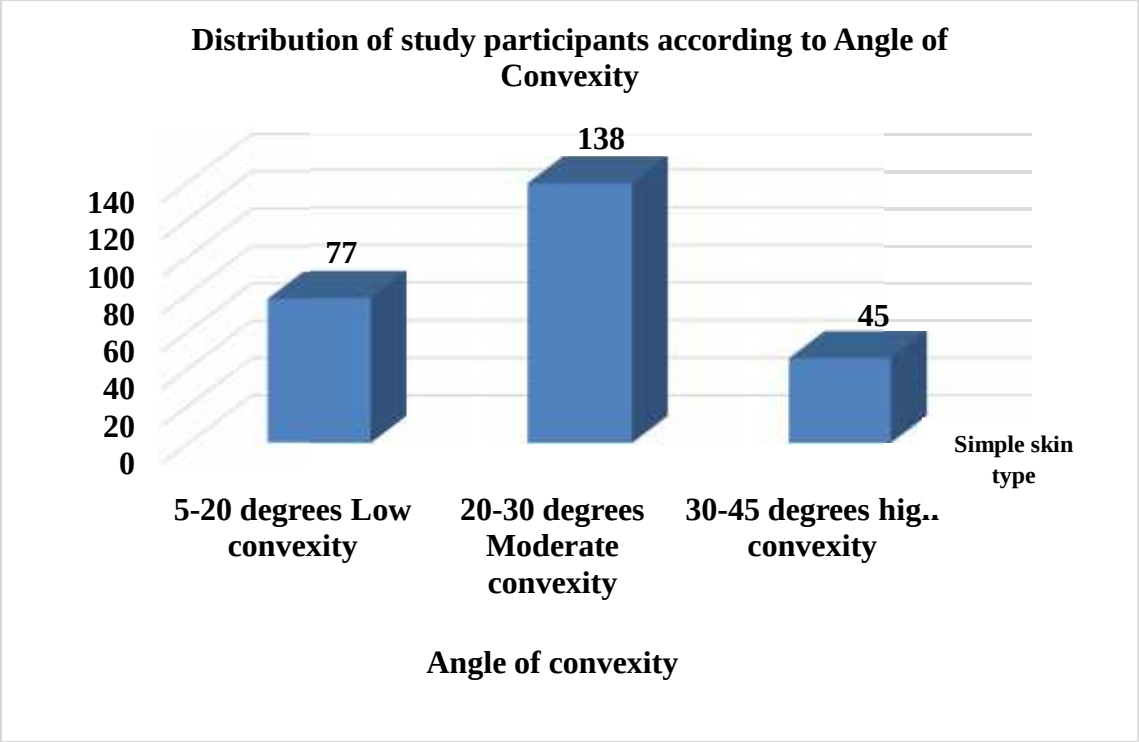
10. Distribution of study participants according to Profile view classification type (PVC):



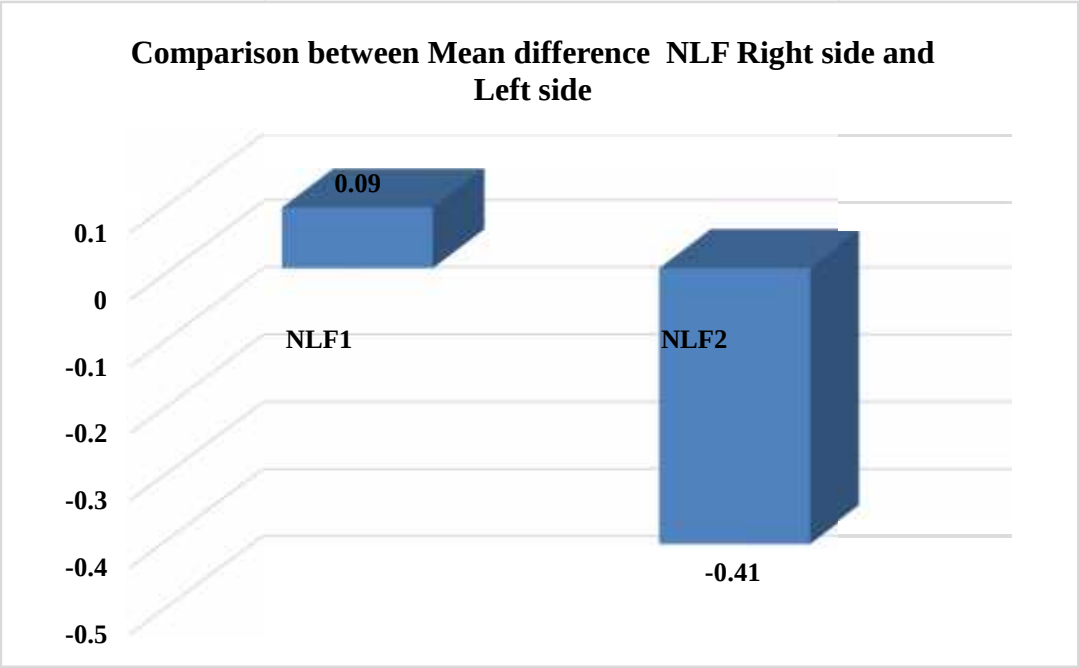
11. Distribution of study participants according to Morphological classification:



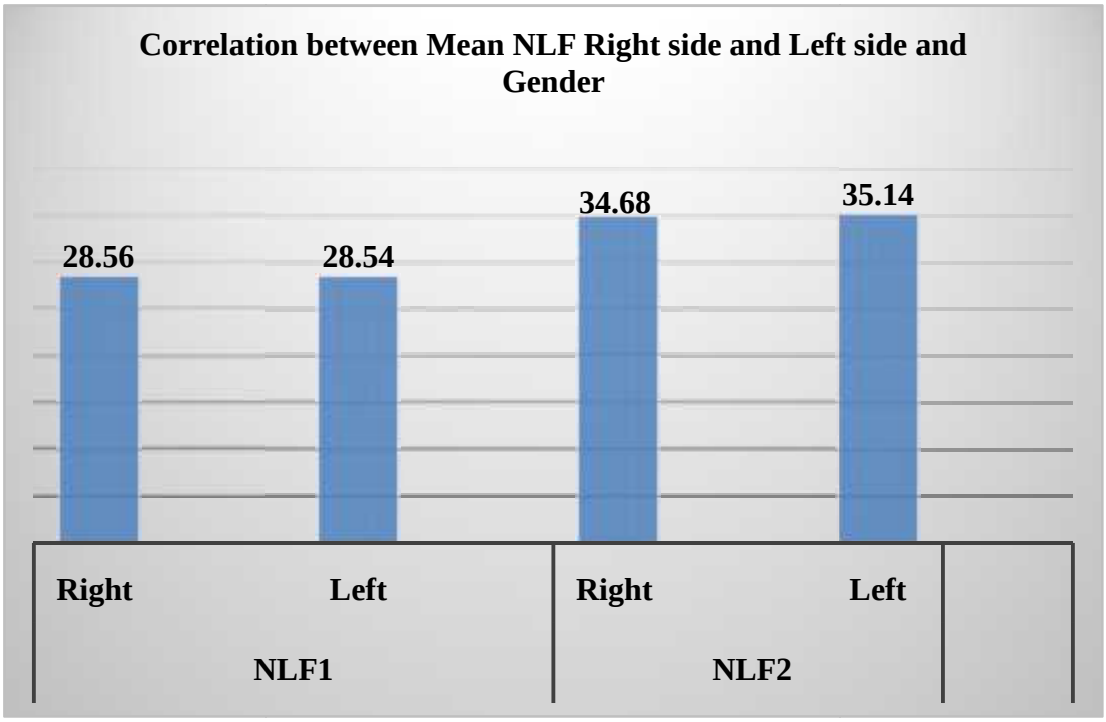
12. Distribution of study participants according to Angle of Convexity:



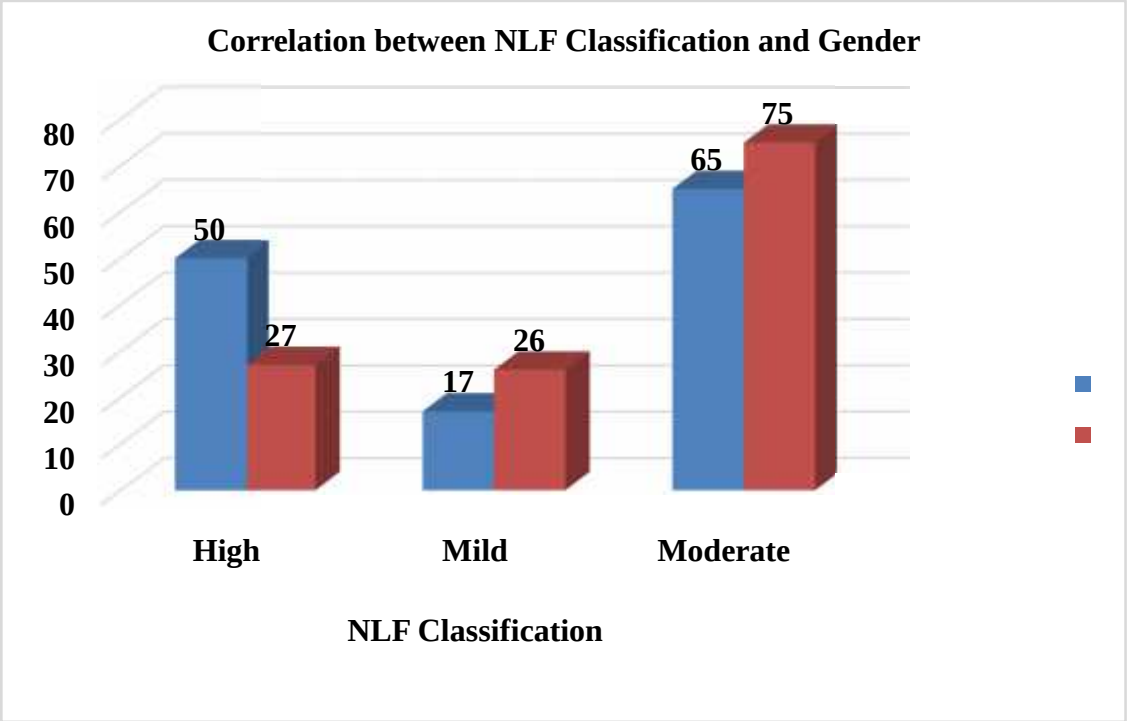
13. Comparison between Mean difference NLF Right side and Left side:



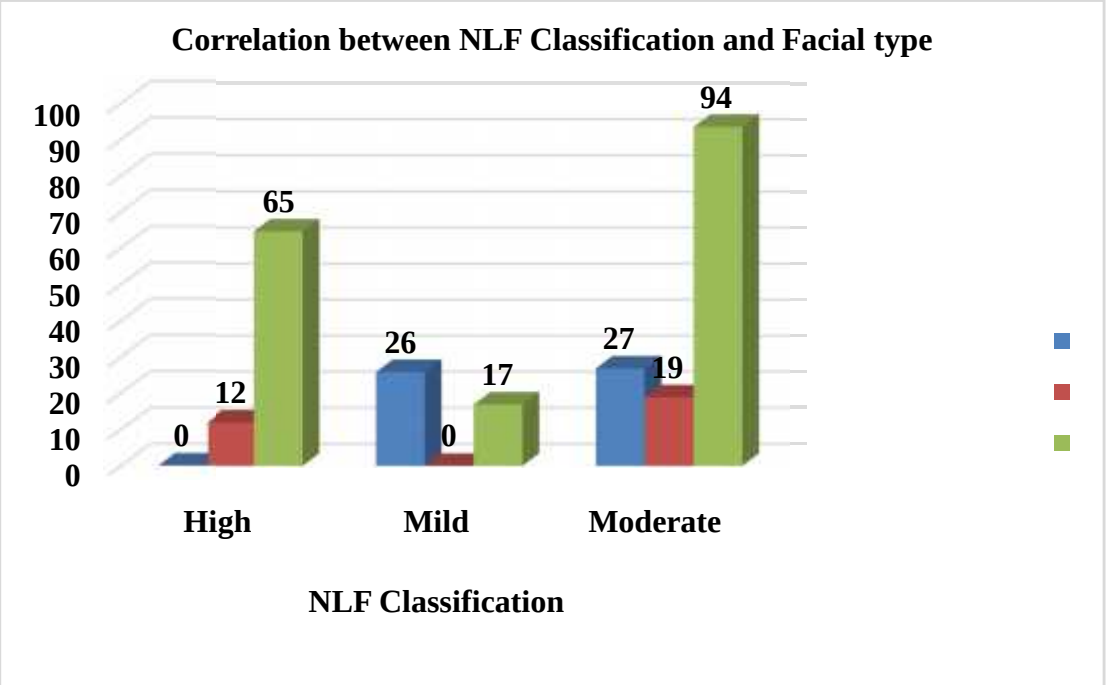
14. Correlation between Mean NLF Right side and Left side and Gender:



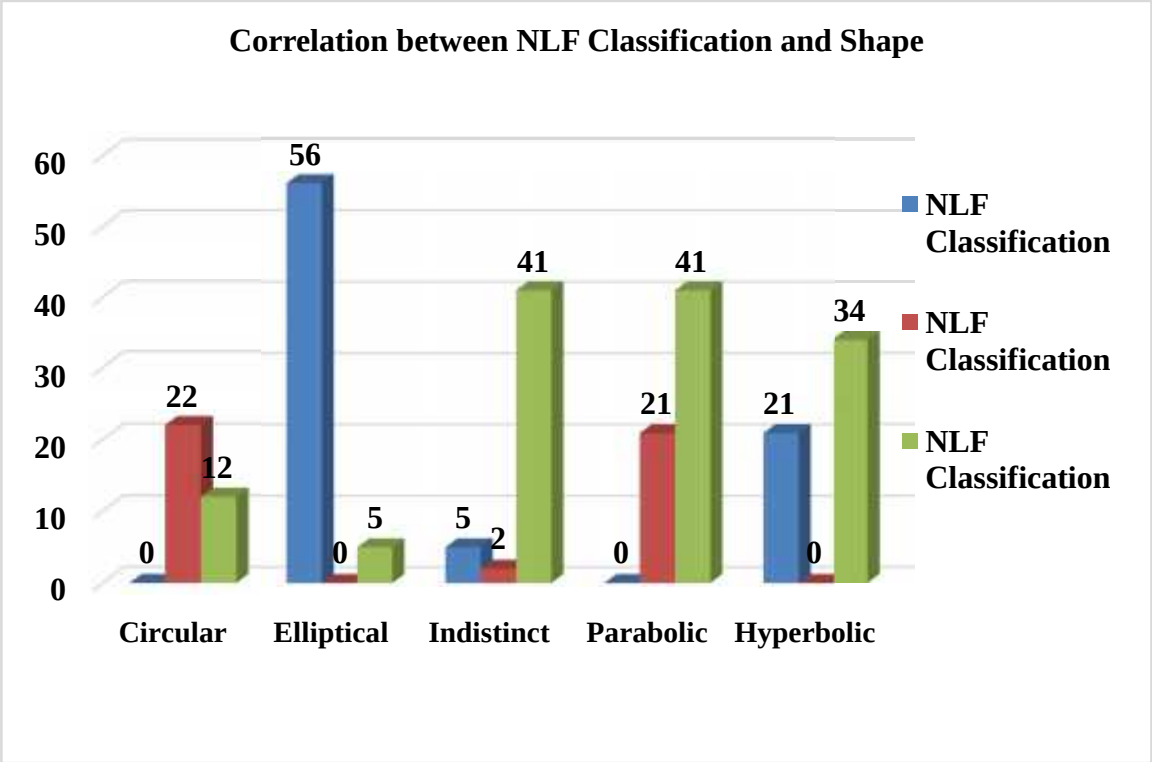
15. Correlation between NLF Classification and Gender :



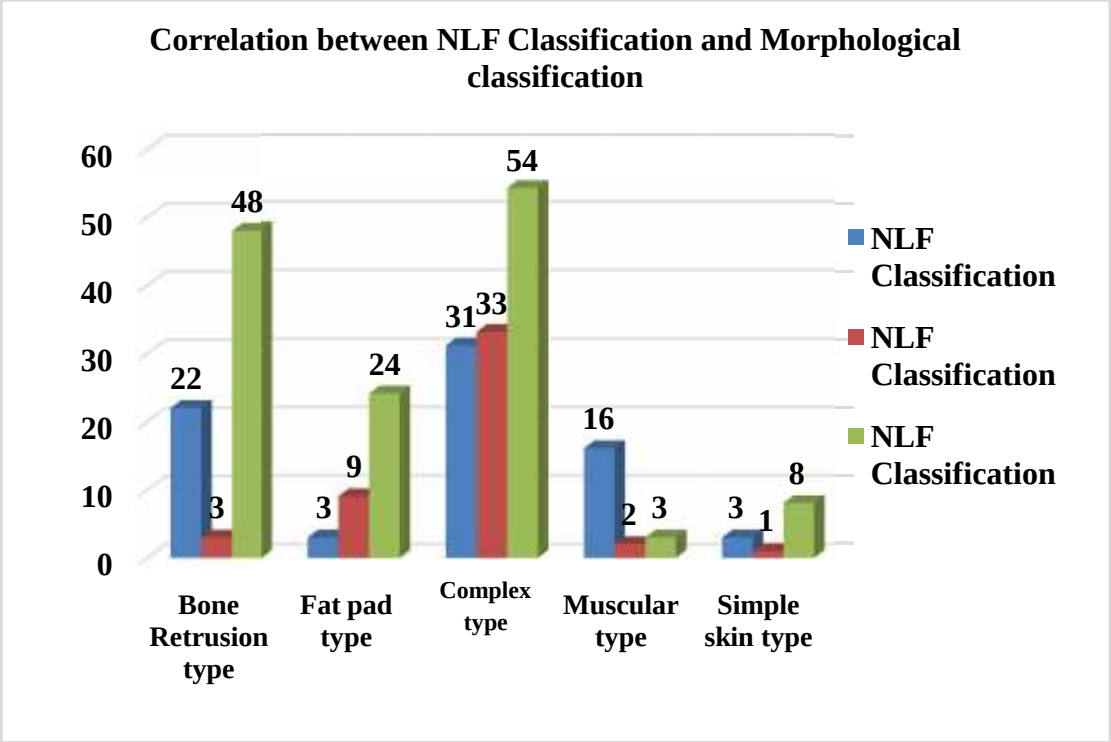
16. Correlation between NLF Classification and Facial type:



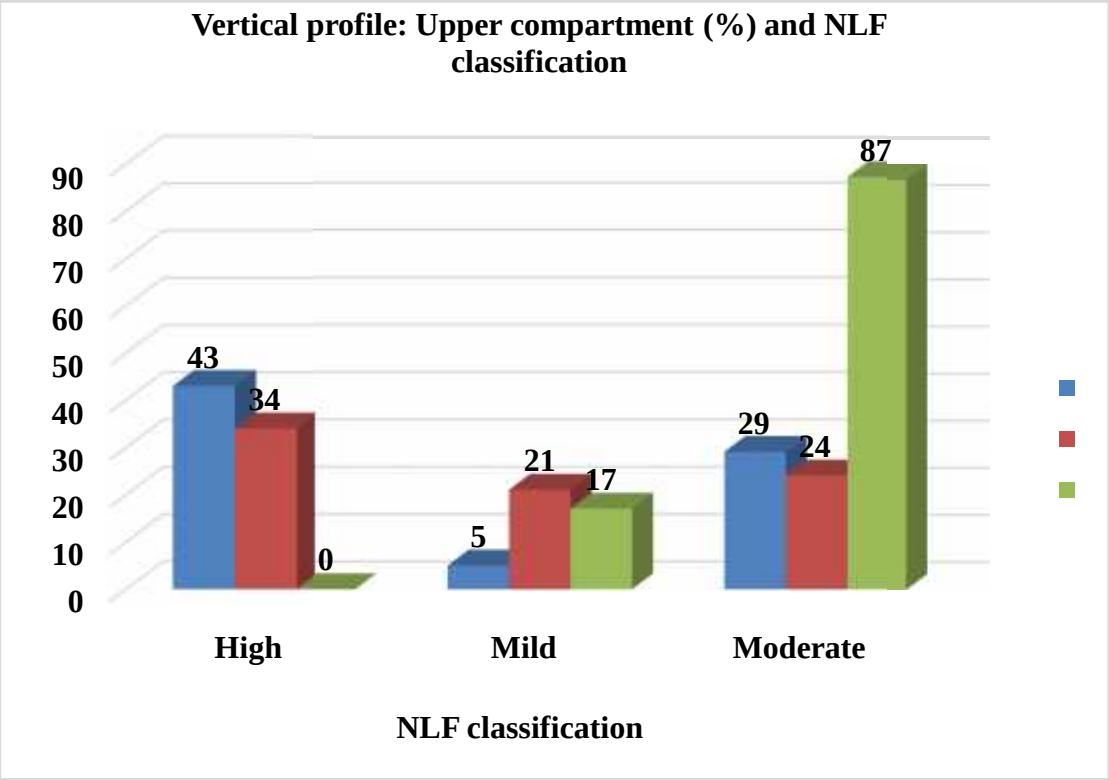
17. Correlation between NLF Classification and Shape:



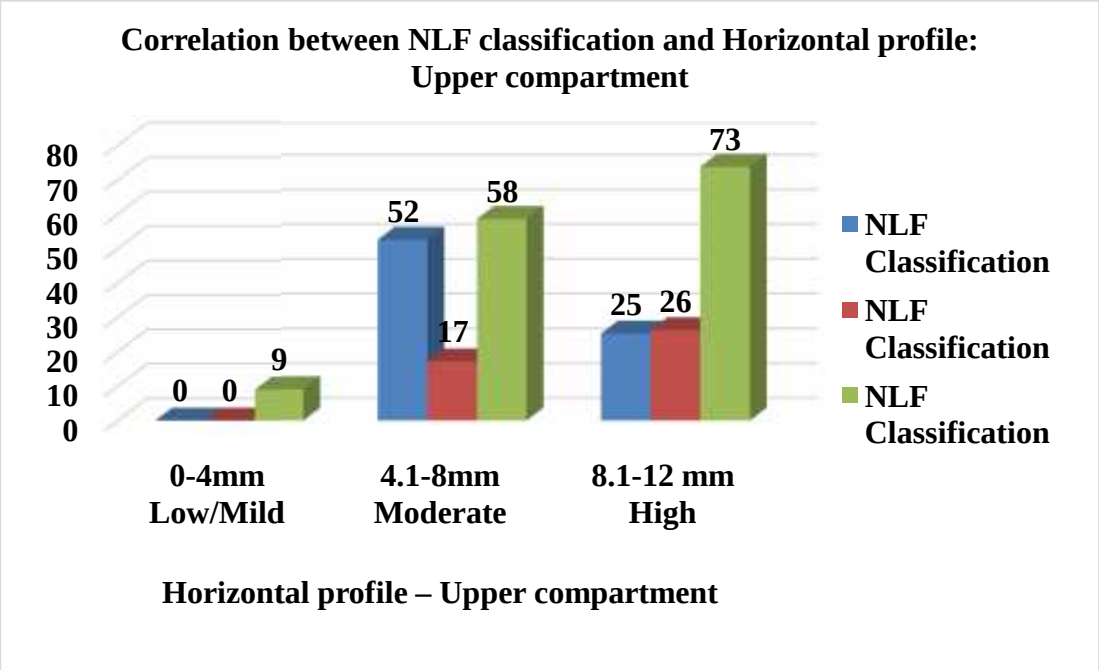
18. Correlation between NLF Classification and Morphological classification:



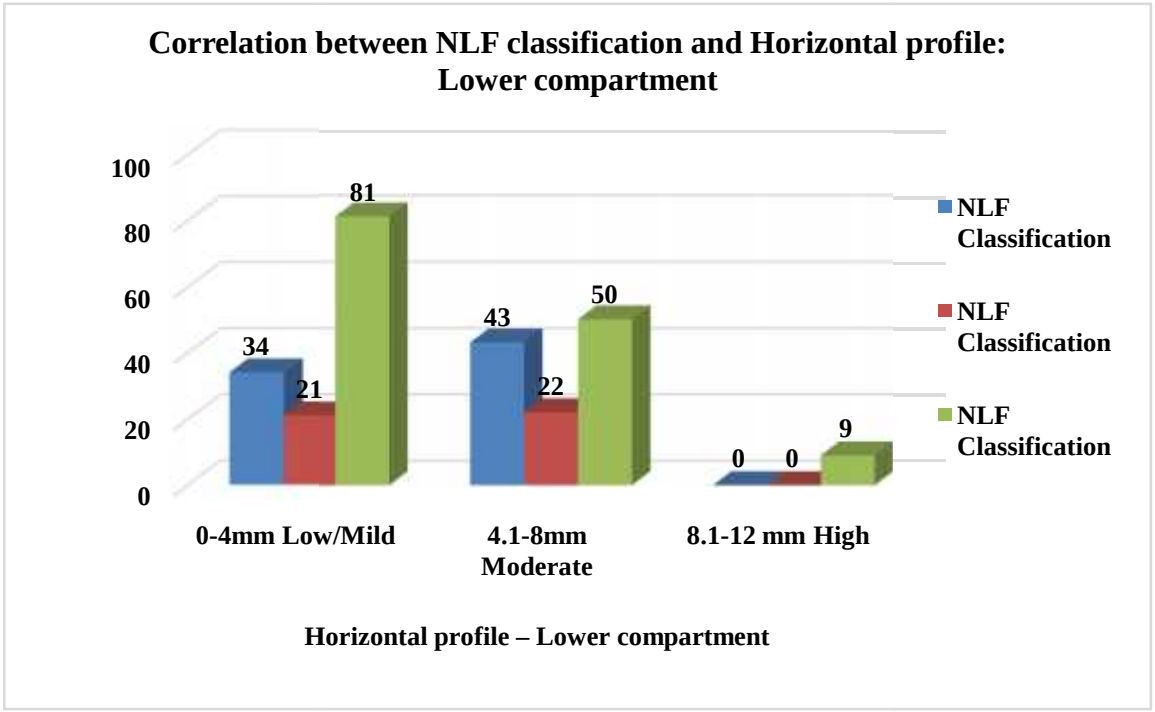
19. Vertical profile: Upper compartment (%) and NLF classification:



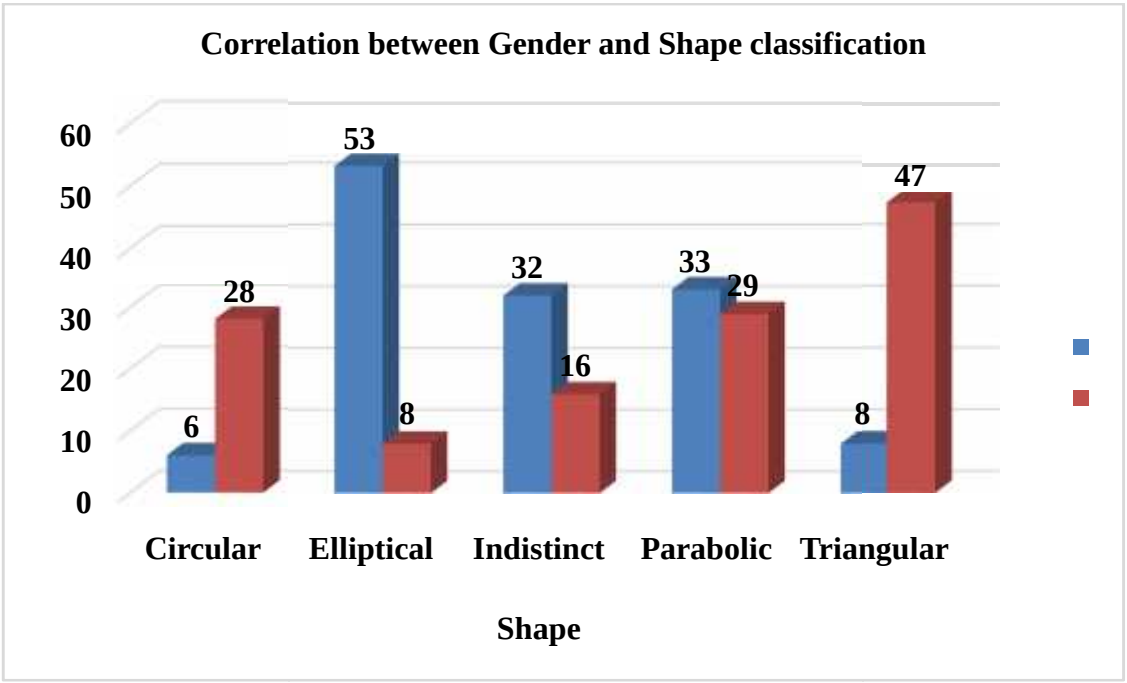
20. Correlation between NLF classification and Horizontal profile: Upper compartment:



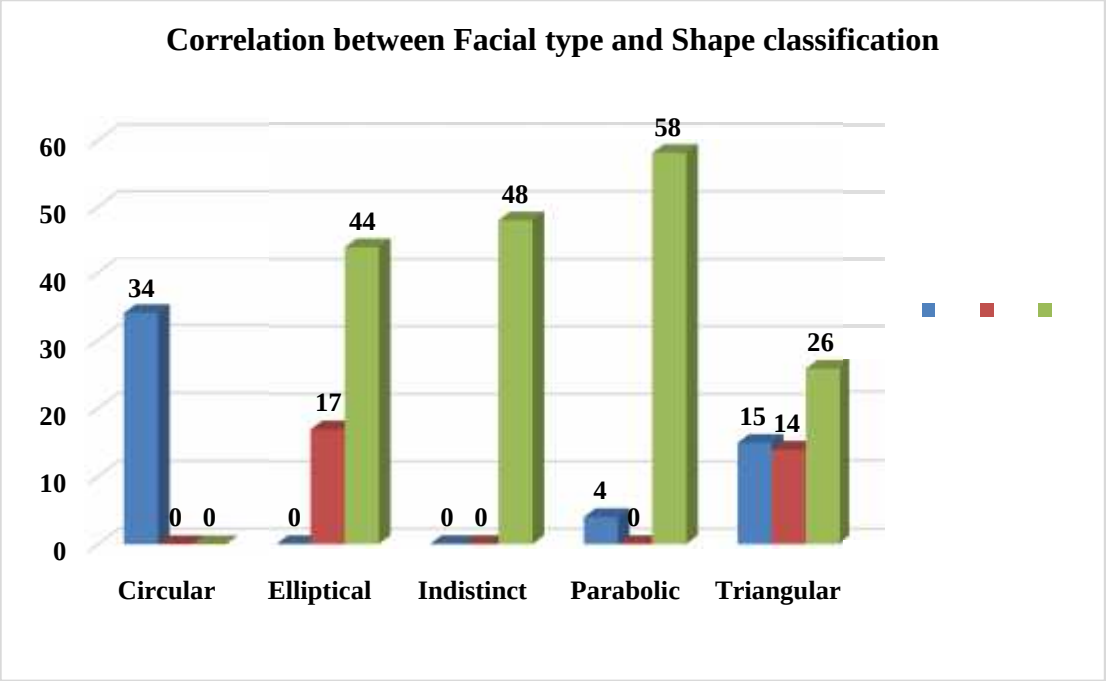
21. Correlation between NLF classification and Horizontal profile: Lower compartment



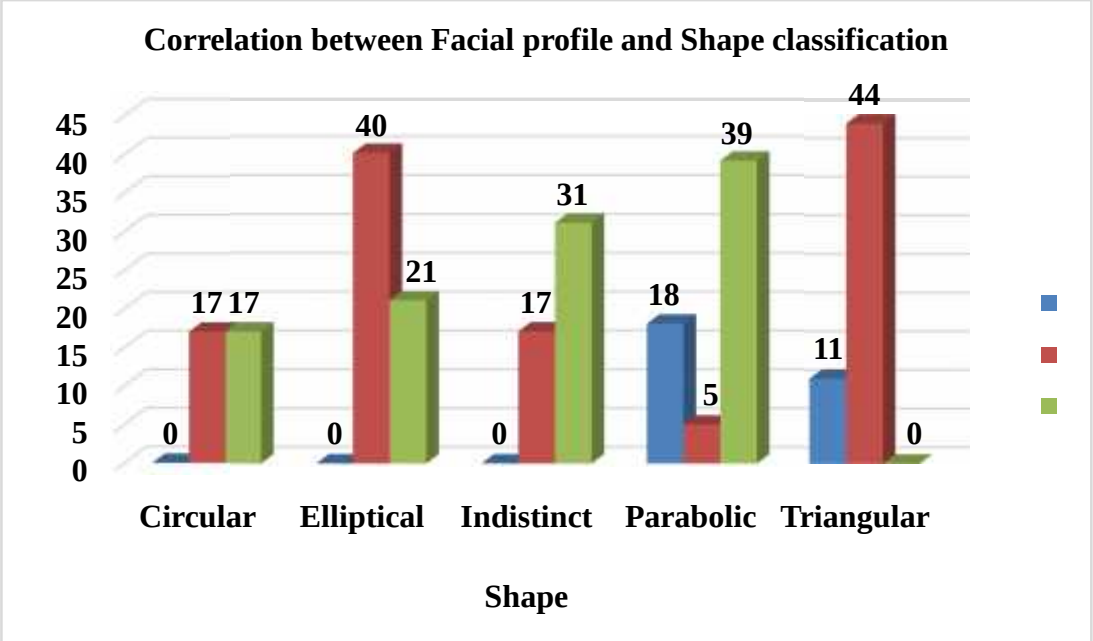
22. Correlation between Gender and Shape classification



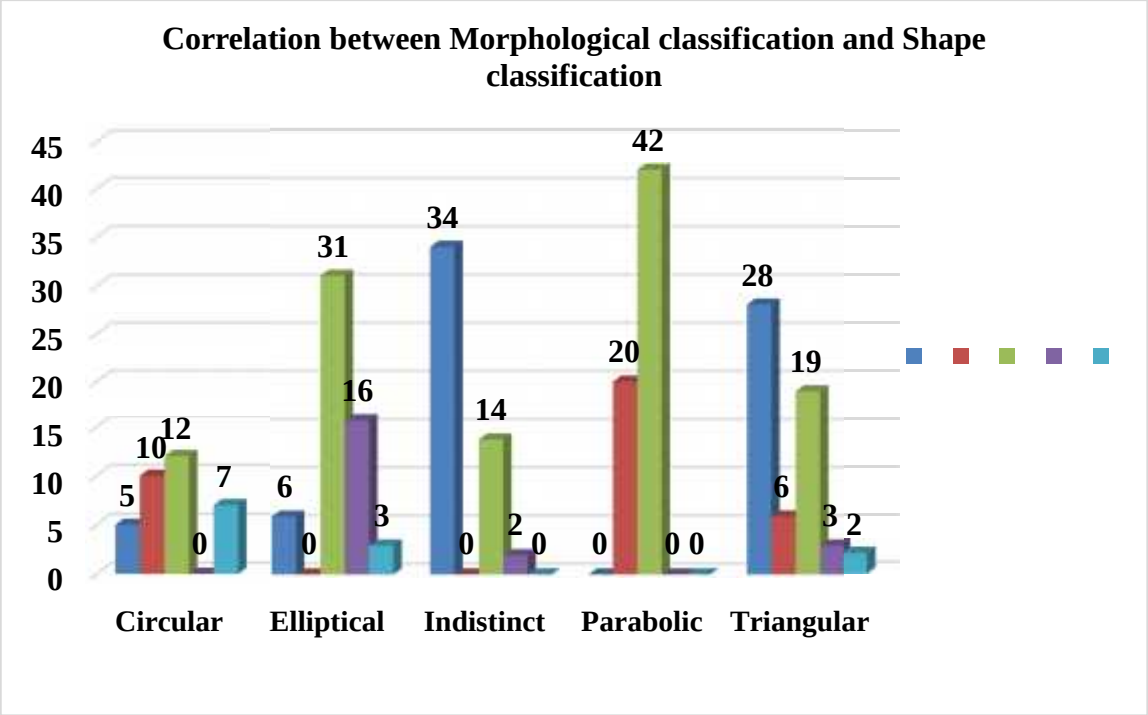
23. Correlation between Facial type and Shape classification:



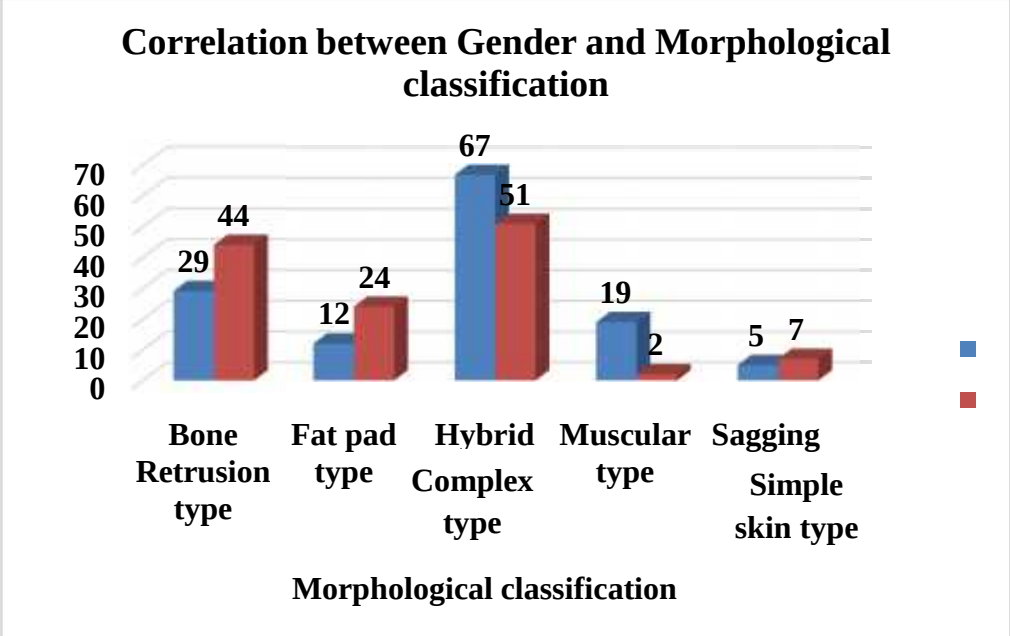
24. Correlation between Facial profile and Shape classification:



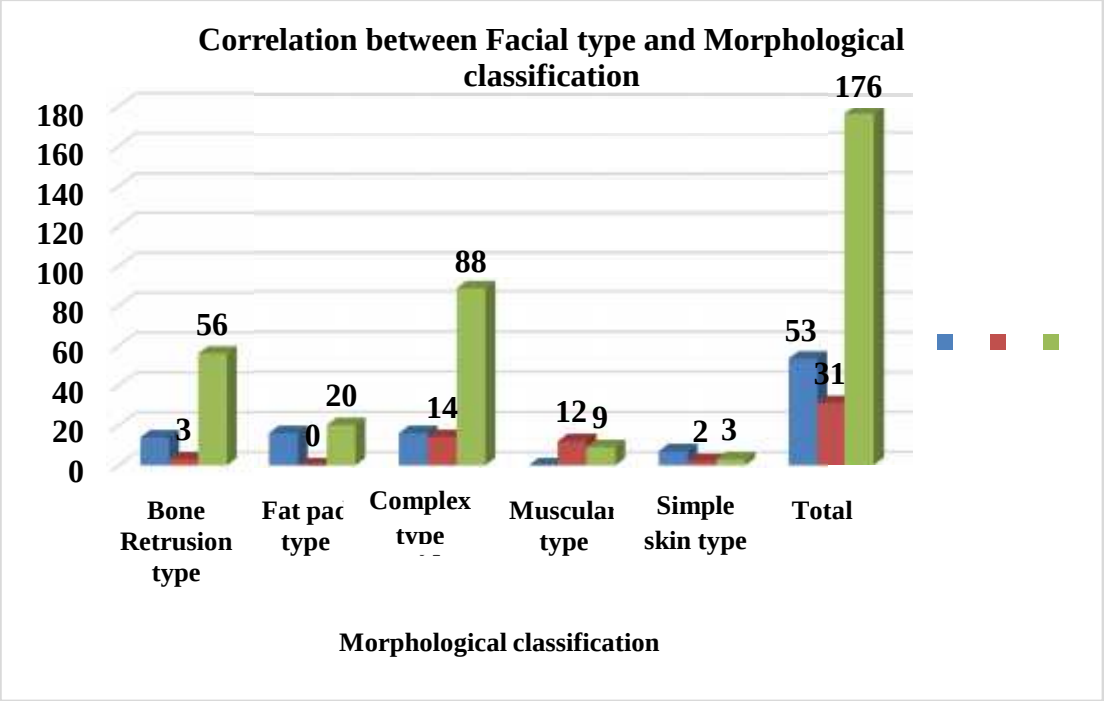
25. **Correlation between Morphological classification and Shape classification:**



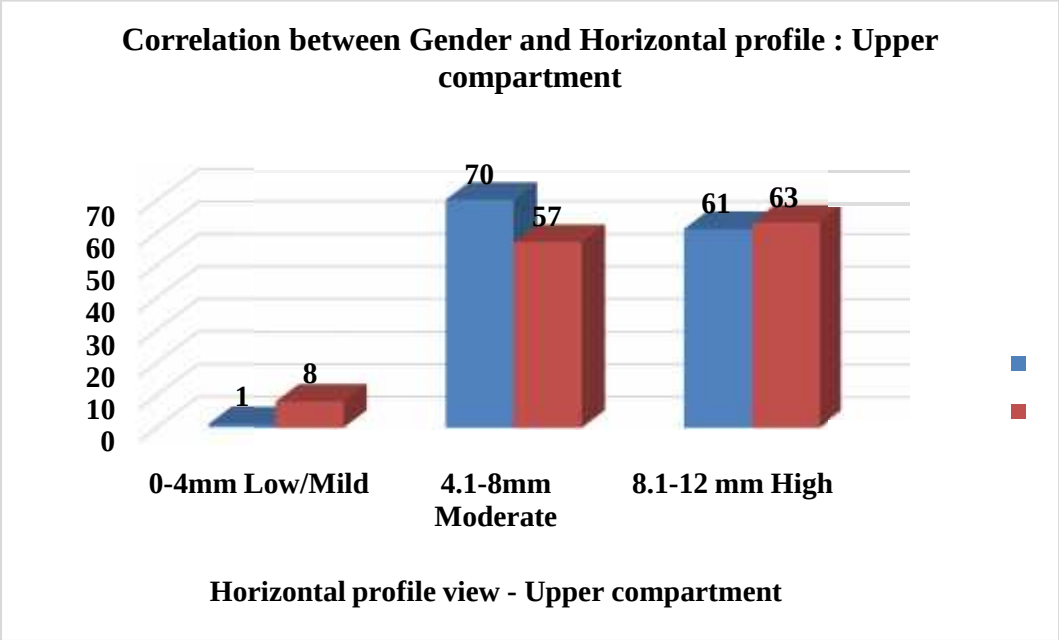
26. **Correlation between Gender and Morphological classification:**



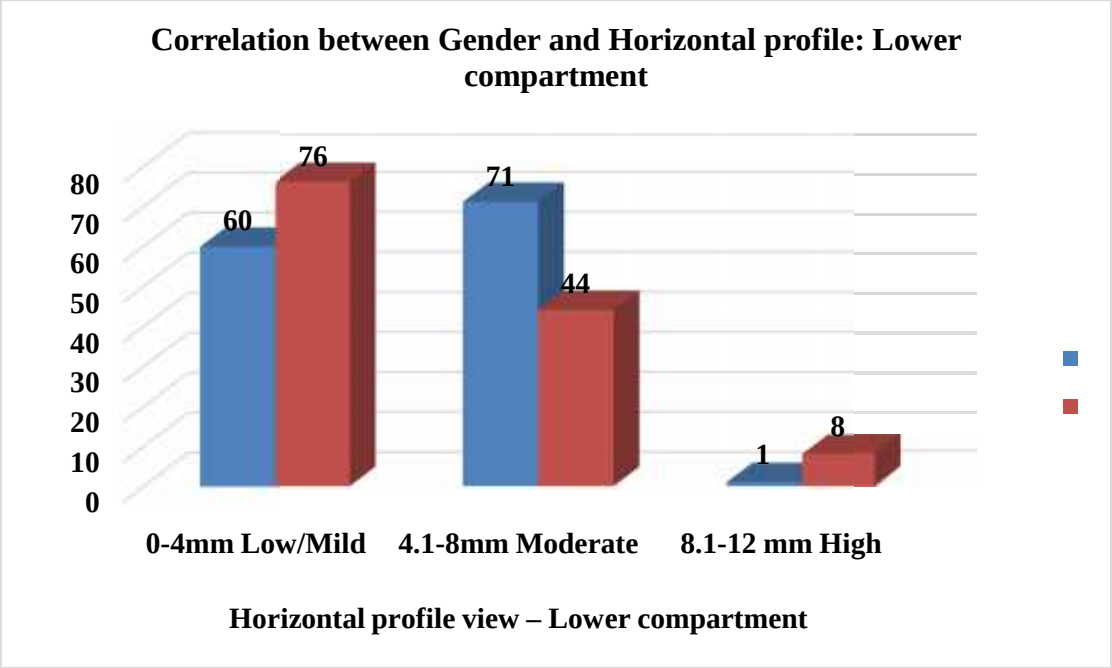
27. Correlation between Facial type and Morphological classification:



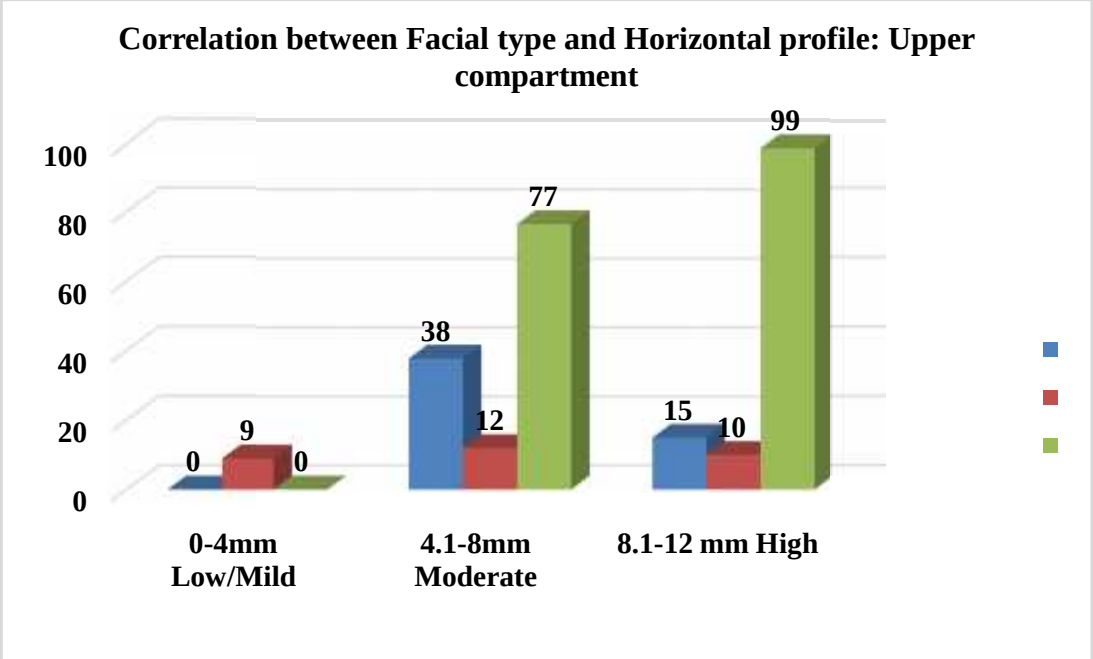
28. Correlation between Gender and Horizontal profile: Upper compartment :



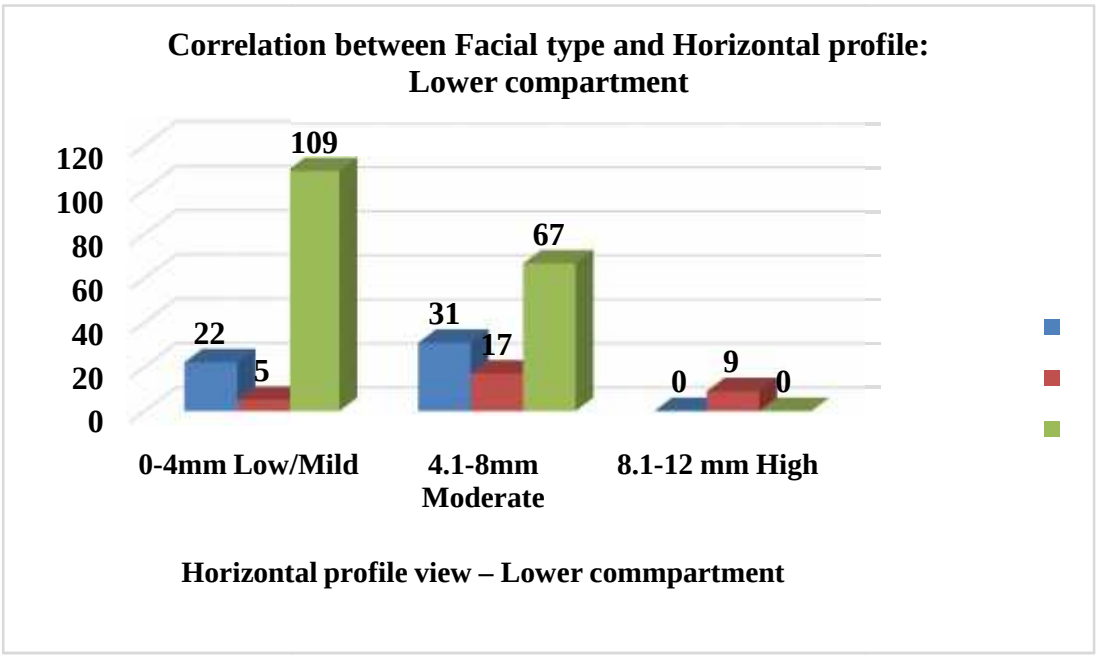
29. Correlation between Gender and Horizontal profile: Lower compartment



30. Correlation between Facial type and Horizontal profile: Upper compartment:

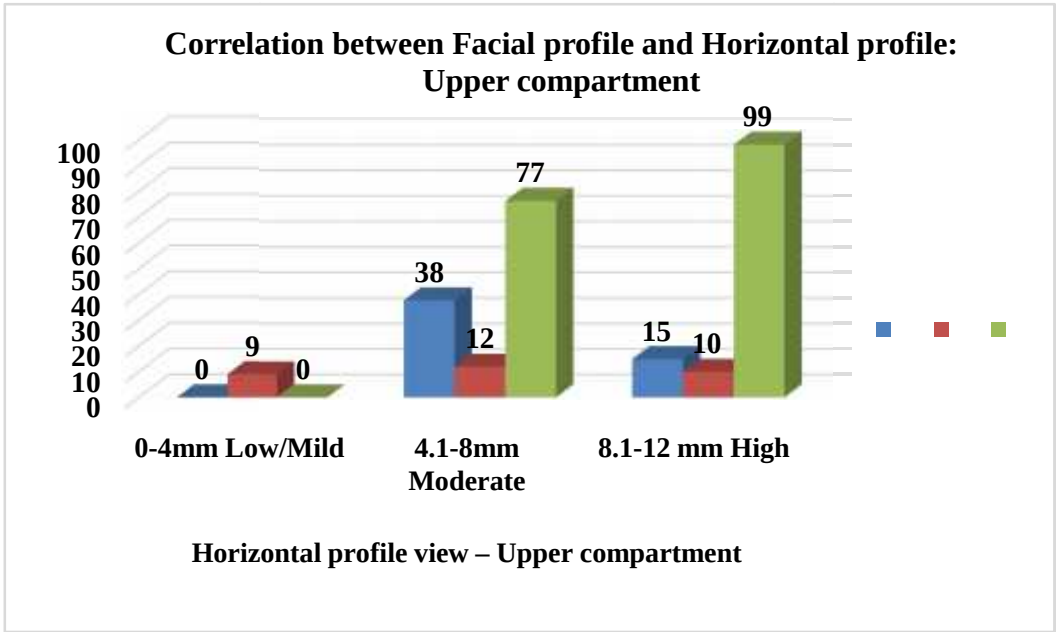


31. <u>Correlation between Facial type and Horizontal profile: Lower compartment:</u>



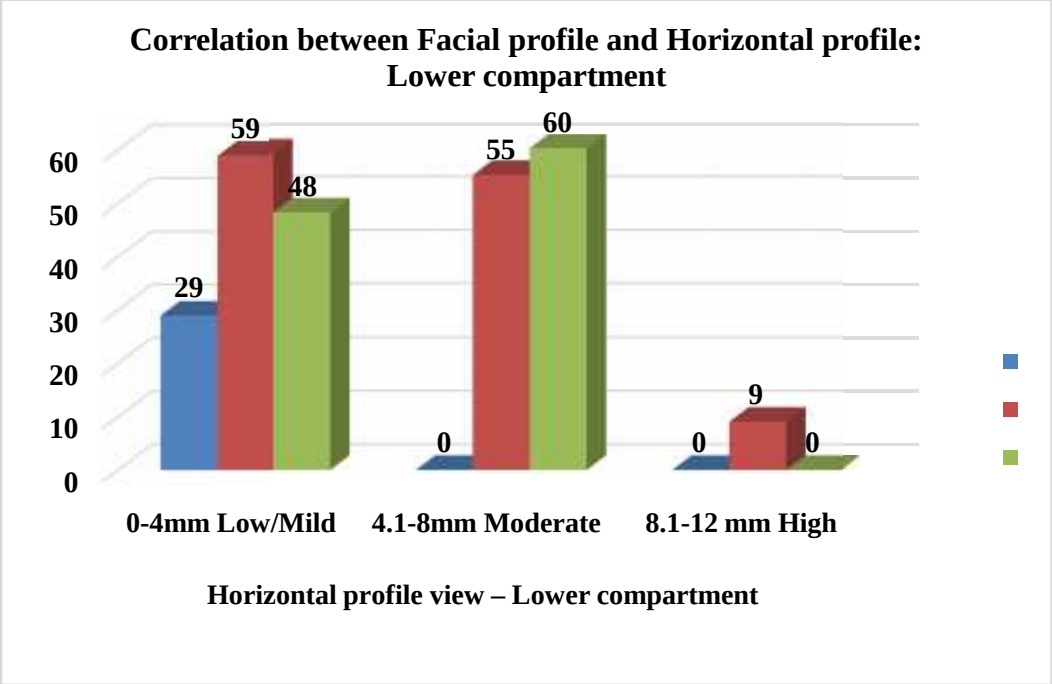
Horizontal profile view – Lower commpartment

32. <u>Correlation between Facial profile and Horizontal profile: Upper compartment:</u>

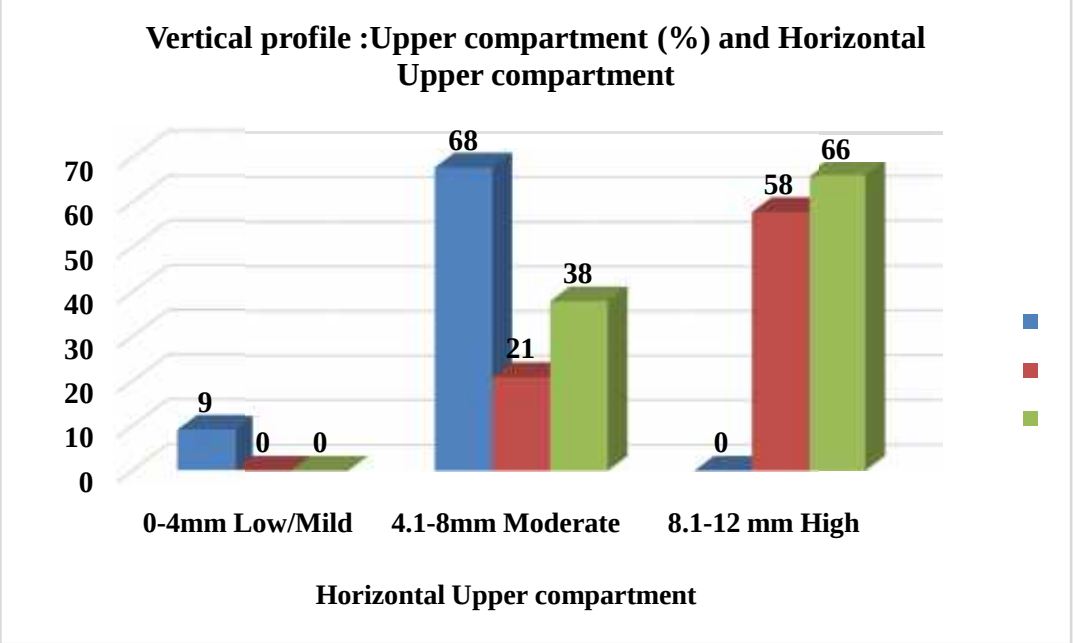


Horizontal profile view – Upper compartment

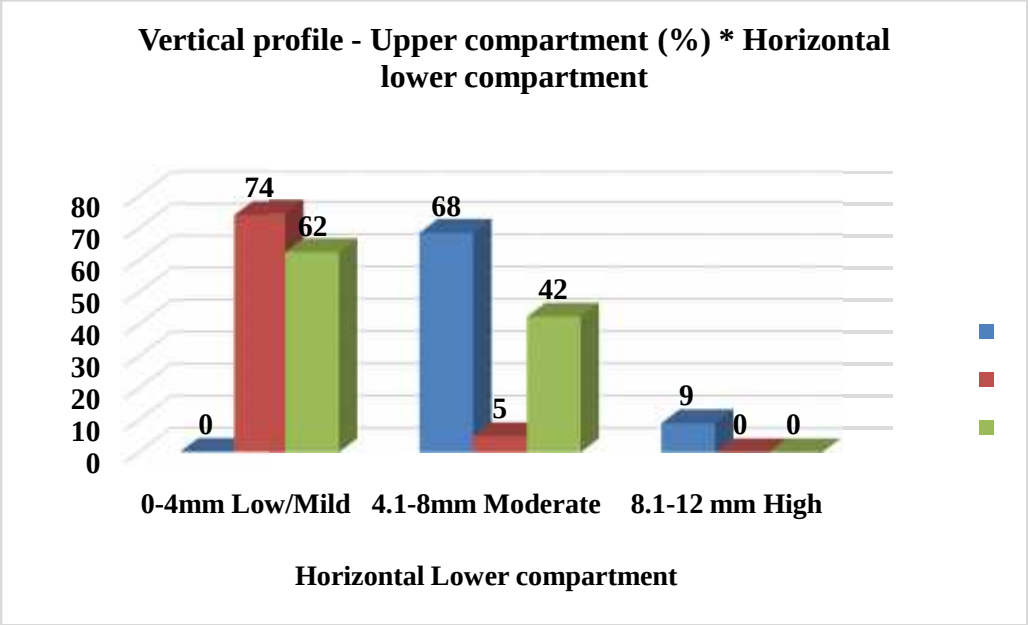
33. Correlation between Facial profile and Horizontal profile: Lower compartment:



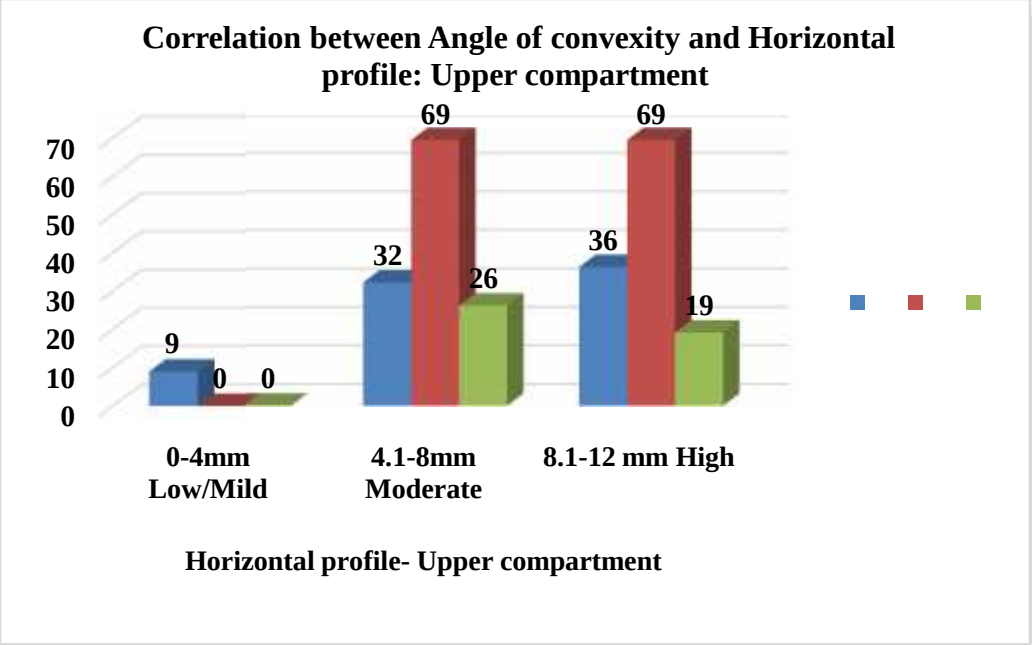
34. Vertical profile: Upper compartment (%) and Horizontal Upper compartment:



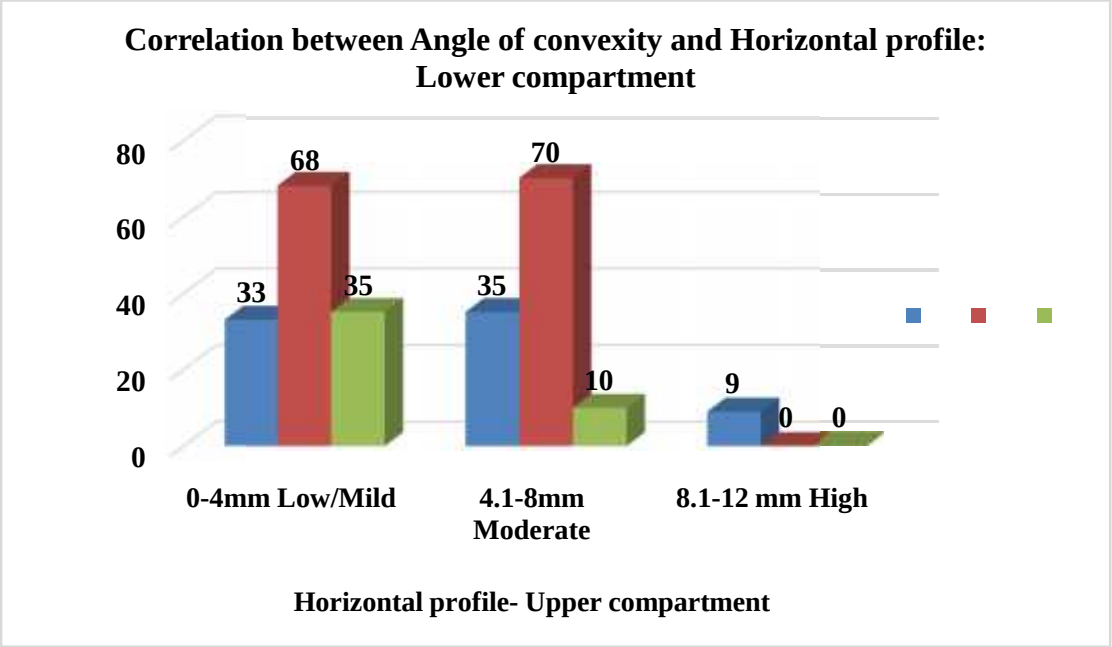
35. <u>Vertical profile: Upper compartment (%) and Horizontal lower compartment:</u>



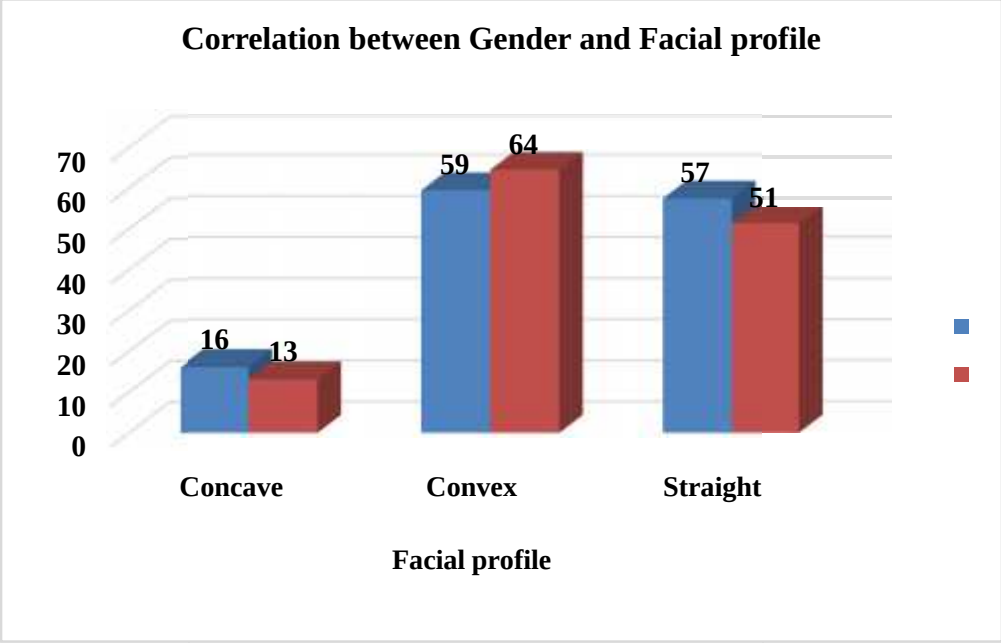
36. <u>Correlation between Angle of convexity and Horizontal profile: Upper compartment:</u>



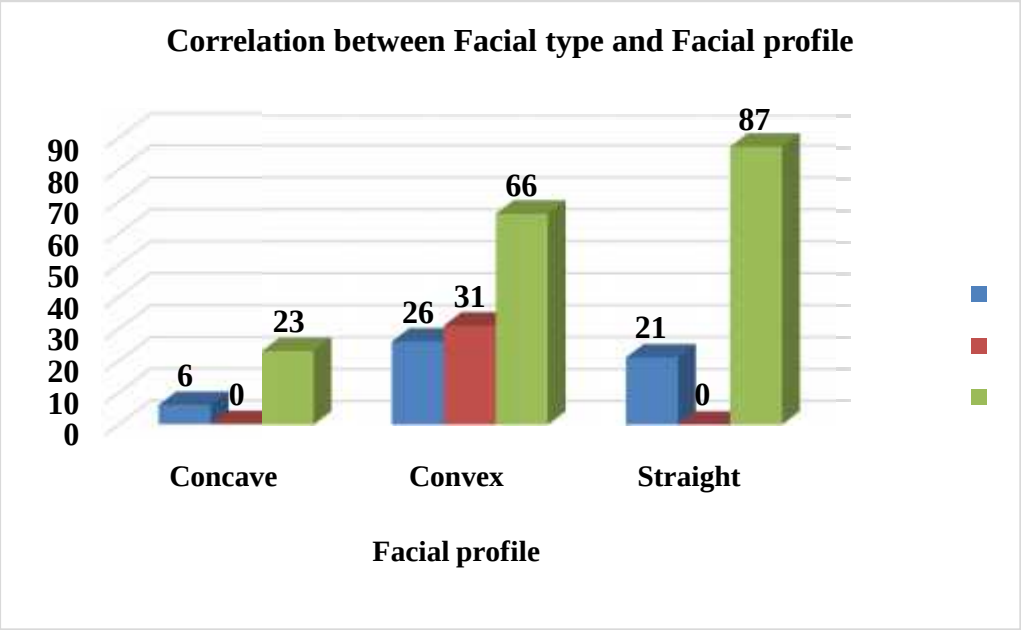
37. Correlation between Angle of convexity and Horizontal profile: Lower compartment:



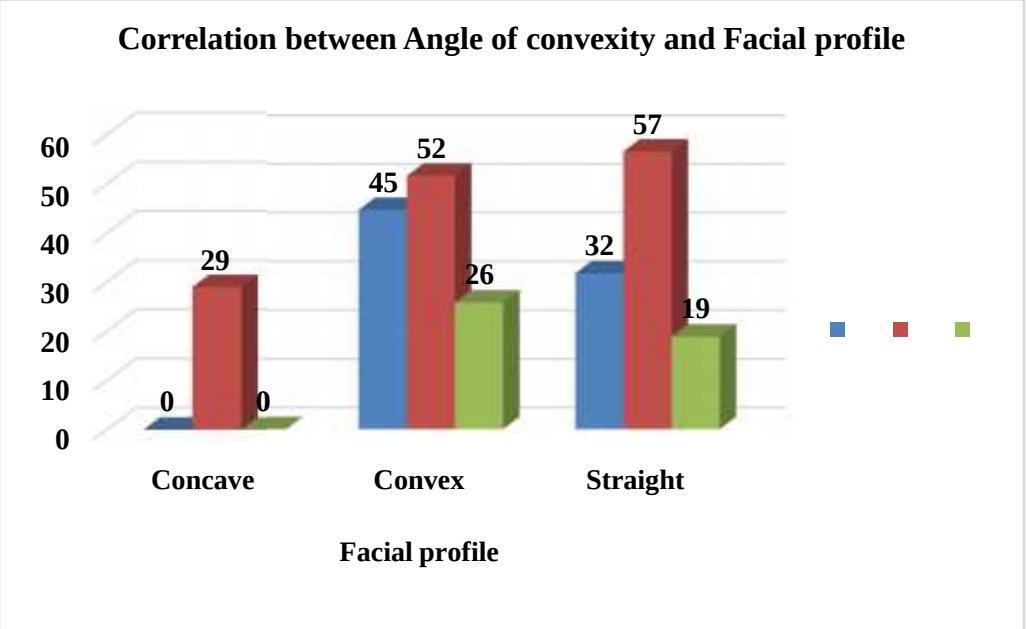
38. Correlation between Gender and Facial profile:



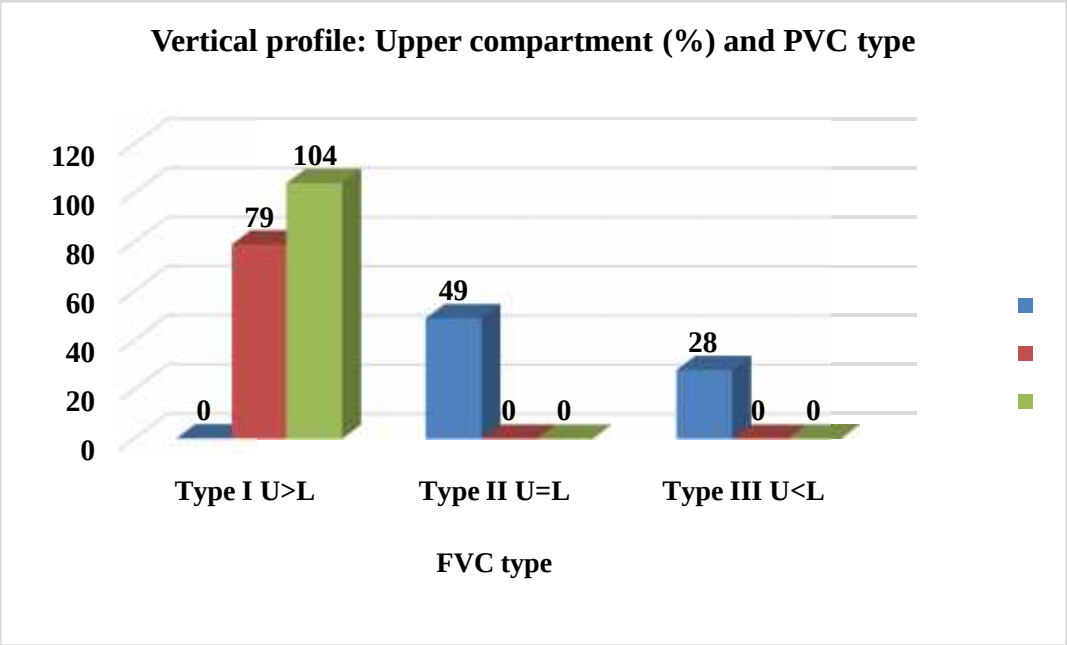
39. <u>Correlation between Facial type and Facial profile:</u>



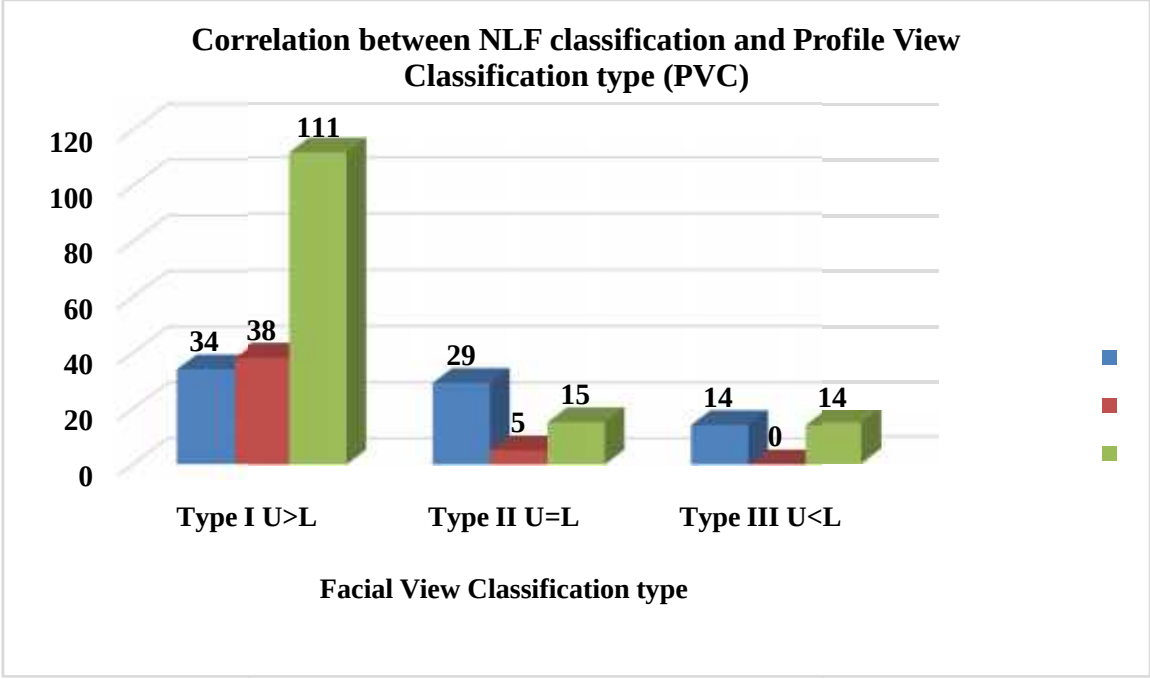
40. <u>Correlation between Angle of convexity and Facial profile:</u>



41. Vertical profile: Upper compartment (%) and PVC type:



42. Correlation between NLF classification and Profile View Classification type (PVC):



DISCUSSION

Since the emergence of the soft tissue paradigm, much attention is given in clinical examination to the display zone of smile which includes the Naso-Labial Fold. Previously Lu Zhang *et al*[13] have classified Naso-Labial Fold morphologically considering the surgical perspective. In this classification additionally, we have considered the clinical aspect of the Naso-Labial Fold using standardized photography in both frontal and profile views with respect to the orthodontic perspective. To diagnose abnormal we need to appreciate normal so is the need for classification. We included the age group from 18-25 years old because at this age group almost the entire growth is complete with respect to the facial skeleton and associated soft tissue structures. According to Bishara *et al*[16,] the changes that took place from 25 to 45 years of age were, on the average of small magnitude, but were statistically significant.And the aging changes with Naso-Labial Fold will be minimal considering the age group. According to Hans Peter Meng *et al*[17], increments in nose height, depth, and inclination are essentially completed in girls by 16 years of age, while continuing to increase in males up to and beyond 18 years. An approximately equal number of males and females were included in the study(132 males; 128 females) so that there will be no confounding bias related to sex while classifying Naso-Labial Fold. For the study, study participants who have not undergone orthodontic treatment or any facial surgery procedures were chosen to classify them accordingly, taking into account normal values and not any surgical or orthodontic disturbing values.

The distribution of facial types in the study participants showed, Mesoprosopic type(67.7%) accounting for maximum facial types followed by Euryprosopic (20.4%) and Leptoprosopic (11.9%) respectively. The distribution of

facial profile differed from a previous study done by Prasanna LC *et al*[18] in the South Indian population,where males showed majorly Leptoprosopic facial type to Mesoprosopic while females showed mostly Euryprosopic facial type to Mesoprosopic, accounting for the maximum number of the study population. This may be due to most of the study participants were students in our study migrated from different places in India for educational purposes. 19. Shukri NM*et al*[19] showed similar results in their study in which Mesoprosopic facial type was mainly seen.

In our study convex profile (47.3%) accounted for the maximum number of study participants followed by straight profile (41.5%) and concave profile (11.2%) having the least number of study participants respectively. In the previous studies, done by Shukri NM *et al*[19],45% contributed for straight profile followed by 36% for the convex profile. This difference can be due to the method of analysis, as three fingers method was used in this study while in our study visual inspection on a profile photograph was used to access the profile.

The facial type distribution with gender showed male participants predominantly present with Mesoprosopic facial type,whereas Euryprosopic was majorly seen in females. Leptoprosopic facial type was evenly distributed in both of them. The facial profile distribution with gender showed the dominance of convex and straight profile in both the genders. The facial type distribution with facial profile showed the predominance of convex profile in Leptoprosopic facial types, whereas Mesoprosopic and Euryprosopic showed the majority of distribution in convex and straight profile, where the concave profile was the least present. This was in accordance to a study done by Ravi Kumar Gudipaneni *et al*[20].

In the previous study, Baek *et al*[15] has given landmarks and parameters (NLF1 and NLF2) for measuring Naso-Labial Fold in frontal view for 3D CBCT study. We have used the same parameters to classify Naso-Labial Fold considering the extent of its convexity in frontal view classification in 2D photographs respectively. Jorgensen[21] assessed photos of 20 normal subjects (10 males and 10 females) from the Lowa Growth Study, in general, he found that landmark identification on photographs was reproducible.The distribution of Naso-Labial Fold considering the convexity of the fold in frontal view was statistically significant ($p=0.01$; $p<0.05$), where moderate type accounted for a maximum of 53.8% of study participants and mild type having the lowest 16.5% of the study participants respectively.

The left and right side values of NLF1 and NLF2 were compared and showed no statistically significant difference. ($p>0.05$). The NLF correlation with gender showed a statistically significant difference($p<0.05$), where the values of NLF1 and NLF2 were minimally greater in males compared to females except the NLF2 value on the left side of female was greater than male. This may be due to the eating habits of males compared to females, where the maxillary arch is broader in males compared to females as well as the associated musculature[22].

On comparing right and left side NLF1and NLF2 values in males and females, the right side extension of the Naso-Labial Fold was minimally greater than the left side in both males and females for NLF1 and NLF2 except in females were NLF2 extension was more on the left (32.92) compared to the right side(32.55) respectively. This can be explained due to preceding growth potential on the right side of the face compared to the left side, considering the larger dimension of the skull and brains of individuals on right side[22]. And also biting habits of the individuals, depending on the

side which is dominant for eating accordingly, the surrounding musculature will be developed and an increase in dimension may be seen at the dominant side. On the other hand, the degree of soft tissue asymmetry is greater than that of underlying hard tissue asymmetry, particularly regarding lip commissures angulation[23].

The distribution of study participants according to their shape was dominated by parabolic(23.8%) and elliptical shape(23.5%) followed by triangular(21.2%), indistinct(18.5%), and circular type (13.1%) having the least.

The distribution of study participants according to Horizontal profile view, extent of concavity – Upper compartment considerably accounted for moderate(48.8%) and high type (47.7%)followed by mild type (3.5%) having the least distribution. The distribution of study participants according to Horizontal profile view – Lower compartment considerably accounted for mild(52.3%) and moderate type (44.2%)followed by high type (3.5%) having the least distribution. The classification predominated by high concave up, mild concave down respectively. This classification was given taking into account the quantitative distribution of Naso-Labial Fold.

Considering the extent of concavity horizontally the Naso-Labial Fold in profile view (PVC) was classified into three types: Type I, Type II, and Type III. This classification was given for the qualitative distribution of Naso-Labial Fold. The distribution was predominated by Type I (70.4%) followed by Type II(18.8%) and Type III (10.8%)respectively.

Depending on the extent of upper and lower compartment vertically in the horizontal profile view, it was classified in percentage for upper and lower

compartment respectively, in which the upper compartment (68.8 %) accounted for most of the vertical Naso-Labial Fold distribution compared to the lower compartment. (31.1 %).

Morphological Classification of Naso-Labial Fold[13]:

1. Skin Type: It is considered by many clinicians as a typical type of Naso-Labial Fold. There are two sub-types of skin type Naso-Labial Fold i.e simple skin type and the other sagging skin type. The later is mostly seen in middle-aged and elderly study participants. Hence it is not considered in the classification. The former simple skin type hasthe appearance of small wrinkles, which become apparent while smiling. This is due to the low aging level of dermis in young study participants. This type of Naso-Labial Fold includes a total of 12 study participants (4.6 %).
2. Fat pad type: It presents as a thick fat pad or plump zygomatic area or straight zygomatic area, which makes the Naso-Labial Fold appear concave in shape. 13.8% (36 study participants) of the study participants have this type of Naso-Labial Fold. The mass of tissue in the lateral part of the Naso-Labial Fold is comparatively thick. The skin tissue aging is relatively faster due to the effect of gravity, which can be seen in the form of dermal changes at a younger age.
3. Muscular type:All the muscles associated with the Naso-Labial area have been mentioned previously. Of these, Levator alae nasi, Levator labii superioris, and Zygolabialis have vertically, gravity-directed muscle contraction and are the three main muscles associated with Naso-Labial Fold deepening. This category of Naso-Labial Fold belonged to 8.1 % (21 study participants).

4. Bone Retrusion type: Cleft lip and palate study participants suffer simultaneous bone retrusion around the pyriform aperture. Certain normal individuals also manifest minor retrusion defects in tissue, are the upper segment of the Naso-Labial Fold resulting from the mild recession of bone tissue around the pyriform aperture, however, the condition doesn't appear prominent. Naso-Labial Folds depicting simple bone retrusion are common in young individuals and commonly display a broad concave, in the upper segment of Naso-Labial Fold, as well the flat skin encircling the Pinna nasi. 28.07% (73 study participants) belong to this category of Naso-Labial Fold.
5. Complex type:A combination of two or more above types is included in this type of Naso-Labial Fold. This type accounted for 45.4% (118 study participants) of the total Naso-Labial Folds, among which the most frequent subtype was fat pad combined with bone retrusion followed by muscular type with bone retrusion.

The distribution of convexity of the Naso-Labial Fold was statistically significant.($p=0.003;p<0.05$). It was distributed according to its extent of convexity where glabella to soft tissue pogonion was considered the principal plane. It quantitatively measures the extent of the Naso-Labial Fold curve in profile view and can also be used as an aesthetic smile parameter in profile view photograph**.** Yi Lin *et al*[24]**,** included the Naso-Labial Fold and smile curve as the determining factors for the beauty of smile in frontal and profile view. It was majorly distributed in a moderate convexity category(53.1%), followed by low convexity(29.6%) and high convexity category(17.3%) respectively.

Correlations:-

Mesoprosopic face was mostly dominated by Males (64.9%) over females, with a high type of (NLF frontal view classification) most common. In theseparticipants,the parabolic shape(32.95%) of Naso-Labial Fold was most commonly seen followed by indistinct(27.2%)(all) and elliptical shape(25%) respectively, whereas circular shape was absent in this participants. Complex(50%) and Bone retrusion type (31.8%)of morphology was most common in these subjects followed by fat pad type(11.3%). Straight(49.4%) and convex profile (39.5%) were dominated in this facial type. High type(56.2 percent) was most commonly followed by moderate(43.7 %) from the horizontal profile view upper compartment classification, while the low type was absent. Mild (61.93 %) dominated over moderate (38 %) in the lower compartment, and high form was absent. 77 %-96 % dominated (77.8 %) in the profile view vertical compartment, and Type I was the most common in the qualitative classification of the NLF. Moderate convexity(55.1%) was most common followed by low convexity(28.9%) considering the angle of convexity.

Euryprosopic face was dominated mostly by females (64.9 %) over males, with the most prevalent moderate and mild type (NLF frontal view classification), while the high type was absent. In this subject, circular shape(64.1%) of Naso-Labial Fold was most commonly seen followed by hyperbolic (28.3%) respectively, whereas elliptical and indistinct shape was absent in these participants. Complex(30%), Fat pad type(30%), and Bone retrusion type (26%)of morphology was most common in these subjects, whereas muscular type was absent. Convex(49%) and straight profile (39.1%) were dominated in this facial type. From the horizontal profile view upper compartment classification, moderate type(71.6%) was most common, whereas low type absent in the lower compartment, moderate (58.4 percent) was dominant over

low (41.5 percent) and there was no high type. In the profile view vertical compartment, 77 % - 96% dominated (43.8%), and Type I was the most common in NLF qualitative classification but Type III was absent.Moderate convexity(54.7%) was most common followed by low(22.4%) and high convexity(22.4%) considering the angle of convexity.

Leptoprosopic face was equally present in males and females, with moderate(61.2%) and high type(38.7%)(NLF frontal view classification) most common whereas low type absent. In this subjects elliptical(54.8%) and hyperbolic shape(45.1%) of Naso-Labial Fold was only seen, whereas circular,parabolic, and indistinct shape was absent in these participants. Complex(45.1%), and muscular type (38.7%)of morphology were most common in these subjects, whereas the fat pad type was absent. Convex profile was the only profile present in this facial type. From the horizontal profile view upper compartment classification, moderate type(38.7%), high type (32.2%), and low type (29%) were equally present. In the lower compartment, low and high types were dominated by moderate (54.8 %). In the profile view vertical compartment, 36% - 56% (67.7%) dominated while 77 % - 96% was absent. Type I,Type II, and Type III were equally distributed in NLF qualitative classification. Low(45.1%) and moderate convexity(38.7%) was most common considering the angle of convexity.

The correlation of the NLF convexity angle with G-Sn-Pog and facial profile was statistically significant and had a positive correlation(R=0.48). Therefore, the NLF convexity angle increases with the value of G-Sn-Pog and vice versa. Its correlation in profile view with the vertical extent(percent) was statistically significant

and had a positive correlation with the upper(R=0.31) and lower compartments (R=0.55).

The correlation between the classification of horizontal profile view and the extent of vertical profile view (%) was statistically significant and had a positive correlation in the upper (R= 0.48) and lower compartments (R= 0.58). Therefore, the horizontal extent of the concavity is directly proportional to its vertical extent in the upper and lower compartments.

Parameter	Gender	Facial type	Profile	Shape	Morpho	NLF-H Upper	NLF-H Lower	NLF-V Upper%	FVC type
NLF-FV	HT: M MT: F LT: M≤F	HT: Me≠Eu MT: Me LT: Me≤Eu≠Le		HT: E≠C≠P MT: I=P LT: C=P≠E;H	HT:Hy;Fpt;Sst MT:Hy;Sst;Mt ;Brt LT:Hy;Mt	HT:MT≠LT MT:HT LT:HT≠LT	HT:MT=LT≠HT MT:LT LT:LT=MT≠HT	HT:X MT:Z LT:Y	HT:T1 MT:T1 LT:T1≠T3
Shape	E:M H:F C:F P:M=F I:M	Eu:C≠E;I Le:E=T≠C;I;P Me:P≠C	Cc:P≠C;I;E Cx:E≤H St: P≠H		Hy:C;E;P Brt:I;H≠P Mt:E≠P;C Sst:C≠P;I Fpt:P≠I;E				
Morpho	Brt:F Fpt:F Hy:F=M	Eu:Fpt;Hy; Brt≠Mt Le:Hy=Mt≠							
	Mt:M Sst:F=M	Fpt Me:Hy							
NLF-H Upper	HT:F MT:M LT:F=M	Eu:MT≠LT Le:MT=HT=LT Me:HT≠LT	Cc:LT≠HT;MT Cx:LT=MT St:LT=MT≠HT					**Vertical%** HT: Z;Y≠X MT: X LT: X≠Z;Y	

NLF-H Lower	HT:F MT:M LT:F=M	Eu:MT=LT≠HT Le:MT Me:LT≠HT	Cc:HT≠LT;MT Cx:HT=MT St:HT=MT≠LT					**Vertical%** HT: X≠Y;Z MT: X LT: Y;Z≠X	
FVC type	T1:F=M T2:M T3:F=M	Eu:T1≠T3 Le:T1=T2= T3Me:T1	Cc:T1 Cx:T1 St:T1≠T3					T1:Z≠X T2: X≠Y:Z T3:X≠Y:Z	
Angle of convexity	HT:F=M MT:F=M LT:F=M		Cc:MT≠LT:HT Cx:MT=LT St:MT			HT:MT;HT≠LT MT:MT;HT≠LT LT: MT;HT	HT:LT≠HT MT:MT;LT≠HT LT: MT;LT		HT:T1≠T2 MT:T1≠T3 LT:T1≠T2

HT:High Type
MT:Moderate Type
LT:Low Type
M:Male
F:Female
St:Straight

Me:Mesoprosopic
Le:Leptoprosopic
Eu:Euryprosopic
Cc:Concave
Cx:Convex

E:Elliptical
C:Circular
P:Parabolic
H: Hyperbolic
I:Indistinct

Hy:Hybrid type
Brt:Bone retrusion type
Fpt: Fat pad type
Mt:Muscular type
Sst: Simple skin type

X:36% - 56%
Y:57% - 76 %
Z:77 % - 96%

Maximum
Absent
Minimum

LIMITATIONS OF THE STUDY

For a descriptive study, the number of participants in this study was limited. A larger sample size could be used for more conclusive and reliable outcomes.

Taking into account the orthodontic treatment period and the growth status of the individuals, the study was limited to specific age groups. In order to register all the variations associated with Naso-Labial Fold, participants from all age groups should be included (eg. 25-35; 36-50; 51-65 years old).

SCOPE OF THE STUDY

This was presumably the first quantitative and qualitative classification of the Naso-Labial Fold, considering the orthodontic outlook, according to the available literature.

This classification and parameters introduced in this study can be included in orthodontic diagnostic aids as a parameter in '**Smile-Soft Tissue**' aesthetics.

The quantitative data obtained from this study can be correlated to the attractiveness of the smile.

Naso-Labial Fold can be incorporated as a parameter in orthodontic treatment and orthognathic surgical planning.

CONCLUSION

This is presumably the first study in which the classification of Naso-Labial Fold is done, with respect to the Orthodontic perspective.

In this study, Naso-Labial Fold was classified using standardized videography from frontal view and profile view photographs respectively.

I] Classifications for frontal view included:

1. According to the extension of Naso-Labial Fold at NLF1 and NLF2 soft tissue landmarks and classified as Mild, Moderate, and High considering the extent of the curve.
2. According to its geometric shape i.e circular, elliptical, indistinct, parabolic, and hyperbolic/triangular respectively.
3. According to its morphology i.e Bone retrusion type, Fat pad type, Complex type, Muscular type, and Simple skin type respectively.

II] Classifications for profile view included:

A. According to quantitative or the horizontal extension of concavity seen in the upper and lower compartment of the Naso-Labial Fold, classified as Mild, Moderate, and High Concave up or Concave down respectively.
B. According to qualitative or comparing the vertical extension of Naso-Labial Fold in the upper and lower compartment, classified as Type 1 (U>L); Type II (U≈L) and Type III (U<L) respectively.

The angle of convexity was measured considering the extension of the Naso-Labial Fold curve horizontally. It was divided into Low, moderate, and high

convexity depending on its extent and the angle measured respectively. Its correlation with G-Sn-Pog and facial profiles is statistically significant and have a positive correlation(R=0.48). Its correlation with the vertical extension(%) in profile view is statistically significant and has a positive correlation with the upper (R=0.31) and lower compartment(R=0.55).

The correlation between horizontal profile view classification and vertical profile view extension(%) is statistically significant and has a positive correlation in the upper(R=0.48) and lower compartment(R=0.58) respectively.

SUMMARY

The aim of the study was to evaluate the shape and morphology of Naso-Labial Fold during smile, with standardized photography.

The standardized video was recorded for 260 study participants while smiling which included an equal number of males and females respectively. Using MAKHTER- Facial Analysis Software, the best three smile photographs which showed a change in Naso-Labial Fold were shortlisted and facial soft tissue analysis was done.

Descriptive statistics were performed for this study. An intra-group comparison was performed using an Independent t-test. To identify correlations among quantitative changes of NLFs and convexity of Naso-Labial Fold, Pearson's correlation was analyzed

The Naso-Labial Fold was classified in frontal view considering the extent of Naso-Labial Fold NLF1 and NLF2 values (mild, moderate, high), according to its mathematical shape(Circular, elliptical, parabolic, hyperbolic and indistinct) and according to its morphology (Bone retrusion type, fat pad type, muscular type, simple skin type and complex type) respectively. The Naso-Labial Fold was classified in profile view considering its extent of concavity horizontally in the upper and lower compartment of NLF (mild, moderate, high) and classification comparing its vertical extent in upper and lower compartment (Type I, Type II, Type III) respectively.

A positive correlation was seen between the angle of convexity of NLF and G-Sn-Pog, thus facial profile. The horizontal extent of concavity in the profile view showed a positive correlation with the vertical extent of NLF in the upper and lower compartment respectively.

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moderate-to-severe Naso-Labial Folds: a randomized, evaluator-blinded study. Dermatologic Surgery. 2018 Jun 1;44(6):833-40.

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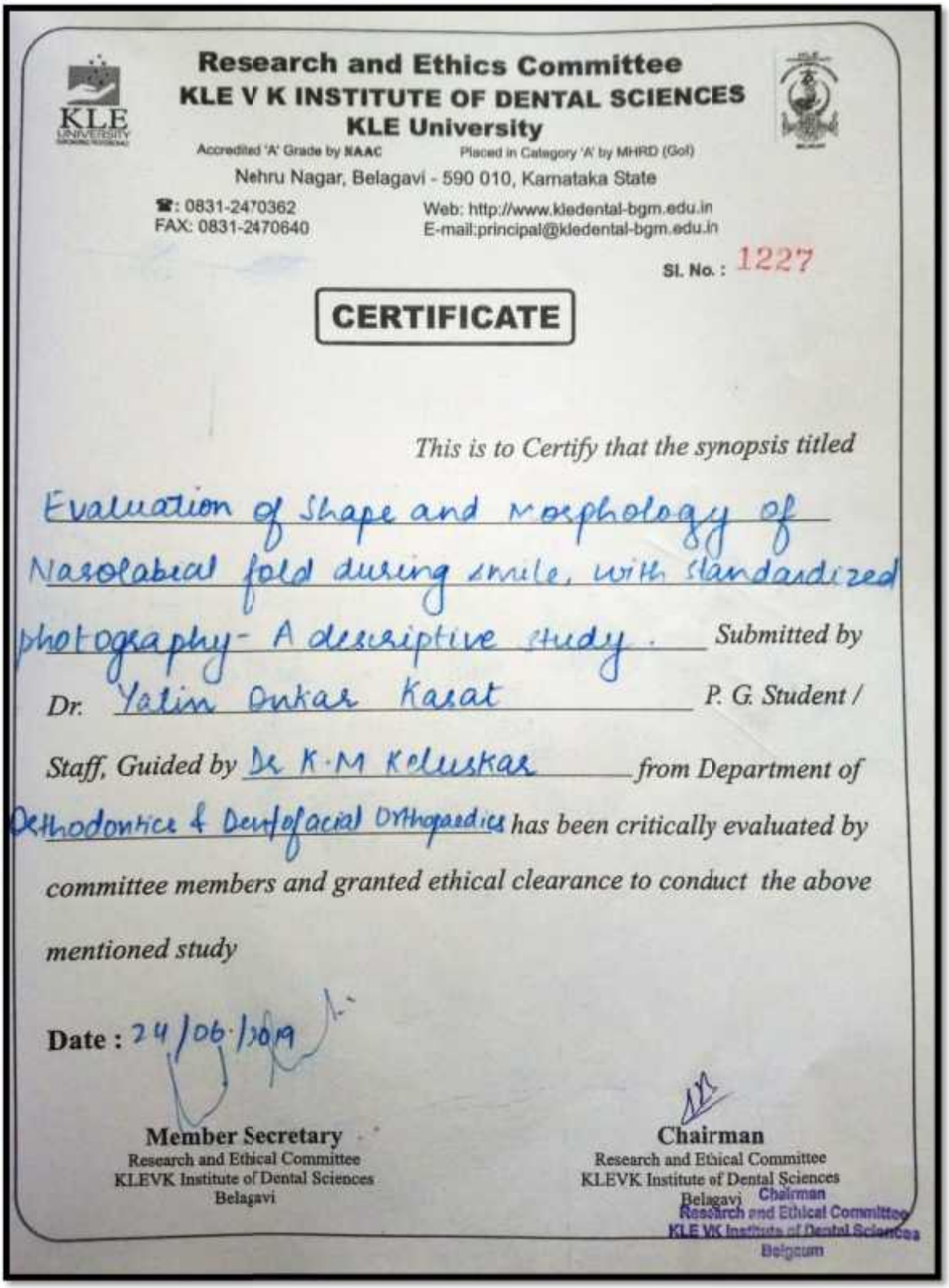
ANNEXURE – I-ETHICAL CLEARANCE



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Sl. No. : 1227

CERTIFICATE

This is to Certify that the synopsis titled

Evaluation of Shape and Morphology of Nasolabial fold during smile, with standardized photography- A descriptive study.

Submitted by

Dr. Yatin Onkar Kasat *P. G. Student /*

Staff, Guided by Dr K.M Keluskar *from Department of* Orthodontics & Dentofacial Orthopaedics *has been critically evaluated by committee members and granted ethical clearance to conduct the above mentioned study*

Date : 24/06/2019

Member Secretary
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

Chairman
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

Chairman
Research and Ethical Committee
KLE VK Institute of Dental Sciences
Belgaum

ANNEXURE – II -CONSENT FORM

KLE UNIVERSITY'S KLE VK INSTITUTE OF DENTAL SCIENCES,

BELAGAVI –590010.

CONSENT FORM

EVALUATION OF SHAPE AND MORPHOLOGY OF NASO-LABIAL FOLD DURING SMILE, WITH STANDARDIZED PHOTOGRAPHY.

OPERATOR: DR. YATIN KASAT

I, _____ aged _____ have been informed about my involvement in the study:

1. I agree to give my personal details like name, age, sex, address and the details required for the study to the best of my knowledge.
2. I am informed about the procedure of videography and also that I will be undergoing the procedure. I agree and give my consent to the orthodontist for procedure.
3. I permit the dentist to utilize the information given by me and results obtained from this study for presentation and publication purpose.
4. I will not claim any returns for my cooperation in the study, even if it is being sponsored by any agency. I am participating with my own will and wish.
5. I will follow the instructions given by the doctor.
6. During the study, if I wish to resign from the study, I am free to do so and my treatment will still be completed in the department.

In my full consciousness and presence of mind, after understanding all the procedure in my vernacular language, I am willing and give my consent to participate in this study.

Date:

Place:

Subject's Signature Signature of witness

ಸಮ್ಮತಿ/ಒಪ್ಪಿಗೆ ಪತ್ರ

ಕೆ.ಎಲ್.ಇ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಕೆ.ಎಲ್.ಇ ವಿ.ಕೆ ದಂತ ವಿಜ್ಞಾನ ಸಂಸ್ಥೆ

ಬೆಳಗಾವಿ 590010

ಪ್ರಮಾಣಿಕೃತ ಫೋಟೊಗ್ರಾಫ ಮೂಲಕ ನಗುವಾಗ ನಾಸೊಲ್ಯಾಬಿಯ್ಲ ಫೊಲ್ಡ್ ನ ಮೊರ್ಫೊಲೊಜ್ಯಿ ಮತ್ತು ಆಕಾರದ ಮುಲ್ಯಾಂಕನ

ಚಿಕಿತ್ಸೆ ಮಾಡಿದವರು: ಡಾ॥ ಯತಿನ ಕಸತ

ನಾನು, _____ ವಯಸ್ಸು:____ ಈ ಅಧ್ಯಯನದಲ್ಲಿನ ನನ್ನ ಪಲ್ಗೊಳ್ಳುವಿಕೆ ಬಗ್ಗೆ ನನಗೆ ಮಾಹಿತಿ ನೀಡಲಾಗಿದೆ.

1] ನಾನು ನನ್ನ ಉತ್ತಮ ಮಾಹಿತಿಗೆ ತಕ್ಕಂತೆ ನನ್ನ ವೈಯಕ್ತಿಕ ಮಾಹಿತಿಯನ್ನು ಆಂದರೆ ನನ್ನ ಹೆಸರು, ವಯಸ್ಸು, ಲಿಂಗ, ವಿಳಾಸ ಮತ್ತು ಅಧ್ಯಯನಕ್ಕೆ ಆವಶ್ಯಕವದ ಇತರೆ ಮಾಹಿತಿಯನ್ನು ನೀಡಲು ಒಪ್ಪಿರುತ್ತೆನೆ.

2] ನನಗೆ ಚಾಯಾಗ್ರಹಣದ ವಿಧಾನದ ಬಗ್ಗೆ ಮಾಹಿತಿ ನೀಡಲಾಗಿದ್ದು, ಹಾಗೂ ನಾನು ಈ ವಿಧಾನಕ್ಕೆ ಒಳಪಡುವ ಬಗ್ಗೆಯೂ ಮಾಹಿತಿ ನೀಡಲಾಗಿದೆ.

3] ನಾನು ಇದಕ್ಕೆ ಒಪ್ಪಿದ್ದು ಹಲ್ಲು ನೆರ್ವುಗ (ಒರ್ಥೊಡೊಂಟಿಸ್ಟ್) ಇವರಿಗೆ ನನ್ನ ಸಮ್ಮತಿಯನ್ನು ನೀಡುತ್ತೆನೆ.

4] ದಂತ ವೈದ್ಯರಿಗೆ ನಾನು ನೀಡಿದ ಮಾಹಿತಿಯನ್ನು ಮತ್ತು ಅಧ್ಯಯನದಿಂದ ಪಡೆಯಲಾದ ಪರೀಕ್ಷಣೆಗಳನ್ನು ಮಂಡನೆ ಮತ್ತು ಪ್ರಕಾಶನ ಮಾಡಲು ಬಳಸಲು ನಾನು ಈ ಮೂಲಕ ಅನುಮತಿಯನ್ನು ನೀಡುತ್ತೆನೆ.

5] ಈ ಅಧ್ಯಯನದಲ್ಲಿ, ಇದು ಯಾವುದೇ ಕಾರ್ಯಭಾರಿ (ಎಜನ್ಸಿ) ಯಿಂದ ಪ್ರಾಯೊಜಿಲ್ಪಟ್ಟಿದ್ದಾದರೂ ಸಹ, ನಾನು ನೀಡಿರುವ ಸಹಕಾರಕ್ಕೆ ನಾನು ಯಾವುದೇ ಪ್ರಕಾರದ ಸಂಭಾವನೆಯನು ಕೇಳುವುದಿಲ್ಲ. ಇದರಲ್ಲಿ ನಾನು ನನ್ನ ಸಂತೋಷದಿಂದ ಮತ್ತು ಪ್ರಜ್ಞೆಯಿಂದ ಭಾಗಿಯಾಗಿರುತ್ತೆನೆ.

6] ವೈದ್ಯರು ನೀಡಿರುವ ನಿರ್ದೆಶನಗಳನ್ನು ನಾನು ಪಾಲಿಸುತ್ತೆನೆ.

7] ಅಧ್ಯಯನ ಜಾರಿಯಲ್ಲಿರುವಾಗ, ಅಧ್ಯಯನದಲ್ಲಿನ ನನ್ನ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯಿಂದ ಹೊರ ಬೀಳಲು ನನಗೆ ಸಂಪೂರ್ಣ ಸ್ವಾತಂತ್ರ್ಯ ಇರುತ್ತದೆ, ಆದಾಗ್ಯೂ ವಿಭಾಗದಿಂದ ನನ್ನ ಚಿಕಿತ್ಸೆಯನ್ನು ಪೂರ್ಣ ಮಾಡಲಾಗುವುದು.

ಇದರಲ್ಲಿನ ವಿಧಿ–ವಿಧಾನಗಳನ್ನು ನನ್ನ ಆಡು ಭಾಷೆಯಲ್ಲಿ ತಿಳಿದುಕೊಂಡು, ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನನ್ನ ಸಮ್ಮತಿ/ಒಪ್ಪಿಗೆಯನ್ನು ನಾನು ನನ್ನ ಸಂಕೋಷದಿಂದ ಮತ್ತು ಪೂರ್ಣ ಪಜ್ಞೆಯಿಂದ ನೀಡಿರುತ್ತೆನೆ.

ಸ್ಥಳ:
ದಿನಾಂಕ

ಭಾಗಿಯಾಗುವವರ ಸಹಿ ಸಾಕ್ಷಿಯ ಸಹಿ

सम्मती पत्र

के.एल.ई विश्वविद्यालयचे वी.के दंत चिकित्सा संस्था

बेळगवी– ५९००१०

हसताना नसोलाबियल फोल्ड ची मोर्फोलोजी व आकार, मूल्यांकन, प्रमाणित छायाग्रहणा सहीत,

चिकित्सक: डॉ. यतीन कसत

मी, ---------- वय -------- या अध्ययना बद्दल मला माहिती दिलेली आहे.

१] मी, अध्ययनाला आवश्यक अशी माझी वैयक्तीक माहिती म्हणजे माझे नाव, वय, लिंग, पत्ता इत्यादी माहिती देण्यास सम्मती देत आहे.

२] मला छायाचइत्रीकरणा बद्दल महिती दिलेली असून, मी प्रक्रीयेत सहभागी होण्यास तयार आहे.

३] मी, ऑर्थोडॉन्टीस्ट यांना प्रक्रीया राबविणेस सम्मती देतो.

४] मी, मी दिलेली माहिती व अध्ययनातील परिणाम यांचा सादरीकरण व प्रकाशन करणेस ऑर्थोडॉन्टीस्ट यांना सम्मती देत आहे.

५] जरी हे अध्ययन प्रायोजीत असले तरी, मी, माझ्या कडून दिलेल्या सहकार्या बद्दल कोणतेही मानधन मगणार नाही.

६] मी वैद्यांनी दिलेल्या सूचनांचे पालन करीन.

७] अध्ययना दरम्यान मला वाटल्यास मी अध्ययनातून बाहेर पडू शकत असून, तरीदेखील विभागा कडून माझ्यावरील उपचार चालूच रहतील.

सदर प्रक्रिये बद्दल मला माझ्या भाषेत समजावून सांगितले वरून मी माझ्या संतोषाने, अक्कल हुशारीने सदर अध्ययनात सहभाग होण्यास माझी सम्मती देत आहे.

स्थळ:

तारीख:

सहभागी होणायाची सही साक्षीदाराची सही

ANNEXURE – III - DATA ENTRY SHEET

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
1	25	20.3	22.2	20.6	23.7	M	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.1	3.5	13.3	5.2	18.5
2	24	34.2	37.5	32.6	35.8	M	5	Convex	23.5	High	II	M	MT	Elliptical	7.2	6.8	10	10.05	20.05
3	21	27.6	31.8	26.4	33.6	M	4	Straight	19.5	Moderate	I	F	HT	Parabolic	8.7	3.2	19.8	4.8	24.6
4	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
5	23	31.5	35.1	30.6	37.2	M	11	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
6	20	29.5	33.6	29.1	35.4	E	10.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
7	19	27.4	36	27.1	37.4	M	7.5	Convex	13.5	High	III	M	HT	Elliptical	4.5	6.2	9.5	10	19.5
8	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
9	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
10	21	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	2.7	19.2	4	23.2
11	18	31.1	36	29.8	34.6	E	2.5	Concave	21	Moderate	I	F	FPT	Triangular	8.5	1.2	21.7	2.7	24.4
12	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	I	F	BR	Indistinct	6.4	4.5	15.2	3.1	18.3
13	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
14	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	7.6	1.2	22.6	1.4	24
15	24	28.1	32.9	24	32.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
16	22	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
17	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
18	21	28.6	32.8	27.4	33.6	M	4.5	Straight	19.5	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
19	19	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
20	23	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
21	20	23.5	29.6	24.2	30	E	10.5	Convex	22.5	Mild	II	F	FPT	Circular	6.4	7	11.8	10.2	22
22	19	27.2	36.8	27.1	37.4	M	7.5	Convex	14.5	High	III	M	HT	Elliptical	4.5	7.8	9.8	10.6	20.4
23	20	26.3	29.9	25.3	30.1	L	11	Convex	12	Moderate	I	F	HT	Triangular	8.1	3.3	13.8	8.3	21.9
24	22	30	36	29.6	36.2	M	5	Straight	27	Moderate	I	M	HT	Indistinct	10.7	5.2	14.2	2.3	16.5
25	24	22.7	32.2	23.2	31.5	M	6.5	Convex	32	Moderate	III	M	FPT	Parabolic	5.4	7.8	8.4	12.8	21.2
26	18	32.1	36.2	31.8	35.6	M	1.5	Concave	26	Moderate	I	F	HT	Triangular	9.5	2.2	22.7	2.8	25.5
27	21	25.3	32.8	24.6	33.2	M	3.5	Straight	20.5	**Moderate**	I	M	BR	Indistinct	7.4	4.6	16.2	4.1	20.3
28	19	23.8	29.4	24.5	29.8	E	2.5	Straight	29.5	Mild	I	F	FPT	Circular	9.2	6.2	15	4.2	19.2
29	20	26.8	33.2	26.4	32.7	M	9.5	Convex	19.5	Moderate	I	M	BR	Indistinct	8.6	3.2	20.6	3.4	24
30	24	29.1	34.9	28.6	35.4	L	14.5	Convex	30.5	**Moderate**	I	M	ST	Elliptical	8.2	4.6	16.5	6.2	22.7

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
31	25	19.3	24.2	20.6	23.7	E	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.3	3.8	12.3	4.2	16.5
32	24	35.2	42.5	36.6	41.8	M	13	Convex	33.5	High	I	M	MT	Elliptical	10.2	2.8	12.4	8.5	20.9
33	21	27.6	31.8	26.4	33.6	M	4	Straight	36.5	Moderate	I	F	HT	Parabolic	10.7	3.2	18.8	4.8	23.6
34	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
35	23	31.5	35.1	30.6	37.2	M	14	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
36	20	28.5	32.6	29.1	33.4	E	11.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
37	25	27.4	36	27.1	37.4	M	8.5	Convex	13.5	High	III	M	ST	Elliptical	4.5	6.2	9.5	10	19.5
38	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
39	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
40	19	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	1.7	19.2	4	23.2
41	18	31.1	36	29.8	34.6	M	2.5	Concave	21	Moderate	I	F	FPT	Parabolic	8.5	0.8	21.7	2.7	24.4
42	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	II	F	BR	Indistinct	6.4	6.2	9.2	9.8	19
43	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
44	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	11.6	1	20.6	3.4	24
45	23	27.1	34.9	26.8	33.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
46	24	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
47	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
48	18	28.6	32.8	27.4	33.6	M	4.5	Straight	36	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
49	20	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
50	22	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
51	24	20.2	23.2	20.6	23.7	M	4.5	Straight	22.5	Mild	I	F	HT	Parabolic	10.2	2.6	13.3	4.2	17.5
52	20	35.2	38.5	34.6	37.8	M	7	Convex	25.5	High	II	M	MT	Elliptical	7.2	7	9	9.05	18.05
53	23	27.6	33.8	26.4	33.6	M	6	Straight	16.5	Moderate	I	F	HT	Parabolic	9.7	2.2	18.8	5.8	24.6
54	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
55	23	31.5	35.1	30.6	37.2	M	11	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
56	20	29.5	33.6	29.1	35.4	E	10.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
57	19	27.4	36	27.1	37.4	M	7.5	Convex	13.5	High	III	M	HT	Elliptical	4.5	6.2	9.5	10	19.5
58	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
59	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
60	21	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	2.7	19.2	4	23.2
61	18	31.1	36	29.8	34.6	E	2.5	Concave	21	Moderate	I	F	FPT	Triangular	8.5	1.2	21.7	2.7	24.4

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
62	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	I	F	BR	Indistinct	6.4	4.5	15.2	3.1	18.3
63	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
64	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	7.6	1.2	22.6	1.4	24
65	24	28.1	32.9	24	32.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
66	22	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
67	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
68	21	28.6	32.8	27.4	33.6	M	4.5	Straight	19.5	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
69	19	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
70	23	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
71	20	23.5	29.6	24.2	30	E	10.5	Convex	22.5	Mild	II	F	FPT	Circular	6.4	7	11.8	10.2	22
72	19	27.2	36.8	27.1	37.4	M	7.5	Convex	14.5	High	III	M	HT	Elliptical	4.5	7.8	9.8	10.6	20.4
73	20	26.3	29.9	25.3	30.1	L	11	Convex	12	Moderate	I	F	HT	Triangular	8.1	3.3	13.8	8.3	21.9
74	22	30	36	29.6	36.2	M	5	Straight	27	Moderate	I	M	HT	Indistinct	10.7	5.2	14.2	2.3	16.5
75	24	22.7	32.2	23.2	31.5	M	6.5	Convex	32	Moderate	III	M	FPT	Parabolic	5.4	7.8	8.4	12.8	21.2
76	18	32.1	36.2	31.8	35.6	M	1.5	Concave	26	Moderate	I	F	HT	Triangular	9.5	2.2	22.7	2.8	25.5
77	21	25.3	32.8	24.6	33.2	M	3.5	Straight	20.5	**Moderate**	I	M	BR	Indistinct	7.4	4.6	16.2	4.1	20.3
78	19	23.8	29.4	24.5	29.8	E	2.5	Straight	29.5	Mild	I	F	FPT	Circular	9.2	6.2	15	4.2	19.2
79	20	26.8	33.2	26.4	32.7	M	9.5	Convex	19.5	Moderate	I	M	BR	Indistinct	8.6	3.2	20.6	3.4	24
80	24	29.1	34.9	28.6	35.4	L	14.5	Convex	30.5	**Moderate**	I	M	ST	Elliptical	8.2	4.6	16.5	6.2	22.7
81	25	19.3	24.2	20.6	23.7	E	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.3	3.8	12.3	4.2	16.5
82	24	35.2	42.5	36.6	41.8	M	13	Convex	33.5	High	I	M	MT	Elliptical	10.2	2.8	12.4	8.5	20.9
83	21	27.6	31.8	26.4	33.6	M	4	Straight	36.5	Moderate	I	F	HT	Parabolic	10.7	3.2	18.8	4.8	23.6
84	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
85	23	31.5	35.1	30.6	37.2	M	14	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
86	20	28.5	32.6	29.1	33.4	E	11.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
87	25	27.4	36	27.1	37.4	M	8.5	Convex	13.5	High	III	M	ST	Elliptical	4.5	6.2	9.5	10	19.5
88	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
89	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
90	19	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	1.7	19.2	4	23.2
91	18	31.1	36	29.8	34.6	M	2.5	Concave	21	Moderate	I	F	FPT	Parabolic	8.5	0.8	21.7	2.7	24.4
92	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	II	F	BR	Indistinct	6.4	6.2	9.2	9.8	19

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
93	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
94	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	11.6	1	20.6	3.4	24
95	23	27.1	34.9	26.8	33.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
96	24	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
97	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
98	18	28.6	32.8	27.4	33.6	M	4.5	Straight	36	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
99	20	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
100	22	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
101	18	31.1	36	29.8	34.6	E	2.5	Concave	21	Moderate	I	F	FPT	Triangular	8.5	1.2	21.7	2.7	24.4
102	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	I	F	BR	Indistinct	6.4	4.5	15.2	3.1	18.3
103	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
104	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	7.6	1.2	22.6	1.4	24
105	24	28.1	32.9	24	32.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
106	22	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
107	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
108	21	28.6	32.8	27.4	33.6	M	4.5	Straight	19.5	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
109	19	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
110	23	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
111	20	23.5	29.6	24.2	30	E	10.5	Convex	22.5	Mild	II	F	FPT	Circular	6.4	7	11.8	10.2	22
112	19	27.2	36.8	27.1	37.4	M	7.5	Convex	14.5	High	III	M	HT	Elliptical	4.5	7.8	9.8	10.6	20.4
113	20	26.3	29.9	25.3	30.1	L	11	Convex	12	Moderate	I	F	HT	Triangular	8.1	3.3	13.8	8.3	21.9
114	22	30	36	29.6	36.2	M	5	Straight	27	Moderate	I	M	HT	Indistinct	10.7	5.2	14.2	2.3	16.5
115	24	22.7	32.2	23.2	31.5	M	6.5	Convex	32	Moderate	III	M	FPT	Parabolic	5.4	7.8	8.4	12.8	21.2
116	18	32.1	36.2	31.8	35.6	M	1.5	Concave	26	Moderate	I	F	HT	Triangular	9.5	2.2	22.7	2.8	25.5
117	21	25.3	32.8	24.6	33.2	M	3.5	Straight	20.5	**Moderate**	I	M	BR	Indistinct	7.4	4.6	16.2	4.1	20.3
118	19	23.8	29.4	24.5	29.8	E	2.5	Straight	29.5	Mild	I	F	FPT	Circular	9.2	6.2	15	4.2	19.2
119	20	26.8	33.2	26.4	32.7	M	9.5	Convex	19.5	Moderate	I	M	BR	Indistinct	8.6	3.2	20.6	3.4	24
120	24	29.1	34.9	28.6	35.4	L	14.5	Convex	30.5	**Moderate**	I	M	ST	Elliptical	8.2	4.6	16.5	6.2	22.7
121	25	19.3	24.2	20.6	23.7	E	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.3	3.8	12.3	4.2	16.5
122	24	35.2	42.5	36.6	41.8	M	13	Convex	33.5	High	I	M	MT	Elliptical	10.2	2.8	12.4	8.5	20.9
123	21	27.6	31.8	26.4	33.6	M	4	Straight	36.5	Moderate	I	F	HT	Parabolic	10.7	3.2	18.8	4.8	23.6

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
124	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
125	23	31.5	35.1	30.6	37.2	M	14	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
126	20	28.5	32.6	29.1	33.4	E	11.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
127	25	27.4	36	27.1	37.4	M	8.5	Convex	13.5	High	III	M	ST	Elliptical	4.5	6.2	9.5	10	19.5
128	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
129	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
130	19	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	1.7	19.2	4	23.2
131	25	20.3	22.2	20.6	23.7	M	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.1	3.5	13.3	5.2	18.5
132	24	34.2	37.5	32.6	35.8	M	5	Convex	23.5	High	II	M	MT	Elliptical	7.2	6.8	10	10.05	20.05
133	21	27.6	31.8	26.4	33.6	M	4	Straight	19.5	Moderate	I	F	HT	Parabolic	8.7	3.2	19.8	4.8	24.6
134	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
135	23	31.5	35.1	30.6	37.2	M	11	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
136	20	29.5	33.6	29.1	35.4	E	10.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
137	19	27.4	36	27.1	37.4	M	7.5	Convex	13.5	High	III	M	HT	Elliptical	4.5	6.2	9.5	10	19.5
138	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
139	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
140	21	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	2.7	19.2	4	23.2
141	25	19.3	24.2	20.6	23.7	E	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.3	3.8	12.3	4.2	16.5
142	24	35.2	42.5	36.6	41.8	M	13	Convex	33.5	High	I	M	MT	Elliptical	10.2	2.8	12.4	8.5	20.9
143	21	27.6	31.8	26.4	33.6	M	4	Straight	36.5	Moderate	I	F	HT	Parabolic	10.7	3.2	18.8	4.8	23.6
144	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
145	23	31.5	35.1	30.6	37.2	M	14	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
146	20	28.5	32.6	29.1	33.4	E	11.5	Convex	21.5	Moderate	II	F	BR	Triangular	5.3	5.8	10.8	9.8	20.6
147	25	27.4	36	27.1	37.4	M	8.5	Convex	13.5	High	III	M	ST	Elliptical	4.5	6.2	9.5	10	19.5
148	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
149	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
150	19	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	M	FPT	Parabolic	7.2	1.7	19.2	4	23.2
151	18	31.1	36	29.8	34.6	M	2.5	Concave	21	Moderate	I	M	FPT	Parabolic	8.5	0.8	21.7	2.7	24.4
152	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	II	F	BR	Indistinct	6.4	6.2	9.2	9.8	19
153	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
154	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	11.6	1	20.6	3.4	24

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
155	23	27.1	34.9	26.8	33.4	E	13.5	Convex	32.5	Moderate	I	M	ST	Circular	7.2	4	14.5	7.2	21.7
156	24	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
157	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
158	18	28.6	32.8	27.4	33.6	M	4.5	Straight	36	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
159	20	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
160	22	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
161	18	31.1	36	29.8	34.6	E	2.5	Concave	21	Moderate	I	M	FPT	Triangular	8.5	1.2	21.7	2.7	24.4
162	23	23.3	32	24.5	33.2	M	3	Straight	23.5	Moderate	I	F	BR	Indistinct	6.4	4.5	15.2	3.1	18.3
163	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	M	HT	Circular	7.2	5.2	14	3.2	17.2
164	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	7.6	1.2	22.6	1.4	24
165	24	28.1	32.9	24	32.4	E	13.5	Convex	32.5	Moderate	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
166	22	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
167	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
168	21	28.6	32.8	27.4	33.6	M	4.5	Straight	19.5	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
169	19	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
170	23	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
171	20	23.5	29.6	24.2	30	E	10.5	Convex	22.5	Mild	II	F	FPT	Circular	6.4	7	11.8	10.2	22
172	19	27.2	36.8	27.1	37.4	M	7.5	Convex	14.5	High	III	M	HT	Elliptical	4.5	7.8	9.8	10.6	20.4
173	20	26.3	29.9	25.3	30.1	L	11	Convex	12	Moderate	I	F	HT	Triangular	8.1	3.3	13.8	8.3	21.9
174	22	30	36	29.6	36.2	M	5	Straight	27	Moderate	I	M	HT	Indistinct	10.7	5.2	14.2	2.3	16.5
175	24	22.7	32.2	23.2	31.5	M	6.5	Convex	32	Moderate	III	M	FPT	Parabolic	5.4	7.8	8.4	12.8	21.2
176	18	32.1	36.2	31.8	35.6	M	1.5	Concave	26	Moderate	I	F	HT	Triangular	9.5	2.2	22.7	2.8	25.5
177	21	25.3	32.8	24.6	33.2	M	3.5	Straight	20.5	Moderate	I	M	BR	Indistinct	7.4	4.6	16.2	4.1	20.3
178	19	23.8	29.4	24.5	29.8	E	2.5	Straight	29.5	Mild	I	M	FPT	Circular	9.2	6.2	15	4.2	19.2
179	20	26.8	33.2	26.4	32.7	M	9.5	Convex	19.5	Moderate	I	M	BR	Indistinct	8.6	3.2	20.6	3.4	24
180	24	29.1	34.9	28.6	35.4	L	14.5	Convex	30.5	Moderate	I	M	ST	Elliptical	8.2	4.6	16.5	6.2	22.7
181	18	31.1	36	29.8	34.6	M	2.5	Concave	21	Moderate	I	F	FPT	Parabolic	8.5	0.8	21.7	2.7	24.4
182	23	23.3	32	24.5	33.2	M	3	Straight	23.5	Moderate	II	M	BR	Indistinct	6.4	6.2	9.2	9.8	19
183	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
184	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	11.6	1	20.6	3.4	24
185	23	27.1	34.9	26.8	33.4	E	13.5	Convex	32.5	Moderate	I	F	ST	Circular	7.2	4	14.5	7.2	21.7

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
186	24	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
187	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
188	18	28.6	32.8	27.4	33.6	M	4.5	Straight	36	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
189	20	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
190	22	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
191	24	20.2	23.2	20.6	23.7	M	4.5	Straight	22.5	Mild	I	M	HT	Parabolic	10.2	2.6	13.3	4.2	17.5
192	20	35.2	38.5	34.6	37.8	M	7	Convex	25.5	High	II	M	MT	Elliptical	7.2	7	9	9.05	18.05
193	23	27.6	33.8	26.4	33.6	M	6	Straight	16.5	Moderate	I	M	HT	Parabolic	9.7	2.2	18.8	5.8	24.6
194	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
195	23	31.5	35.1	30.6	37.2	M	11	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
196	20	29.5	33.6	29.1	35.4	E	10.5	Convex	21.5	Moderate	II	M	BR	Triangular	5.3	5.8	10.8	9.8	20.6
197	19	27.4	36	27.1	37.4	M	7.5	Convex	13.5	High	III	M	HT	Elliptical	4.5	6.2	9.5	10	19.5
198	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	M	HT	Triangular	3.3	8.1	8.1	13.8	21.9
199	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
200	21	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	2.7	19.2	4	23.2
201	18	31.1	36	29.8	34.6	M	2.5	Concave	21	Moderate	I	M	FPT	Parabolic	8.5	0.8	21.7	2.7	24.4
202	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	II	F	BR	Indistinct	6.4	6.2	9.2	9.8	19
203	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
204	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	11.6	1	20.6	3.4	24
205	23	27.1	34.9	26.8	33.4	E	13.5	Convex	32.5	**Moderate**	I	M	ST	Circular	7.2	4	14.5	7.2	21.7
206	24	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
207	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
208	18	28.6	32.8	27.4	33.6	M	4.5	Straight	36	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
209	20	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
210	22	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
211	18	31.1	36	29.8	34.6	E	2.5	Concave	21	Moderate	I	M	FPT	Triangular	8.5	1.2	21.7	2.7	24.4
212	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	I	F	BR	Indistinct	6.4	4.5	15.2	3.1	18.3
213	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	M	HT	Circular	7.2	5.2	14	3.2	17.2
214	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	7.6	1.2	22.6	1.4	24
215	24	28.1	32.9	24	32.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
216	22	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
217	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
218	21	28.6	32.8	27.4	33.6	M	4.5	Straight	19.5	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
219	19	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
220	23	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
221	20	23.5	29.6	24.2	30	E	10.5	Convex	22.5	Mild	II	F	FPT	Circular	6.4	7	11.8	10.2	22
222	19	27.2	36.8	27.1	37.4	M	7.5	Convex	14.5	High	III	M	HT	Elliptical	4.5	7.8	9.8	10.6	20.4
223	20	26.3	29.9	25.3	30.1	L	11	Convex	12	Moderate	I	F	HT	Triangular	8.1	3.3	13.8	8.3	21.9
224	22	30	36	29.6	36.2	M	5	Straight	27	Moderate	I	M	HT	Indistinct	10.7	5.2	14.2	2.3	16.5
225	24	22.7	32.2	23.2	31.5	M	6.5	Convex	32	Moderate	III	M	FPT	Parabolic	5.4	7.8	8.4	12.8	21.2
226	18	32.1	36.2	31.8	35.6	M	1.5	Concave	26	Moderate	I	F	HT	Triangular	9.5	2.2	22.7	2.8	25.5
227	21	25.3	32.8	24.6	33.2	M	3.5	Straight	20.5	**Moderate**	I	M	BR	Indistinct	7.4	4.6	16.2	4.1	20.3
228	19	23.8	29.4	24.5	29.8	E	2.5	Straight	29.5	Mild	I	M	FPT	Circular	9.2	6.2	15	4.2	19.2
229	20	26.8	33.2	26.4	32.7	M	9.5	Convex	19.5	Moderate	I	M	BR	Indistinct	8.6	3.2	20.6	3.4	24
230	24	29.1	34.9	28.6	35.4	L	14.5	Convex	30.5	**Moderate**	I	M	ST	Elliptical	8.2	4.6	16.5	6.2	22.7
231	18	31.1	36	29.8	34.6	M	2.5	Concave	21	Moderate	I	F	FPT	Parabolic	8.5	0.8	21.7	2.7	24.4
232	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	II	M	BR	Indistinct	6.4	6.2	9.2	9.8	19
233	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
234	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	11.6	1	20.6	3.4	24
235	23	27.1	34.9	26.8	33.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
236	24	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
237	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
238	18	28.6	32.8	27.4	33.6	M	4.5	Straight	36	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
239	20	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
240	22	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4
241	25	20.3	22.2	20.6	23.7	M	2.5	Straight	20.5	Mild	I	F	HT	Parabolic	9.1	3.5	13.3	5.2	18.5
242	24	34.2	37.5	32.6	35.8	M	5	Convex	23.5	High	II	M	MT	Elliptical	7.2	6.8	10	10.05	20.05
243	21	27.6	31.8	26.4	33.6	M	4	Straight	19.5	Moderate	I	F	HT	Parabolic	8.7	3.2	19.8	4.8	24.6
244	24	32.9	39.1	33.8	41.6	M	2	Straight	21	High	I	M	HT	Elliptical	5.7	3.1	15.7	6.4	22.1
245	23	31.5	35.1	30.6	37.2	M	11	Convex	29	High	I	F	ST	Triangular	8.4	3.6	13.2	7.3	20.5
246	20	29.5	33.6	29.1	35.4	E	10.5	Convex	21.5	Moderate	II	M	BR	Triangular	5.3	5.8	10.8	9.8	20.6
247	19	27.4	36	27.1	37.4	M	7.5	Convex	13.5	High	III	M	HT	Elliptical	4.5	6.2	9.5	10	19.5

		Right		Left		Facial type				Frontal view Classif			Morpho Classif		Hor- Profile view		Ver-Profile view		
Sr no.	Age	NLF1	NLF2	NLF1	NLF2	FT	G-Sn-Pog	Profile	Angle°	FVC	Type	SEX	MC	Shape	U	L	U	L	T
248	20	25.3	28.9	25.3	30.1	L	10	Convex	10	Moderate	III	F	HT	Triangular	3.3	8.1	8.1	13.8	21.9
249	22	29	35	29	36.2	M	5	Straight	17	Moderate	I	M	HT	Indistinct	9.7	4.2	13.2	1.3	14.5
250	21	23.7	33.2	25.2	31.5	M	5.5	Straight	34	Moderate	I	F	FPT	Parabolic	7.2	2.7	19.2	4	23.2
251	18	31.1	36	29.8	34.6	E	2.5	Concave	21	Moderate	I	M	FPT	Triangular	8.5	1.2	21.7	2.7	24.4
252	23	23.3	32	24.5	33.2	M	3	Straight	23.5	**Moderate**	I	M	BR	Indistinct	6.4	4.5	15.2	3.1	18.3
253	19	25.8	29.2	26.5	29.8	E	2	Straight	19.5	Mild	I	F	HT	Circular	7.2	5.2	14	3.2	17.2
254	20	26	32.1	26.4	31.7	M	7	Convex	17.5	Moderate	I	M	BR	Indistinct	7.6	1.2	22.6	1.4	24
255	24	28.1	32.9	24	32.4	E	13.5	Convex	32.5	**Moderate**	I	F	ST	Circular	7.2	4	14.5	7.2	21.7
256	22	22.3	29.1	23.2	30	M	1	Concave	28.5	Mild	I	M	HT	Parabolic	8.1	3.5	12.3	5.2	17.5
257	25	34.1	39.6	33.5	38.8	L	12	Convex	30	High	II	M	MT	Elliptical	7.6	7.2	11.2	10.6	21.8
258	21	28.6	32.8	27.4	33.6	M	4.5	Straight	19.5	Moderate	I	M	HT	Parabolic	9.7	3.6	18.8	4.6	23.4
259	19	31.9	38.1	32.8	39.6	M	2	Straight	24	High	II	M	HT	Elliptical	5.7	5.4	10.6	10.8	21.4
260	23	32.5	36.1	31.6	36.8	M	12	Convex	29	High	I	F	BR	Triangular	8.2	3.8	14.2	7.2	21.4