"CO RELATION BETWEEN SMILE ESTHETIC AND NASOLABIAL FOLD. A CROSS SECTIONAL ANALYTICAL STUDY"

By

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Dissertation

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IN

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KLE VISHWANATH KATTI INSTITUTE OF DENTAL SCIENCES,

KAHER, BELAGAVI, KARNATAKA.

2020 - 2023

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LIST OF ABBREVIATION

NLF	:	Naso-Labial Fold
U	:	Upper
L	:	Lower
Sn	:	Subnasale
Ls	:	Labrale superius
G	:	Glabella
N	:	Nasion
Pog	:	Pogonion
x1 and x3	:	Point perpendicular to the N-Pog plane definitely opposite to Sn on left and right side
x2 and x4	:	Point perpendicular to the N-Pog plane definitely opposite to Ls on left and right side

ABSTRACT

Aim and Objective: To co-relate perception of smile esthetics with classification of nasolabial fold using standardized video-photography among orthodontists

1. To obtain esthetic smile evaluated by orthodontist
2. To co relate esthetic smile with established classification of nasolabial fold
3. To incorporate nasolabial fold and esthetic smile as parameters in orthodontic treatment and orthognathic surgical planning.

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 (72) and females (72), 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 distribution of study participants according to their shape was dominated by elliptical shape(32.6%) followed by indistinct (30.6%), circular (18.1%), parabola type (16%) and hyperbola type (2.8%) having the least.

Distribution of study participants according to Morphological classification: The distrubution of subjects according to morphology showed maximum in simple skin with 32.6%(47 subjects) followed by fat pad with 24.3%(35 subjects), muscular type with 22.9%(33 subjects), hybrid type being 11.1%(16 subjects) and with least being the bone retrusion with 9% (13 subjects)

Conclusion: Perception of smile esthetics was co-related with classification of nasolabial fold using standardized video-photography

- The obtained esthetic smile samples were evaluated by orthodontist and were categorized under three classifications namely-
    1. Esthetically unpleasant
    2. Esthetically acceptable
    3. Esthetically pleasant
- For any orthodontic and orthognathic surgery,with respect to pleasant smile the following parameter of nasolabial fold were obtained
- The NLF classification of high type to be considered
- (High type refers to the distance of NLF1 from the mid-saggital plane should be 30.1-36mm and NLF2 from the mid-saggital plane should be 37.1-44mm, with established classification from previous dessertation)
- The NLF1 Left should be 30.09 ± 6.73 mm.
- The NLF1 right should be 29.97 ± 6.16 mm
- The NLF2 Left should be 35.78 ± 5.45 mm.
- The NLF2 Right should be 35.58 ± 3.78mm.
- The shape of nasolabial fold should be ellipse/parabola.
- The morphology of nasolabial fold should be musuclar/bony retrusion type.

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

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INTRODUCTION

In today's era, patients are more concerned about smile esthetics. This being the main reason to seek orthodontic treatment in patients. Since the patient's decision to undertake orthodontic treatment is based primarily on esthetic considerations, the evaluation and understanding of the factors that influence their decision is of key importance to evaluate overall orthodontic treatment.

Various body characteristics determine physical attractiveness, but facial appearance seems to be the most important component of physical attractiveness [1] and in that smile is the cornerstone of the social interactions[2]. 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. [3]

In modern dental practice esthetic enhancement of Oro-facial architecture is of utmost importance to the patient, which ultimately depends to a great extent on the presence of bright, pleasing and attractive smile. Smile may be defined as a change of facial expression involving brightening of the eyes an upward curving of the corners of the mouth with no sound and less muscular distortion.

Facial harmony and balance are determined by the facial skeleton and its soft tissue drape. The evaluation of the soft tissue role is vital in smile designing. Soft tissue changes have been shown to accompany growth, orthodontic treatment as well as plastic surgery.

It is for these reasons that the soft tissue role must be carefully examined before a decision regarding smile enhancement, orthodontic treatment and/or orthognathic surgery can be made. Review of the nasolabial soft tissue is important

when contemplating smile enhancement since movement of the maxillary incisor in any of the three planes of space influences this area.

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. [4,5]

The success of smile design is determined by the patient's soft-tissue limitations and the extent to which orthodontics or multidisciplinary treatment can satisfy the patient's and orthodontist's esthetic goals.

Facial profile and lip-dynamics can be assessed by evaluating nasolabial angle on rest and nasolabial angle on posed smile from lateral photographs of the patients at rest, and on posed smiling respectively. Gingival tissue-display, and tooth-display, can be assessed by analysing, the static frontal photograph on posed smile.

A detailed esthetic judgment of the face should be carried out using the patient’s frontal face view, during conversation, their facial expressions and smiling. When we consider smile esthetics, one study reported that orthodontists and their patients did not agree in their evaluation of the esthetic preference of frontal and profile views of the same smile. For this reason, it has been recommended that orthodontists should not only consider profile evaluation, but also other soft tissue parameter like nasolabial fold.

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] Much attention 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 special considerations in orthodontic diagnosis and treatment planning represent the new vistas in orthodontics that reflect the incorporation of artistic elements into our decision-making process. Many of our decisions are now based on proportions, not linear measurements. Shape and form are now important features of contemporary treatment planning, and draw on the talents of the orthodontist to "see" and establish the goals of treatment in terms of health, wellness, and appearance.

The morphology of the nasolabial crease is determined largely by the skeleton in rest, implying it can be altered by orthopaedic or orthodontic correction. Evaluation of nasolabial fold can serve as diagnostic aid in orthodontic treatment and orthognathic surgical planning.

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 diversify from the elevators of the upper lip muscles.
c. Elevators of the muscles of the upper lip pass through the fold on the way to the upper lip vermillion, and
d. Muscle fibres emerging 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 Musculo Aponeurotic 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.

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 concerning orthodontic diagnosis and treatment planning. Thus, this prompts us for a more specific 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 Rater's 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.

The literature has extensively covered the subject of smile in an objective manner; however, only a few studies have investigated the pleasant and unpleasant features of one's smile. With a view to discussing this issue and giving further contribution to the literature, this study aimed at co-relation of perception of smile esthetics with classification of nasolabial fold using standardized photography among orthodontists.

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 co-relate perception of smile esthetics with classification of nasolabial fold using standardized video-photography among orthodontists

OBJECTIVES

1. To obtain esthetic smile evaluated by orthodontist.
2. To co relate esthetic smile with established classification of nasolabial fold
3. To incorporate nasolabial fold and esthetic smile as parameters in orthodontic treatment and orthognathic surgical planning.

REVIEW OF LITERATURE

Enio Ribeiro Cotrim et al (2014) Conducted photographic study emphasizing the lower third of the face where 41 subjects were assessed by three groups (orthodontists, laypeople and clinicians) who graded the smiles from to 9 to highlight differences in perception of smile esthetics and to assess factors such as lip thickness, smile height, color gradation, tooth size and crowding associated with smile unpleasantness. This study concluded that Orthodontists, laypeople and clinicians similarly assess smile esthetics: however, noticing different characteristics. Thus, the orthodontist must be careful not to impose his own perception of smile esthetics

Vinod Krishnan et al (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

Stebel et al (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.

Lu Zhang et al (2014) studied the classification of Naso-Labial Folds in 900 Asian patients who sought facial rejuvenation treatment in Shanghai 9 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 complex.

Leonard R. Rubin' (1998) studied the anatomy of Naso-Labial Fold in 1000 patients surgically. D 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.

Eul Seon Back et al (2018) studied quantitative and perceived visual clunges of the Naso-Labial Fold following orthodontic retraction of lip protrusion on 39 adult women using computed tomography images retrospectively for measuring NLFI 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 (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 (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.

Bristine M. Jones et al (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.

Philipp Metzler et al (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 10 mm.

Donald S. Mowlds et al (2017) conducted a study on 77 patients evaluating before and after injection of the checks with Hyaluronic acid filler using a three-dimensional camera system and concluded filling the cheek with Jee 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 (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.

Tomonobu Ezure et al (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 (2016) evaluated 12-month effectiveness and safety of VYC-175 L 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 (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.

Marcus C. C. Lim et al (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 (2016) investigated the 3-dimensional (3D) anatomical structure of the muscles o 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.

Elham S. J. Abu Alhaija et al (2010)-conducted a study where their purposes were to rate the attractiveness of different smile variables, to compare the perception of Jordanian laypeople, general practitioners, and orthodontists to altered smile esthetics, and to identify the threshold where different variables begin to impair smile esthetics. A smiling photograph of a female dental student was selected and digitally manipulated to create changes in buccal corridor space (BCS). the amount of gingival

display, and the midline diastema. These altered images were rated by three groups of Jordanians: 200 laypeople. 200 general practitioners and 160 orthodontists. Smile esthetics scores were calculated and comparisons between groups were performed. The results showed that profession and gender affected BCS and midline diastema attractiveness ratings. Wide BCSS, a gingival display of more than 2 mm, and the presence of a midline diastema of any size were rated as unattractive by all groups.

Flores-Mir et al (2004)-conducted a cross sectional survey to compare the aesthetic perception of different anterior visible occlusions in different facial and dental views (frontal vigy, lower facial third view and dental view) by lay persons. The different views of the subjects were rated by 91 randomly selected adult lay persons The study concluded that- a lay panel perceived the aesthetic impact of the visible anterior occlusion was greater in a dental view compared with a full facial view. The anterior visible occlusion, photographed subject, view type are factors, which influence the aesthetic perception of smiles. In addition, gender and level of education had an influence.

MATERIALS AND METHODS

STUDY DESIGN: A CROSS SECTIONAL ANALYTICAL STUDY

SOURCE OF DATA: The data was obtained from the subjects visiting KLE VK Institute of Dental Sciences And Research Center, Nehru nagar, Belagavi-590010, Karnataka

INCLUSION CRITERIA:

1. Volunteers with no gross facial deformity.
2. Equal number of male and female volunteers.
3. Volunteers within age group of 18-25 yrs.

EXCLUSION CRITERIA:

1. Volunteers undergone facial surgical procedure.
2. Volunteers with facial skeletal asymmetry.
3. Orthodontically treated volunteers.
4. Volunteers having history of Diabetes, Tobacco consumption.
5. Volunteers having apparent scars and pigment patches on the face.
6. Volunteers previously treated with facial botox.
7. Volunteers with considerable make up.
8. Volunteers with nerve damage (e.g. Trigeminal Neuralgia, Facial Palsy)

PERMISSION TO BE TAKEN:

- Institutional ethical clearance

SAMPLE SIZE ESTIMATION:

The sample size (n) is derived by using the "comparing two means" formula:

$$n = \frac{(Z\alpha/2+Z\beta)^2 * 2*\sigma^2}{d^2}$$

where Zα/2 – critical value at confidence level of 95%,

α is 0.05 and the critical value is 1.9,

Zβ – for a power of 80%, β is 0.2 and the critical value is 0.84),

σ^2 is the population variance,

d – mean difference between 2 groups (master article reference –Alhaija ES et al, 2010)

Substituting the values in the above formula,

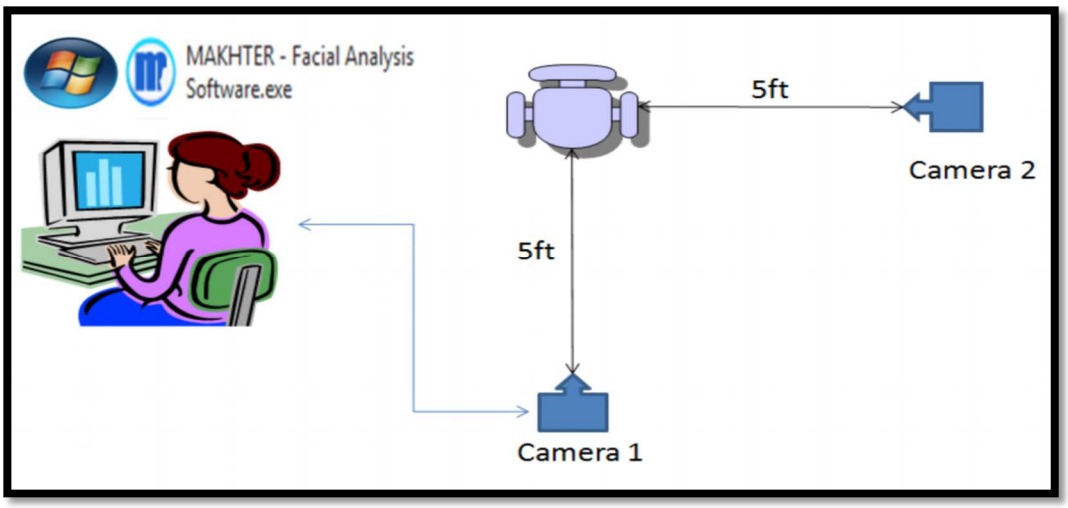
$$n = \frac{\{(0.76)^2+(0.81)^2\}\ (1.96 + 0.84)^2}{(3.31-2.86)^2}$$

A sample size of 47.8~ 48 subjects photograph in each group is derived, considering 3 groups, the total sample size is 144.

INSTRUMENTS AND MATERIALS:

1. Two DSLR Cameras (Canon EOS 1200D)
2. Two Tripod stands.
3. Measurement tape sticker.
4. 1 height adjustable chair.
5. Laptop with MAKHTER Facial Analysis Software.

DETAILS OF THE PROCEDURES CONDUCTED DURING THE RESEARCH



PROCEDURE CARRIED OUT

- The subjects were asked to wash their face (nasolabial fold being an undercut, there were chances of sweat and dust to lodge on it) and then allowed to sit on the height adjustable chair with their back and shoulders straight, with 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 the front of the subject (frontal view) and other lateral to the subject (profile view).

- The measurement tape was then stuck at the center of the forehead and the other one being placed lateral side of the face with 10mm distance from where the nasolabial fold emerges, to eliminate the magnification error. Focus of both the cameras were adjusted with standardized settings such that the face and neck of the subject were clearly visible.
- The volunteers were given instructions prior to the videography. The volunteers were instructed to smile from rest position of the lip then back to rest position. The video was captured in standard settings, and the subject smile was recorded.
- The video captured was then split in photographs by using MAKHTER- Facial Analysis Software
- The Frontal facial photographs of patient's smile was edited. In other words, they were cropped so as to highlight the lower third of the face, particularly the smile. Ten Orthodontists were asked to classify the photographs using global rating scale, with the scores from 1 to 9, as follows:
- Esthetically unpleasant (scores 1, 2 or 3)
- Esthetically acceptable (scores 4, 5 or 6)
- Esthetically pleasant (scores 7, 8 or 9)

The following images were taken for the reference from article entitled – "Perception of adults' smile esthetics among orthodontists, clinicians and lay people"

1.Esthetically unpleasant

2. Esthetically acceptable

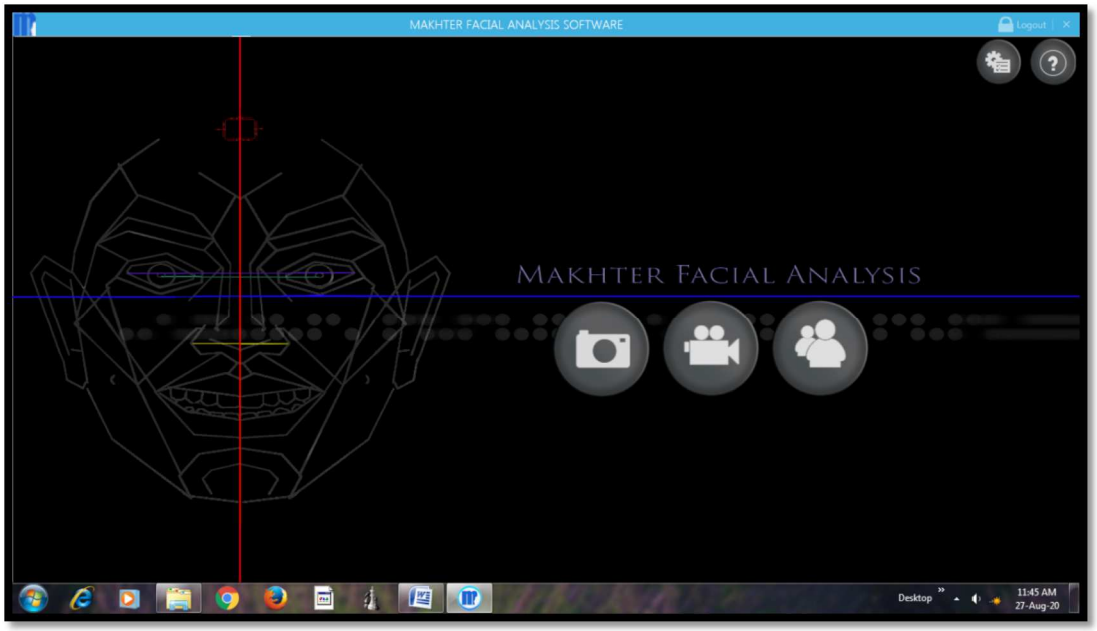
3. Esthetically pleasant

The assessment was carried out by 10 orthodontists, who were asked to fill the questionnaire so as to establish an association between smile unpleasantness and factors such as lip thickness, smile height, color gradation, teeth size and crowding. To eliminate Intra-examiner error, the respective examiners were given 10% of the sample size randomly selected to analyze and score after a period of one month.

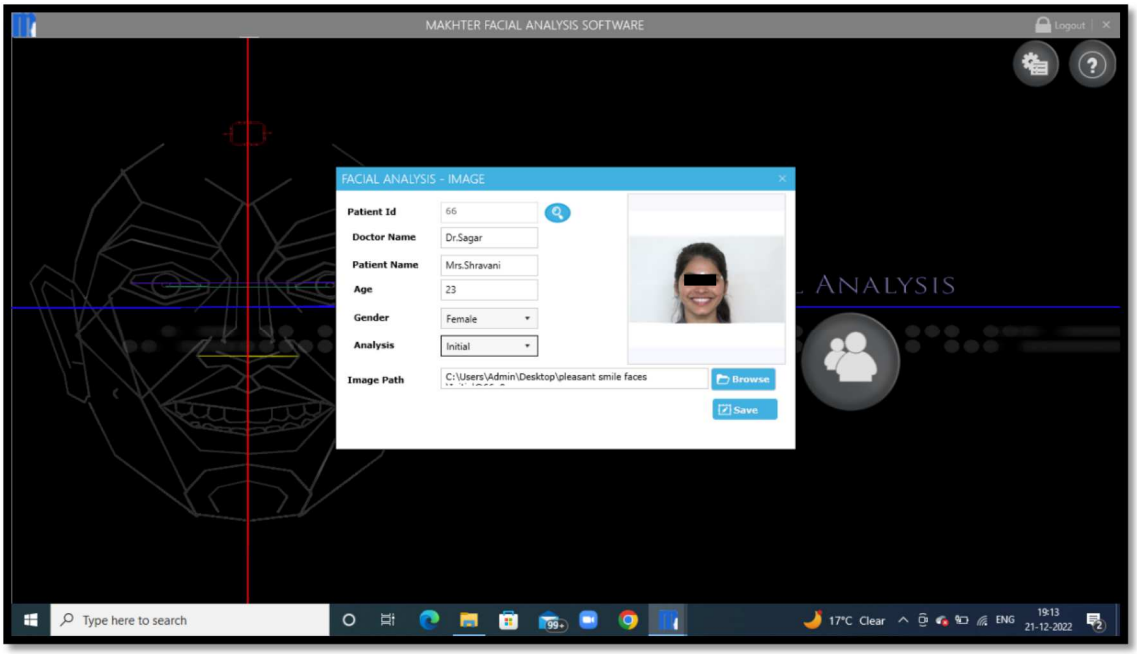
A total of 144 smile samples were obtained, these smiles were then categorized according to the established nasolabial fold classification.

MAKHTER- Facial Analysis Software

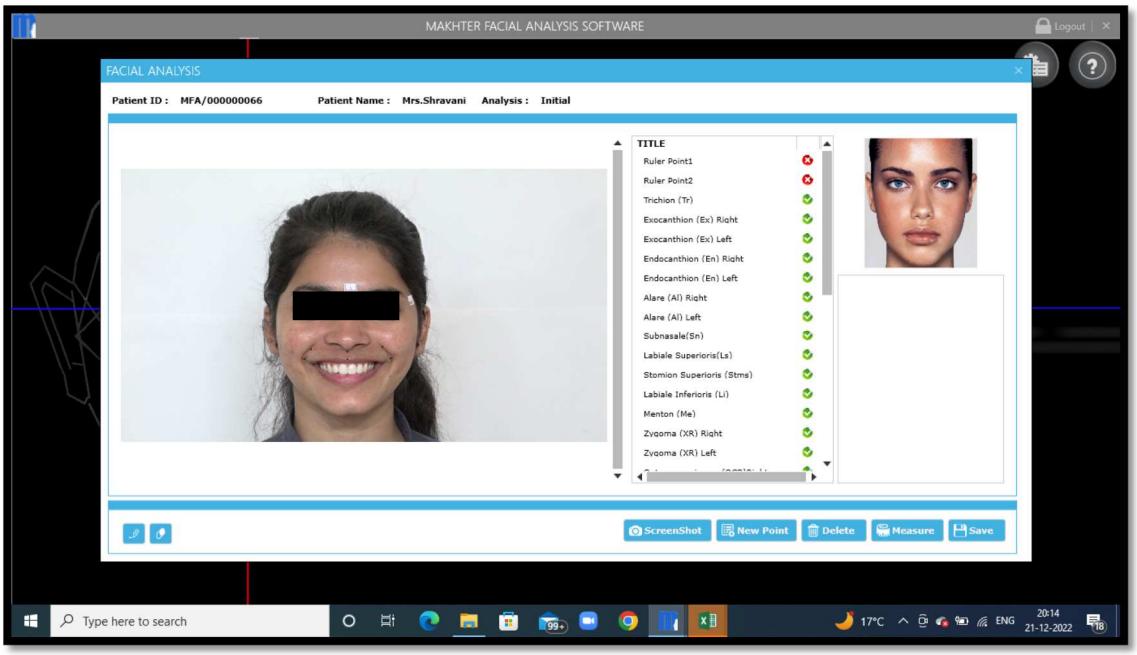
1. **Homepage display of the MAKHTER Software**



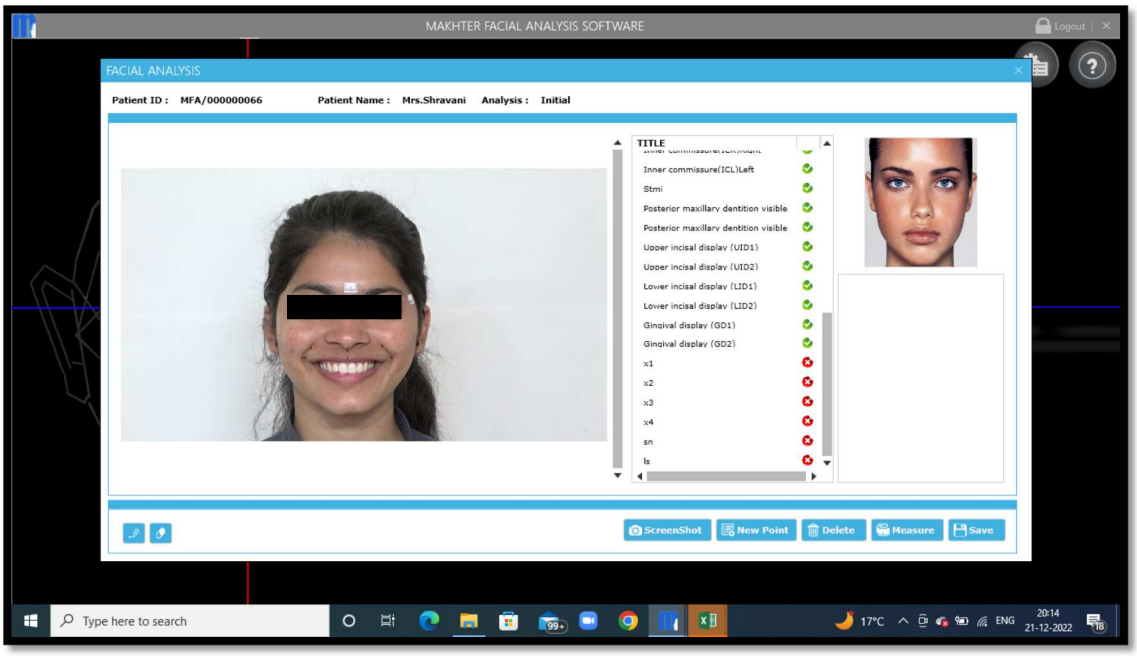
2.The entry of patient details



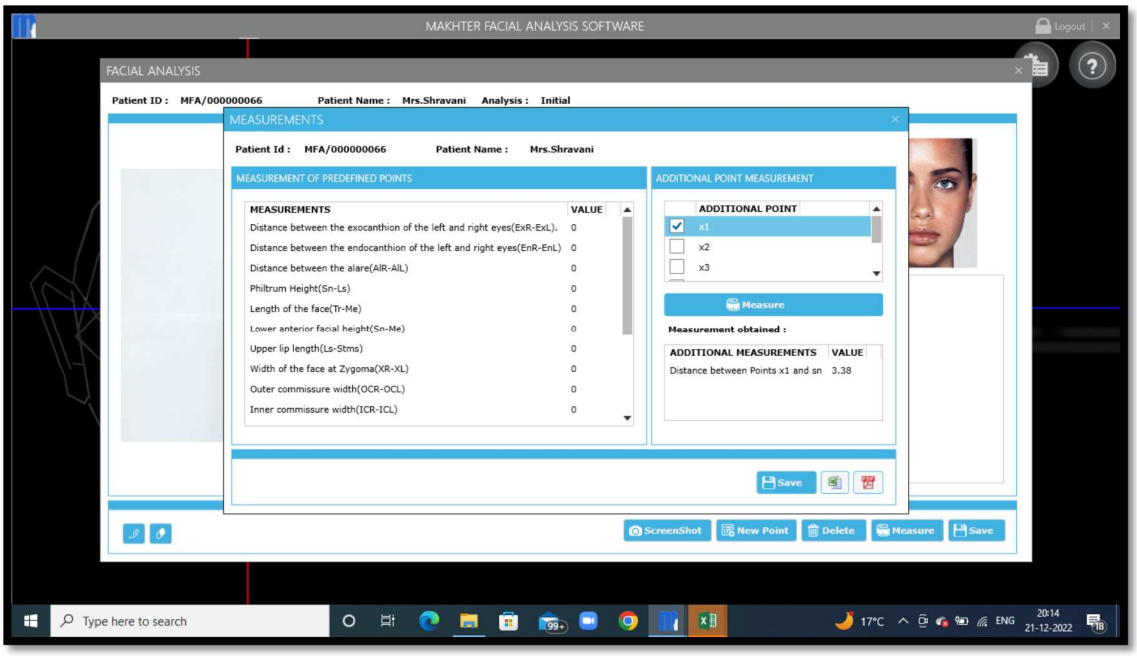
3.Marking of Ruler points on measurement tape to eliminate magnification error.



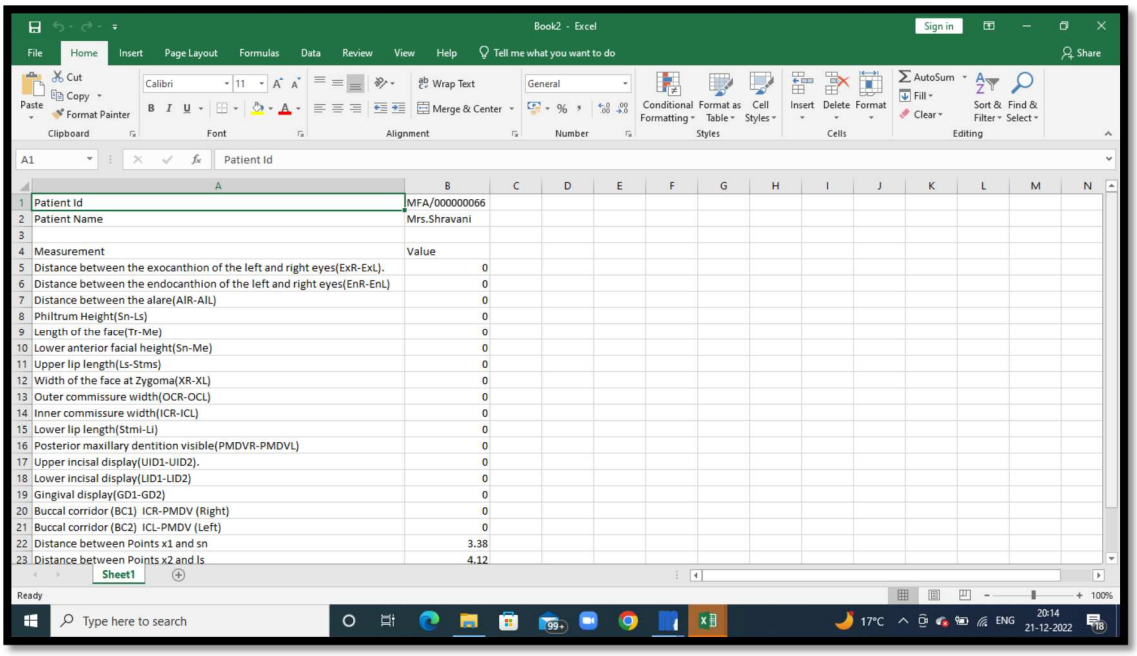
4.Marking of soft tissue landmarks



5.Measuring the distance between two soft tissue landmarks



6. 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]

Fig. 2 Three-dimensional facial soft tissue landmarks

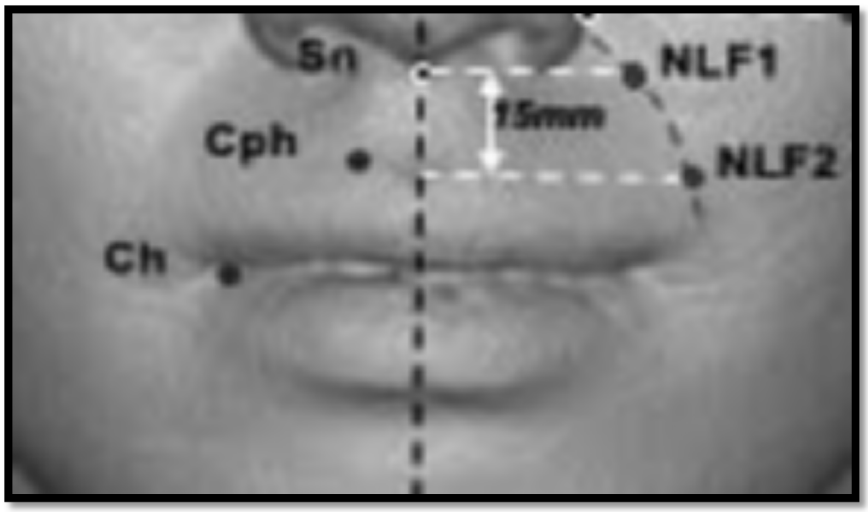
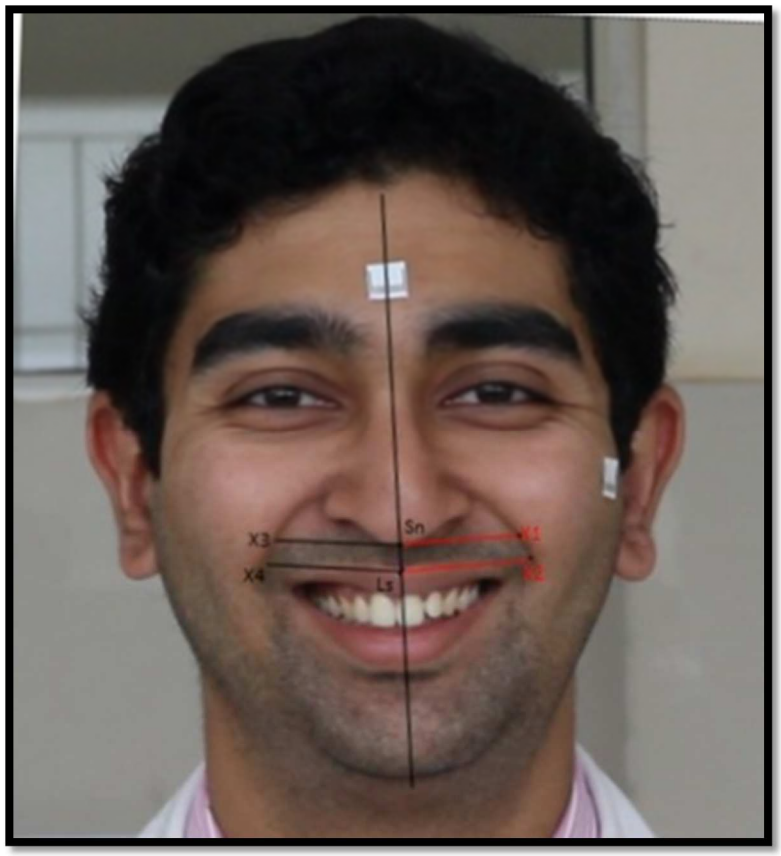


Fig. 3 Marking and mea[redacted]bnasale; Ls: Labrale superius; x1 and x3: Points mark[redacted]Pog plane exactly opposite to Sn on left and right side; x2 and x4: Points marked perpendicular to the N-Pog plane exactly opposite to Ls on left and right side respectively



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

CLASSIFICATION OF NASOLABIAL FOLD

1. Extent of the Nasolabial fold

Distance of nasolabial fold (NLF1* and NLF2*) from midsagittal plane were measured.

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

Shape	Description
Circle	Circle is defined as set of points that are equidistant from certain point.
Ellipse	**Ellipse is a regular oval shape, it is 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	**The hyperbola is two curve that are like infinite bows. It is somewhat triangular in form.**
Indistinct	**The curve that is not even, straight, or smooth.**

2. Shape of the Nasolabial fold:

3.Morphology of the nasolabial fold:

Sr no.	Type	Features
1.	**Simple skin type**	**Fine wrinkles; nasolabial 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; nasolabial fold displayed as a deep furrow.**
4.	**Bone retrusion type**	**Retrusion of bone tissue around the pyriform aperture; the upper segment of nasolabial fold manifested as concave.**
5.	**Hybrid type**	**Combination of two or more of the above types.**

STATISTICAL TEST:

Method of Statistical analysis –

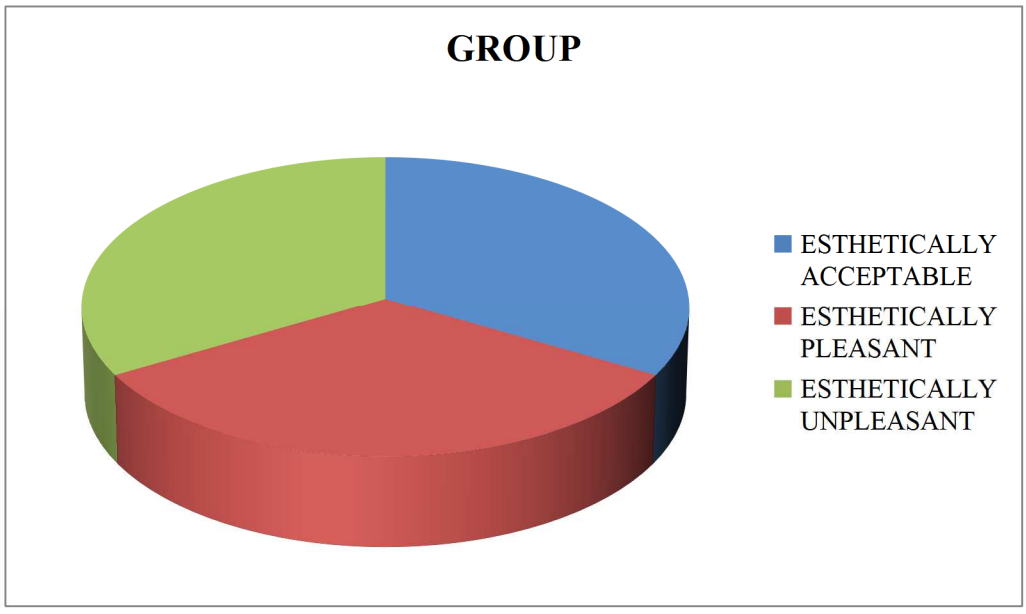
- Data obtained was entered in Microsoft Excel.
- Descriptive and Frequency analysis was done by using Statistical Product and Service Solution (SPSS) (v.21.0) software.
- One-way ANOVA followed by Post hoc tests (Bonferroni, Tukey's HSD) was performed to determine the within group and inter-group comparisons.
- Chi-square test of proportion was performed, if required for significance within parameters.
- Kappa statistics was done for Inter examiner and Intra examiner reliability
- Non-parametric tests was performed wherever required.
- p value of <0.05 was considered statistically significant

RESULTS

TABLE 1: DISTRIBUTION OF SUBJECTS AS PER TYPE OF SMILE

	Frequency	Percent
Esthetically Acceptable	48	33.3%
Esthetically Pleasant	48	33.3%
Esthetically Unpleasant	48	33.3%
Total	144	100.0%

GRAPH 1: DISTRIBUTION OF SUBJECTS AS PER TYPE OF SMILE

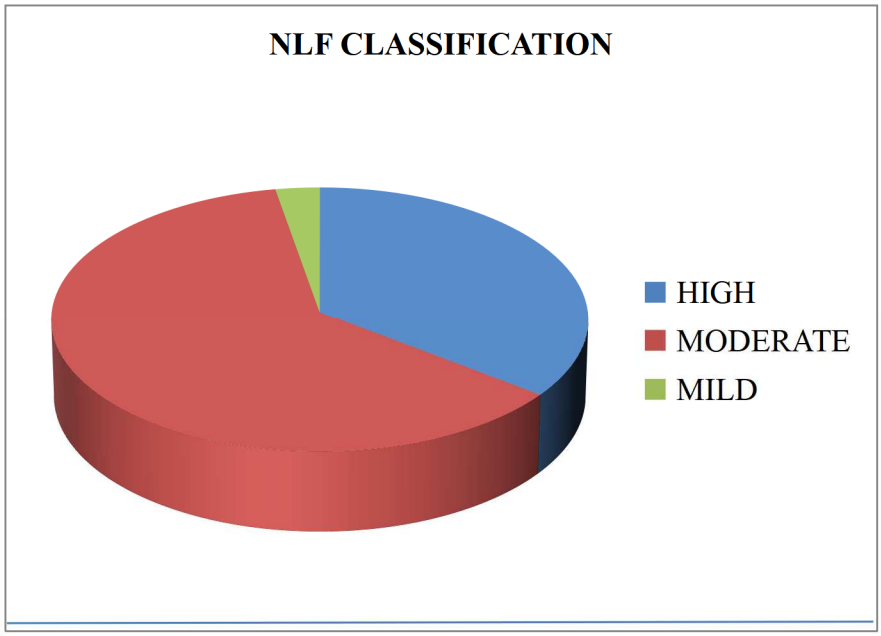


The pie chart shows equal distribution of the study groups.

TABLE 2: THE DISTRIBUTION OF SUBJECTS AS PER EXTENT OF NASOLABIAL FOLD

EXTENT OF NLF FOLD	FREQUENCY	PRECENTAGE
HIGH	51	35.4%
MODERATE	89	61.8%
MILD	4	2.8%
Total	144	100.0%

GRAPH 2: THE DISTRIBUTION OF SUBJECTS AS PER EXTENT OF NASOLABIAL FOLD

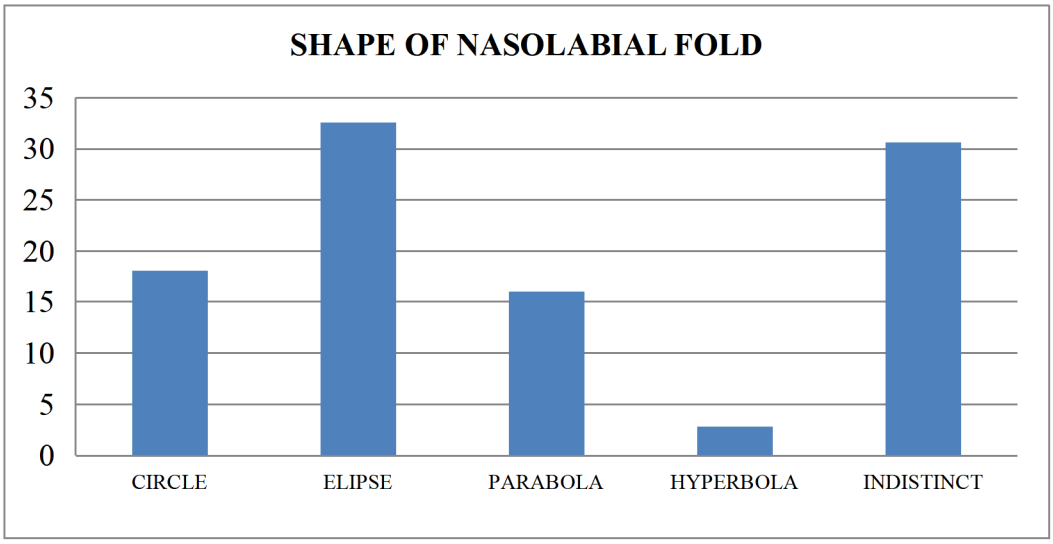


DESCRIPTION OF NLF CLASSIFICATION: The NLF was classified into high (35.4%), moderate (61.8%) and mild (2.8%). Moderate NLF classification was highest followed by high and mild being least.

TABLE 3: THE SHAPE OF NASOLABIAL FOLD AND THEIR FREQUENCY

SHAPE OF NLF FOLD	FREQUENCY	PRECENTAGE
CIRCLE	26	18.1%
ELIPSE	47	32.6%
PARABOLA	23	16.0%
HYPERBOLA	4	2.8%
INDISTINCT	44	30.6%
Total	144	100.0%

GRAPH 3: THE SHAPE OF NASOLABIAL FOLD AND THEIR FREQUENCY



Distribution of study participants according to Shape: In descending order, 32.6% of patients (47 patients) had a elipse shape of Naso-Labial Fold, followed by 30.6% of indistinct (44 patients); 18.1 circle (26 patients); 16% parabola type (23 patients), and 2.8% of hyperbola type (4 patients) shape of Naso-Labial Fold respectively.

TABLE 4: MORPHOLOGY OF NASOLABIAL FOLD

MORPHOLOGY OF NLF	FREQUENCY	PERCENTAGE
SIMPLE SKIN	47	32.6
FAT PAD	35	24.3
MUSCULAR	33	22.9
BONE RETRUSION	13	9.0
HYBRID	16	11.1
Total	144	100.0

Distribution of study participants according to Morphological classification: The distrubution of subjects according to morphology showed maximum in simple skin with 32.6%(47 subjects) followed by fat pad with 24.3%(35 subjects), muscular type with 22.9%(33 subjects), hybrid type being 11.1%(16 subjects) and with least being the bone retrusion with 9% (13 subjects)

GRAPH 4: MORPHOLOGY OF NASOLABIAL FOLD

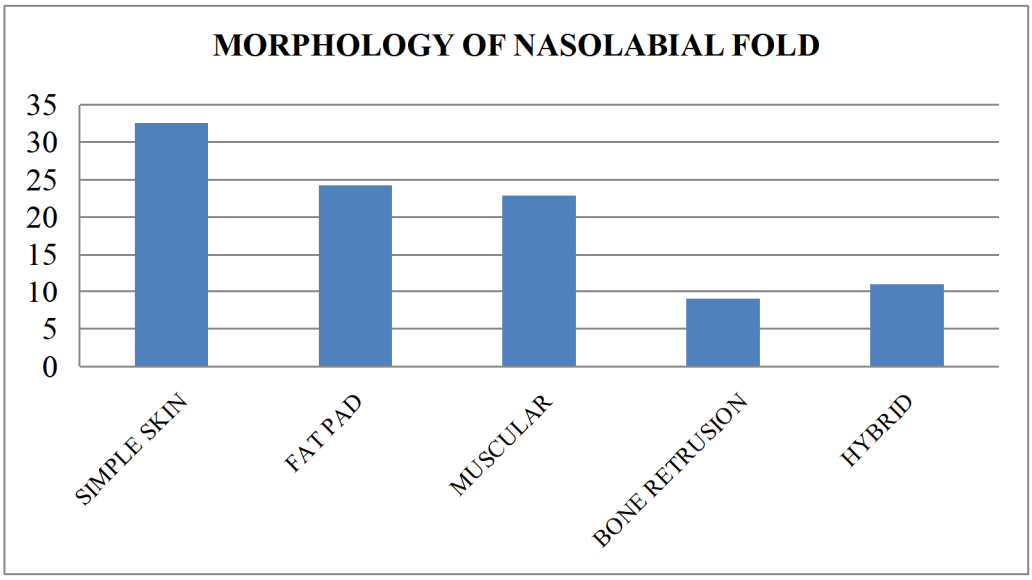


TABLE 5: DESCRIPTIVE STATISICS OF AGE

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
AGE	144	20	25	22.3	1.25

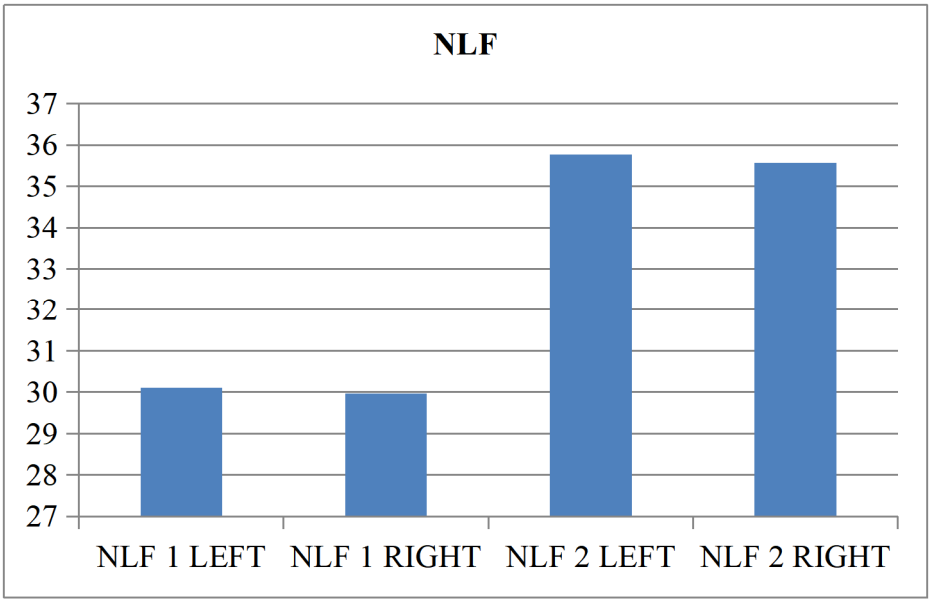
Mean age was found to have a mean of **22.3 ± 1.25**

TABLE 6: DESCRIPTIVE STATISICS OF RIGHT AND LEFT NASOLABIAL FOLD WITH RESPECT TO GENDER

	SEX	N	Mean	Std. Deviation	Mann-Whitney U value	Z value	P value
NLF 1 LEFT	Female	72	29.667	6.7101	2205.500	-1.149	0.251
	Male	72	30.517	6.9103			
NLF 1 RIGHT	Female	72	29.134	6.5491	1994.500	-2.020	**0.043***
	Male	72	30.787	5.8235			
NLF 2 LEFT	Female	72	36.425	6.7895	2216.500	-1.104	0.270
	Male	72	35.090	3.8376			
NLF 2 RIGHT	Female	72	35.396	3.7831	2327.000	-0.648	0.517
	Male	72	35.749	3.8693			

Table 6 shows that, there was a statistically significant difference seen for the values between the groups ($p<0.05$) for NLF 1 RIGHT with higher values in Females

GRAPH 6: DESCRIPTIVE STATISICS OF RIGHT AND LEFT NASOLABIAL FOLD WITH RESPECT TO GENDER

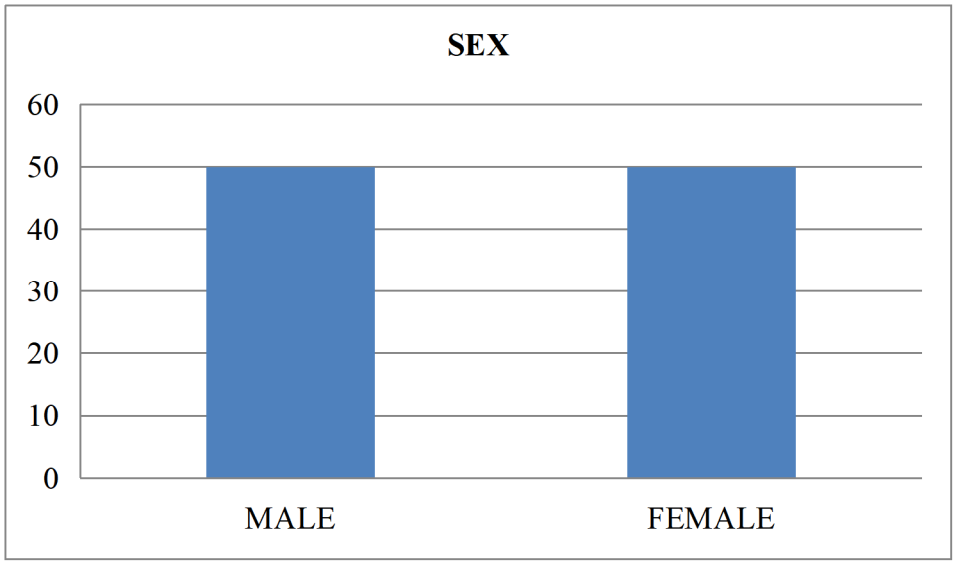


Distribution Statistic of Right and Left NLF: NLF1 LEFT at 30.09±6.73, NLF 1 RIGHT at 29.97±6.16, NLF 2 LEFT at 35.78±5.45, NLF 2 RIGHT at 35.58±3.78. NLF1 LEFT was found to have a higher mean than NLF 1 RIGHT while NLF 2 left had a slightly higher mean than NLF 2 LEFT. The variables were found to be skewed in distribution. NLF1 LEFT, NLF 1 RIGHT, and NLF 2 LEFT are negatively skewed. Negatively skewed means the normal curve data is distributed towards left when plotting in the data graph. A skewed data means the data needs to be compared with non-parametric tests (i.e., Kruskal Wallis test).

TABLE 7: DISTRIBUTION OF MALES AND FEMALES

	FREQUENCY	PERCENTAGE (%)
MALE	72	50
FEMALE	72	50

GRAPH 7: DISTRIBUTION OF MALES AND FEMALES

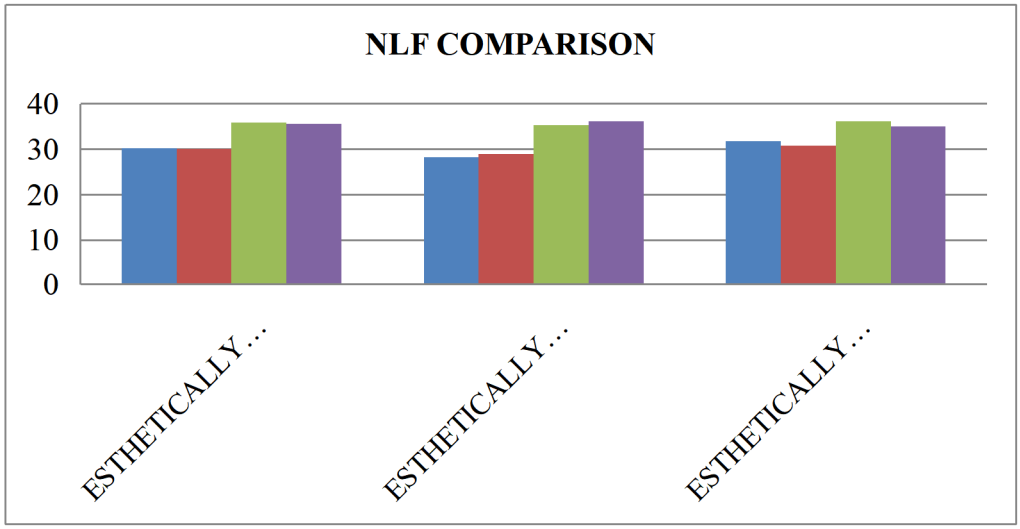


STATISTICAL DISTRIBUTION OF GENDER: Male and Female gender are found to be equally distributed in the study

TABLE 8: KRUSKAL-WALLIS TEST TO COMPARE GROUPS

	Ranks				
	GROUP	M	F	Mean Rank	P VALUE
NLF1 LEFT	Esthetically Acceptable	24	24	62.14	.061
	Esthetically Pleasant	24	24	73.16	
	Esthetically Unpleasant	24	24	82.21	
	Total	72	72		
NFL1 RIGHT	Esthetically Acceptable	24	24	65.19	.275
	Esthetically Pleasant	24	24	78.73	
	Esthetically Unpleasant	24	24	73.58	
	Total	72	72		
NLF2 LEFT	Esthetically Acceptable	24	24	69.18	.791
	Esthetically Pleasant	24	24	74.64	
	Esthetically Unpleasant	24	24	73.69	
	Total	72	72		
NLF2 RIGHT	Esthetically Acceptable	24	24	72.02	.332
	Esthetically Pleasant	24	24	79.04	
	Esthetically Unpleasant	24	24	66.44	
	Total	72	72		

GRAPH 8: KRUSKAL-WALLIS TEST TO COMPARE GROUPS



The NLF 1 RIGHT AND LEFT, NLF 2 RIGHT AND LEFT were found to be statistically insignificant with esthetically unpleasant, pleasant and acceptable groups.

TABLE 9: COMPARISON BETWEEN MORPHOLOGY OF NASOLABIAL FOLD AND GROUPS

		GROUP			Total	P VALUE
		Esthetically Acceptable	Esthetically Pleasant	Esthetically Unpleasant		
Morphology of Nasolabial fold	**Simple skin**	27 (57.4%)	5 (10.6%)	15 (31.9%)	47 (100.0%)	***0.003**
	Fat pad	14 (40.0%)	11 (31.4%)	10 (28.6%)	35 (100.0%)	
	Muscular	2 (6.1%)	23 (69.7%)	8 (24.2%)	33 (100.0%)	
	Bone retrusion	0 (0%)	9 (69.2%)	4 (30.8%)	13 (100.0%)	
	Hybrid	5 (31.2%)	0 (0%)	11 (68.8%)	16 (100.0%)	
Total		48 (33.3%)	48 (33.3%)	48 (33.3%)	144 (100.0%)	

Table 9: The Comparison between Morphology of nasolabial fold and Group.

- In simple skin type more number of subjects were present in esthetically acceptable group (57.4%) followed by esthetically unpleasant (31.9%) and esthetically pleasant group (10.6%).
- In fat pad type more number of subjects were present in esthetically acceptable group (40%) followed by esthetically pleasant (31.4%) and esthetically unpleasant group (28.6%).
- In muscular type more number subjects were present with esthetically pleasant group (69.7%) followed by esthetically unpleasant (30.8%) and esthetically acceptable group (6.1%).
- The bony retrusion type more number subjects were present with esthetically pleasant group (69.2%) followed by esthetically unpleasant (30.8%) and esthetically acceptable group (0%).
- The hybrid types more number subjects were present with esthetically unpleasant group followed by esthetically acceptable (31.2%) and esthetically unpleasant group (0%)

GRAPH 9: THE COMPARISON BETWEEN MORPHOLOGY OF NASOLABIAL FOLD AND GROUP.

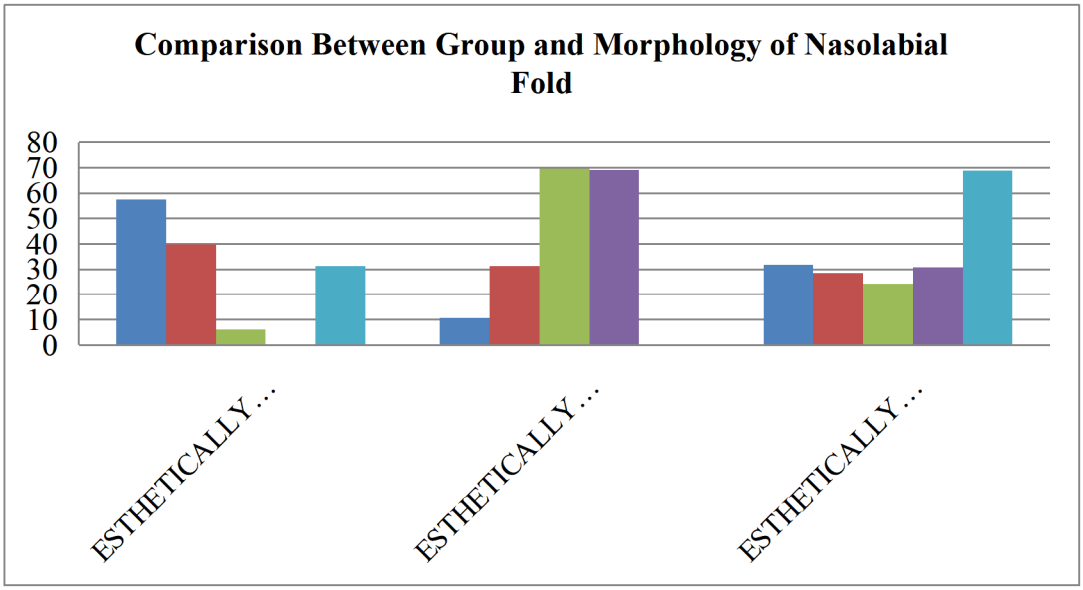


TABLE 10: COMPARISON BETWEEN SHAPE OF NASOLABIAL FOLD AND GROUP

		GROUP			Total	P VALUE
		Esthetically acceptable	Esthetically pleasant	Esthetically unpleasant		
Shape of Nasolabial fold	CIRCLE	12 (46.2%)	8 (30.8%)	6 (23.1%)	26 (100.0%)	***0.004**
	ELIPSE	12 (25.5%)	20 (42.6%)	15 (31.9%)	47 (100.0%)	
	PARABOLA	5 (21.7%)	14 (60.9%)	4 (17.4%)	23 (100.0%)	
	HYPERBOLA	2 (50.0%)	0 (0%)	2 (50.0%)	4 (100.0%)	
	INDISTINCT	17 (38.6%)	6 (13.6%)	21 (47.7%)	44 (100.0%)	
Total		48 (33.3%)	48 (33.3%)	48 (33.3%)	144 (100.0%)	

TABLE 10: Comparison between Shape of Nasolabial fold & GROUP.

In circle shape 46.2% were aesthetically acceptable and 23.1% were unpleasant. In circle esthetically acceptable was highest followed by unpleasant. In ellipse 42.6% were pleasant and 25.5% acceptable. In ellipse, PLEASANT was highest followed by acceptable.

In parabola 60.9% were pleasant and 17.4% unpleasant. In parabola PLEASANT was highest followed by unpleasant.

In hyperbola both acceptable and unpleasant had 50% each. Hyperbola shape is distributed equally in acceptable and unpleasant group.

In indistinct, esthetically unpleasant was 47.7% and pleasant only 13.6%. In indistinct, unpleasant was highest followed by pleasant.

THE COMPARISON WAS FOUND TO BE STATISTICALLY SIGNIFICANT.

- In circle type, greater number of subjects were present in esthetically acceptable group (46.2%) followed by esthetically pleasant (30.8%) and esthetically unpleasant group. (23.1%)
- In ellipse type, greater number of subjects were present in esthetically pleasant group (42.6% followed by esthetically unpleasant (31.9%) and esthetically acceptable group. (25.5%)
- In parabola type, greater number of subjects were present in esthetically pleasant group (60.9%) followed by esthetically acceptable (21.7%) and esthetically unpleasant group (17.4%).
- In hyperbola type, esthetically acceptable and esthetically unpleasant were distributed equally (50% each)

- In indistinct greater number of subjects were present in esthetically unpleasant group (47.7%) followed by esthetically acceptable (38.6%) and esthetically pleasant group (13.6%).

GRAPH 10: COMPARISON BETWEEN SHAPE OF NASOLABIAL FOLD & GROUP

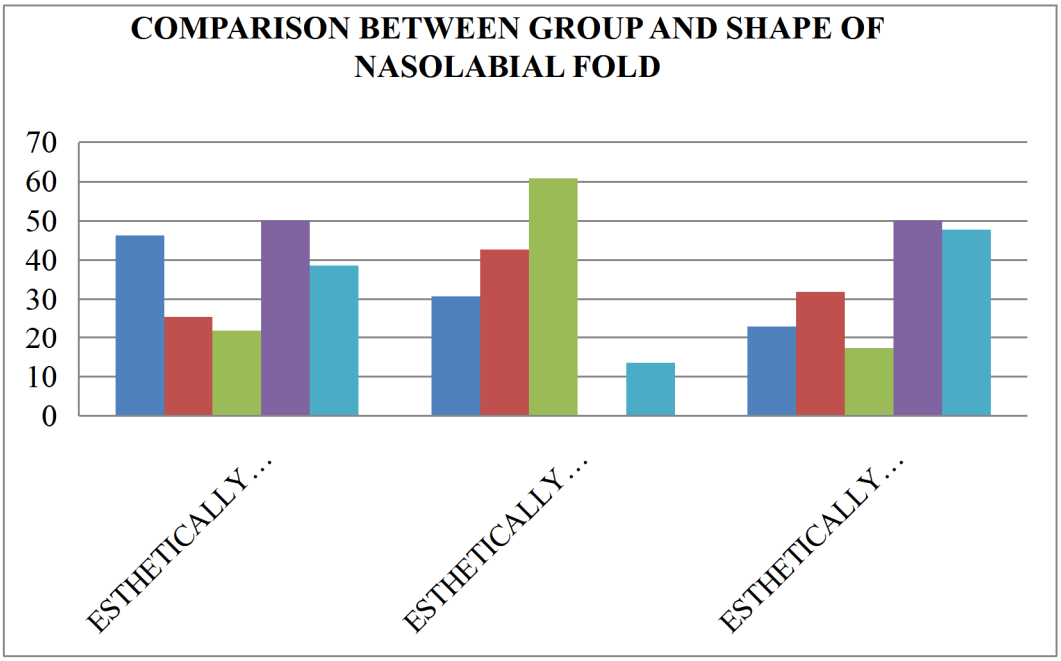


TABLE 11: COMPARISON BETWEEN EXTENT OF NLF CLASSIFICATION AND SMILE GROUP

NLF classification GROUP Cross tabulation							
			GROUP			Total	P Value
			Esthetically Acceptable	Esthetically Pleasant	Esthetically Unpleasant		
NLF classification	HIGH	Count	18	18	15	51	.423
		% Within NLF classification	35.3%	35.3%	29.4%	100.0%	
	MODERATE	Count	29	30	30	89	
		% Within NLF classification	32.6%	33.7%	33.7%	100.0%	
	MILD	Count	1	0	3	4	
		% Within NLF classification	25.0%	.0%	75.0%	100.0%	
Total		Count	48	48	48	144	
		% Within NLF classification	33.3%	33.3%	33.3%	100.0%	

TABLE 11: Comparison between NLF classification & Smile Group.

- In High NLF group (35.3%) was seen in Esthetically Acceptable and Esthetically pleasant group each followed by (29.4%) in esthetically unpleasant. In High NLF group the Esthetically Acceptable was highest followed by Esthetically PLEASANT group and unpleasant.
- In Moderate NLF group both pleasant and unpleasant had 33.7% each. In moderate group both PLEASANT and unpleasant was equal.
- In mild group NLF unpleasant had 75% and acceptable 25%. In mild group unpleasant was the highest followed by acceptable.

THE COMPARISON WAS NOT FOUND TO BE STATISTICALLY SIGNIFICANT.

which shows that almost equal no subjects whether high, moderate or mild appear in smile groups

GRAPH 11: COMPARISON BETWEEN EXTENT OF NLF CLASSIFICATION AND SMILE GROUP

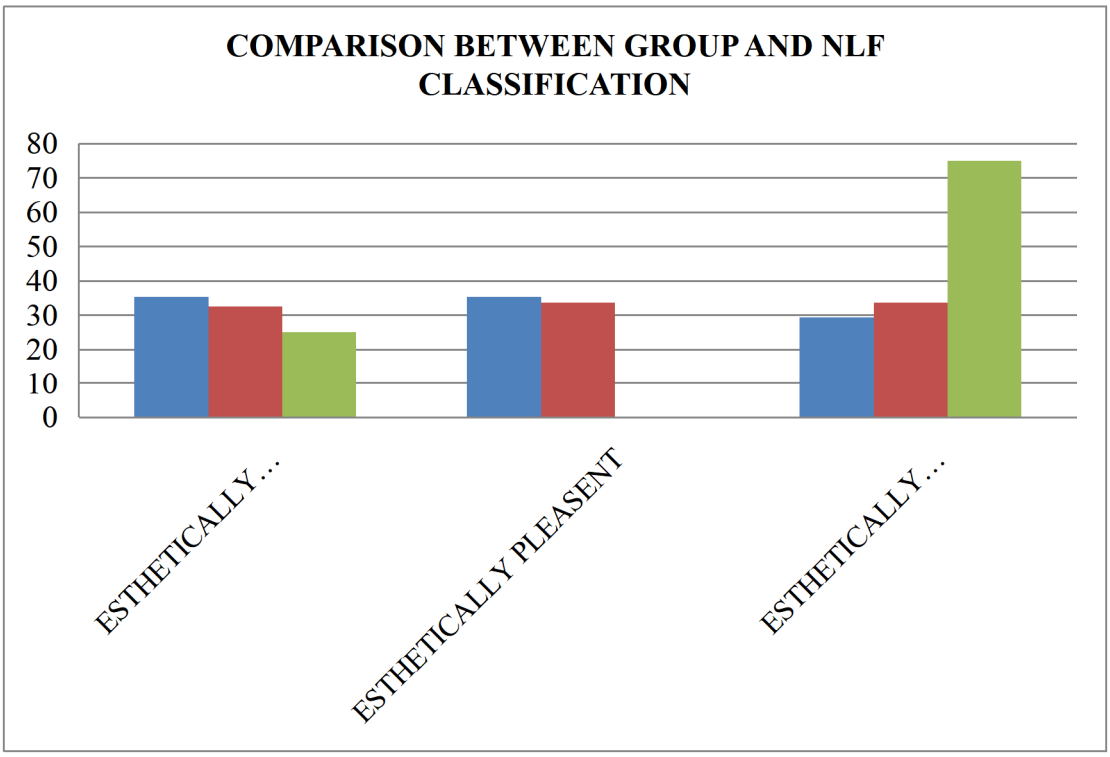


TABLE 12: CORRELATIONS BETWEEN RIGHT AND LEFT NASO LABIAL FOLD

Correlations					
		NLF1 LEFT	NFL1 RIGHT	NLF2 LEFT	NLF2 RIGHT
NLF1 LEFT	R VALUE	1	.616**	.660**	.370**
	P VALUE		.000	.000	.000
	N	144	144	144	144
NFL1 RIGHT	R VALUE	.616**	1	.640**	.467**
	P VALUE	.000		.000	.000
	N	144	144	144	144
NLF2 LEFT	R VALUE	.660**	.640**	1	.573**
	P VALUE	.000	.000		.000
	N	144	144	144	144
NLF2 RIGHT	R VALUE	.370**	.467**	.573**	1
	P VALUE	.000	.000	.000	
	N	144	144	144	144
**. Correlation is significant at the 0.01 level.					

TABLE 12 shows

- There was a positive and moderate correlation between NLF1 LEFT AND NLF1 RIGHT (R=0.616, P=0.000).It means changes in NLF1 LEFT leads positive and moderate changes NLF1 RIGHT

- There was a positive and moderate correlation between NLF1 LEFT AND NLF 2 RIGHT (R=0.660, P=0.000). It means changes in NLF1 LEFT leads positive and moderate changes in NLF2 RIGHT
- There was a positive and moderate correlation between NLF1 RIGHT AND NLF 2 LEFT (R =0.640, P=0.000). It means changes in NLF1 RIGHT leads positive and moderate changes in NLF2 LEFT
- There was positive and low correlation between NLF1 LEFT AND NLF 2 RIRHT (R=0.370, P=0.000). It means changes in NLF1 LEFT leads positive and low changes in NLF2 RIGHT.
- There was positive and moderate correlation between NLF2 RIGHT AND NLF 1 RIRHT (R=0.467, P=0.000). It means changes in NLF2 RIGHT leads positive and moderate changes in NLF1 RIGHT.
- There was positive and moderate corelation between NLF2 RIGHT AND NLF 2 LEFT (R=0.660, P=0.000). It means changes in NLF2 RIGHT leads positive and moderate changes in NLF2 LEFT
- There was positive and moderate corelation between NLF2 LEFT AND NLF 1 LEFT (R=0.573, P=0.000). It means changes in NLF2 LEFT leads positive and moderate changes in NLF1 LEFT.

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 almost the entire growth is complete with respect to the facial skeleton and associated soft tissue structures.

According to Bishara *et al*[32,] 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*[33], 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(72 males; 72 females) so that there will be no confounding bias related to sex while classifying Naso-Labial Fold. For the study, patients 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.

In the previous study, Baek *et al*[17] 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 Iowa 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 61.8 % of study participants and mild type having the lowest 2.8% 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[37]

On comparing right and left side NLF1 and 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 (36.425) compared to the right side(35.090) 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[37]. 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[38].

The distribution of study participants according to their shape was dominated by elliptical shape(32.6%) followed by indistinct (30.6%), circular (18.1%), parabola type (16%) and hyperbola type (2.8%) having the least.

Discussion on Morphological Classification of Naso-Labial Fold[15]:

1. **Skin Type**: Skin type of NLF is considered as typical type by many clinicians. There are two sub-types of skin type NLF i.e simple skin type and the other sagging skin type. The later is mostly seen in middle-aged and elderly patients. Hence it is not considered in the classification. The former simple skin type has the appearance of small wrinkles, which become apparent while smiling. This is due to the low aging level of dermis in young patients. This type of Naso-Labial Fold makes a total of 47 patients (32.6%) in this study.
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. 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. This type of Naso-Labial Fold makes a total of 35 patients (24.3%) in this study.

3. **Muscular Type**: All the muscles associated with the Naso-Labial area have been mentioned previously. Of these, Levator labii superioris aleque nasi, Levator labii superioris, and Zygolabialis(Zygomaticus minor) 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 22.9 % (33 patients).
4. **Bone Retrusion Type**: Cleft lip and palate patients suffer simultaneous bone retrusion around the pyriform aperture. Certain normal individuals also manifest minor retrusion defects in tissue, 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 shape, in the upper segment of Naso-Labial Fold, as well the flat skin encircling the Pinna nasi. 9% (13 patients) belong to this category of Naso-Labial Fold.
5. **Hybrid Type**: A combination of two or more above types is included in this type of Naso-Labial Fold. This type accounted for 11.1% (16 patients) 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. 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 photo.

The present study provides following positive findings for smile groups are as follows.

The positive findings for esthetically unplesant smile that,

- The morphology of nasolabial fold with hybrid type is high and statistically significant.
- The shape of nasolabial fold with indistinct is higher and statistically significant.

The positive findings for esthetically accepted smile is that,

- The morphology of nasolabial fold with simple skin type and fat pad type is higher and statistically significant.
- The shape of nasolabial fold with circular type is higher and statistically significant.

The positive findings for esthetically plesant smile is that,

- The morphology of nasolabial fold with muscular and bone retrusion is high and statistically significant.
- The shape of nasolabial fold with ellipse and parabola is higher and statistically significant.

Therefore for any orthodontic treatment and orthognathic surgery henceforth, with respect to plesant smile ,these parameters should be followed-

- The NLF classification of high type to be considered.

  (High type refers to the distance of NLF1 from the mid-saggital plane should be 30.1-36mm and NLF2 from the mid-saggital plane should be 37.1-44mm, with established classification from previous dessertation)
- The NLF1 Left should be 30.09 ± 6.73 mm.
- The NLF1 right should be 29.97 ± 6.16 mm
- The NLF2 Left should be 35.78 ± 5.45 mm.
- The NLF2 Right should be 35.58 ± 3.78mm.
- The shape of nasolabial fold should be ellipse/parabola.
- The morphology of nasolabial fold should be musuclar/bony retrusion type.

LIMITATIONS OF THE STUDY

Taking into account the orthodontic treatment period and the growth status of the individuals, the study was limited to specific age groups. To register all variations associated with it, more age groups should be included.

SCOPE OF THE STUDY

This was probably 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

- Perception of smile esthetics was co-related with classification of nasolabial fold using standardized video-photography
- The obtained esthetic smile samples were evaluated by orthodontist and were categorized under three classifications namely-

1.Esthetically unpleasant

2. Esthetically acceptable

3. Esthetically pleasant

- For any orthodontic and orthognathic surgery,with respect to pleasant smile the following parameter of nasolabial fold were obtained
- The NLF classification of high type to be considered
- (High type refers to the distance of NLF1 from the mid-saggital plane should be 30.1-36mm and NLF2 from the mid-saggital plane should be 37.1-44mm, with established classification from previous dessertation)
- The NLF1 Left should be 30.09 ± 6.73 mm.
- The NLF1 right should be 29.97 ± 6.16 mm
- The NLF2 Left should be 35.78 ± 5.45 mm.
- The NLF2 Right should be 35.58 ± 3.78mm.
- The shape of nasolabial fold should be ellipse/parabola.
- The morphology of nasolabial fold should be musuclar/bony retrusion type.

SUMMARY

The aim of the study was to study the co-relation of perception of smile esthetics with classification of nasolabial fold using standardized photography among orthodontists.

The standardized video was recorded for 144 study participants while smiling which included an equal number of males and females respectively. Using MAKHTER- Facial Analysis Software, the Frontal facial photographs of patient's smile was edited. In other words, they were cropped so as to highlight the lower third of the face, particularly the smile. Orthodontists were asked to classify the photographs using global rating scale, with the scores from 1 to 9, as follows:

- esthetically unpleasant (scores 1, 2 or 3)
- esthetically acceptable (scores 4, 5 or 6)
- esthetically pleasant (scores 7, 8 or 9)

Assessment were carried out by 10 orthodontists, who also filled out a questionnaire so as to establish an association between smile unpleasantness and factors such as lip thickness, smile height, color gradation, teeth size and crowding. To eliminate Intra-examiner error, the respective examiners were given 10% of the sample size randomly selected to analyze and score after period of one month.

Descriptive and Frequency analysis was done by using Statistical Product and Service Solution (SPSS) (v.21.0) software.

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.

On comparing right and left side NLF1 and 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.

The distribution of study participants according to their shape was dominated by elliptical shape(32.6%) followed by indistinct (30.6%), circular18.1%), parabola type (16%) and hyperbola type (2.8%) having the least.

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

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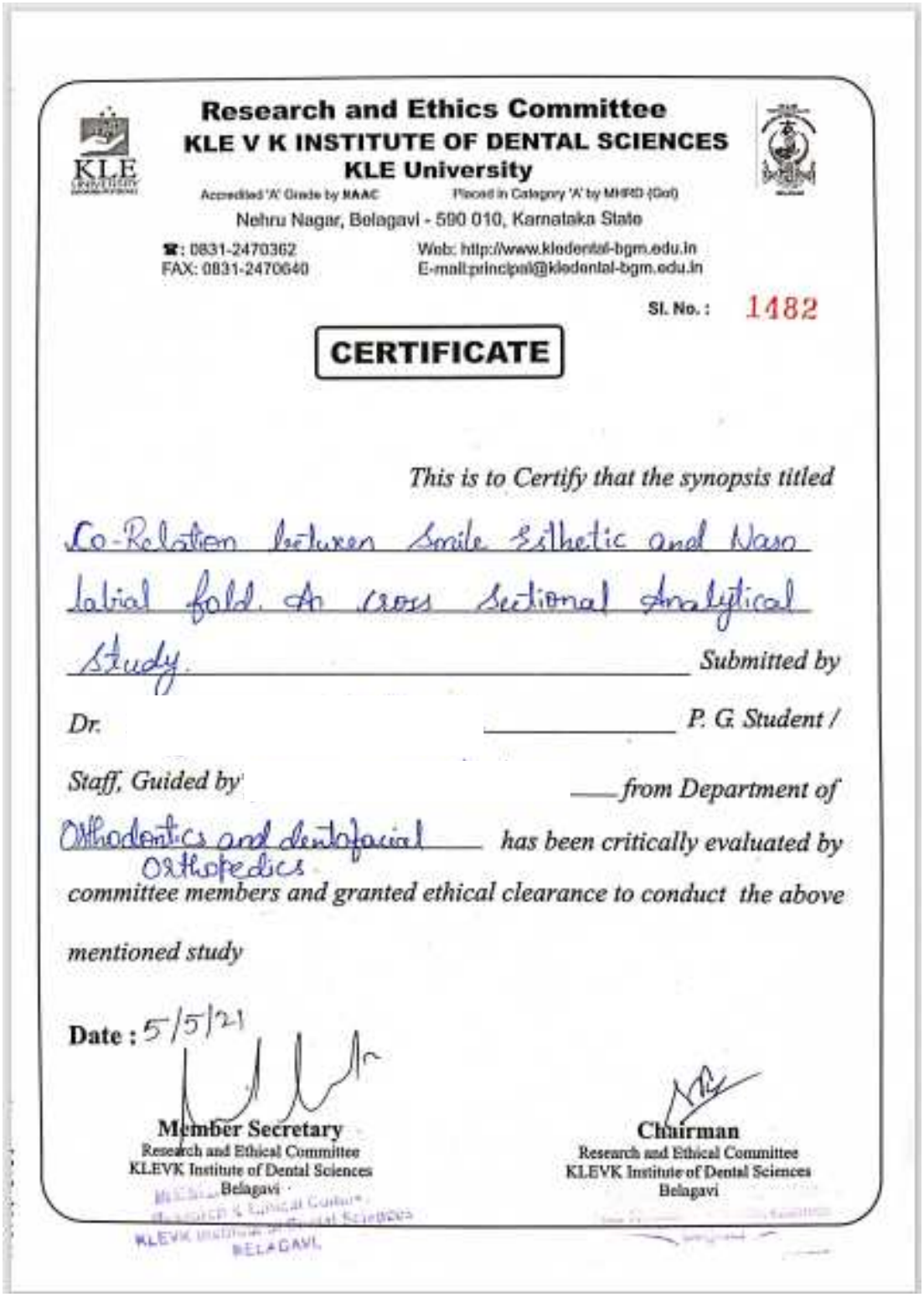
ANNEXURE – I - ETHICAL CLEARANCE



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Sl. No.: 1482

CERTIFICATE

This is to Certify that the synopsis titled

Co-Relation between Smile Esthetic and Naso labial fold. An cross Sectional Analytical Study.

Submitted by

Dr. _____ *P. G. Student /*

Staff, Guided by ____ *from Department of*

Orthodontics and dentofacial Orthopedics *has been critically evaluated by committee members and granted ethical clearance to conduct the above mentioned study*

Date : 5/5/21

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

Chairman
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

KLEVK Institute of Dental Sciences BELAGAVI

ANNEXURE – II - CONSENT FORM

KLE VK INSTITUTE OF DENTAL SCIENCES,

BELAGAVI –590010

KLE VK INSTITUTE OF DENTAL SCIENCES,

BELAGAVI –590010

CONSENT FORM

TITLE: CO-RELATION BETWEEN SMILE ESTHETICS AND NASOLABIAL FOLD – A CROSS SECTIONAL ANALYTICAL STUDY

OPERATOR: DR.

Purpose of the study: You are invited to take part in clinical study, but before you except I would like to help you understand the study and what participation you will be involved in. I am conducting a cross sectional analytical study to co-relate between smile esthetics and nasolabial fold using standardized video photography.

Procedure of the study: If you wish to participate, you will be told to smile from rest position of the lip than back to rest position. The video will be captured in standard settings and your smile will be recorded. Then the photo will be cropped so as to highlight the lower third of the face, particularly the smile and analyzed.

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

- 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.
- 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.
- I permit the dentist to utilize the information given by me and results obtained from this study for presentation and publication purpose.
- 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.
- I will follow the instructions given by the doctor.
- 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:

Signature of witness Signature

ಕೆಎಲ್ಇ ವಿಕೆ ಇನ್ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಡೆಂಟಲ್ ಸೈನಸೆಸ್,

ಬೆಳಗಾವಿ -590010

ರೋಗಿಯ ಮಾಹಿತಿ ಪತ್ರ

ಶೀರ್ಷಿಕೆ: ಸ್ಕೆಲ್ ಎಸ್ಥೆಟಿಕ್ಸ್ ಮತ್ತು ನಾನೋಲಾಬಿಯಲ್ ಪಟ್ಟು ನಡುವಿನ ಸಹ-ಸಂಬಂಧ - ಒಂದು ಅಡ್ಡ ವಿಭಾಗೀಯ ವಿಶ್ಲೇಷಣಾತ್ಮಕ ಅಧ್ಯಯನ.

ಆಪರೇಟರ್:

ಅಧ್ಯಯನದ ಉದ್ದೇಶ: ಕ್ಲಿನಿಕಲ್ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಿಮ್ಮನ್ನು ಆಹ್ವಾನಿಸಲಾಗಿದೆ. ಆದರೆ ನೀವು ಹೊರಡುವಿಸಿ ನಾನು ಅಧ್ಯಯನವನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಸಹಾಯ ಮಾಡಲು ಬಯಸುತ್ತೇನೆ ಮತ್ತು ನೀವು ಯಾವ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುತ್ತೀರಿ. ಸ್ಕೆಲ್ ಎಸ್ಥೆಟಿಕ್ಸ್ ಮತ್ತು ನಾನೋಲಾಬಿಯಲ್ ಪಟ್ಟುಗಳ ನಡುವೆ ಸಹ-ಸಂಬಂಧಿಸಲು ನಾನು ಅಡ್ಡ ವಿಭಾಗೀಯ ವಿಶ್ಲೇಷಣಾತ್ಮಕ ಅಧ್ಯಯನವನ್ನು ನಡೆಸುತ್ತಿದ್ದೇನೆ. ಪ್ರಮಾಣಿತ ವೀಡಿಯೊ ಫೋಟೋಗ್ರಾಫಿಯನ್ನು ಬಳಸುವುದು.

ಅಧ್ಯಯನದ ವಿಧಾನ: ನೀವು ಭಾಗವಹಿಸಲು ಬಯಸಿದರೆ, ವಿಶ್ರಾಂತಿ ಸ್ಥಾನಕ್ಕೆ ಹಿಂದಿರುಗುವುದಕ್ಕಿಂತ ತುಟಿಯ ವಿಶ್ರಾಂತಿ ಸ್ಥಾನದಿಂದ ಕಿರುನಗೆ ಹೇಳಲು ನಿಮಗೆ ತಿಳಿಸಲಾಗುತ್ತದೆ. ವೀಡಿಯೊವನ್ನು ಪ್ರಮಾಣಿತ ಸೆಟ್ಟಿಂಗ್‌ಗಳಲ್ಲಿ ಸೆರೆಹಿಡಿಯಲಾಗುತ್ತದೆ ಮತ್ತು ನಿಮ್ಮ ಸ್ಕೆಲ್ ಅನ್ನು ರೆಕಾರ್ಡ್ ಮಾಡಲಾಗುತ್ತದೆ. ನಂತರ ಮುಖದ ಕೆಳಗಿನ ಮೂರನೇ ಭಾಗವನ್ನು, ವಿಶೇಷವಾಗಿ ಸ್ಕೆಲ್ ಮತ್ತು ವಿಶ್ಲೇಷಣೆಯನ್ನು ಹೈಲೈಟ್ ಮಾಡಲು ಫೋಟೋವನ್ನು ಕತ್ತರಿಸಲಾಗುತ್ತದೆ.

ನಾನು, _____ ವಯಸ್ಸಿನ _____ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯ ಬಗ್ಗೆ ತಿಳಿಸಲಾಗಿದೆ:

- ನನ್ನ ವೈಯಕ್ತಿಕ ವಿವರಗಳಾದ ಹೆಸರು, ವಯಸ್ಸು, ಲಿಂಗ, ವಿಳಾಸ ಮತ್ತು ಅಧ್ಯಯನಕ್ಕೆ ಬೇಕಾದ ವಿವರಗಳನ್ನು ನನ್ನ ಜ್ಞಾನದ ಅತ್ಯುತ್ತಮವಾಗಿ ನೀಡಲು ನಾನು ಒಪ್ಪುತ್ತೇನೆ.
- ವೀಡಿಯೋಗ್ರಫಿಯ ಕಾರ್ಯವಿಧಾನದ ಬಗ್ಗೆ ನನಗೆ ತಿಳಿಸಲಾಗಿದೆ ಮತ್ತು ನಾನು ಕಾರ್ಯವಿಧಾನಕ್ಕೆ ಒಳಗಾಗುತ್ತೇನೆ. ಕಾರ್ಯವಿಧಾನಕ್ಕಾಗಿ ಅರ್ಡೋಡಾಂಟಿಸ್ಟ್‌ಗೆ ನಾನು ಒಪ್ಪುತ್ತೇನೆ ಮತ್ತು ಒಪ್ಪುತ್ತೇನೆ.
- ನಾನು ನೀಡಿದ ಮಾಹಿತಿಯನ್ನು ಮತ್ತು ಈ ಅಧ್ಯಯನದಿಂದ ಪಡೆದ ಫಲಿತಾಂಶಗಳನ್ನು ಪ್ರಸ್ತುತಿ ಮತ್ತು ಪ್ರಕಟಣೆಯ ಉದ್ದೇಶಕ್ಕಾಗಿ ಬಳಸಿಕೊಳ್ಳಲು ನಾನು ದಂತವೈದ್ಯರಿಗೆ ಅನುಮತಿ ನೀಡುತ್ತೇನೆ.
- ಯಾವುದೇ ಏಜೆನ್ಸಿಯಿಂದ ಪ್ರಾಯೋಜಿಸಲ್ಪಟ್ಟಿದ್ದರೂ ಸಹ, ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಸಹಕಾರಕ್ಕಾಗಿ ನಾನು ಯಾವುದೇ ಆದಾಯವನ್ನು ಪಡೆಯುವುದಿಲ್ಲ. ನಾನು ನನ್ನ ಸ್ವಂತ ಇಚ್ಛೆ ಶಕ್ತಿ ಮತ್ತು ಆಶಯದೊಂದಿಗೆ ಭಾಗವಹಿಸುತ್ತಿದ್ದೇನೆ.
- ವೈದ್ಯರು ನೀಡಿದ ಸೂಚನೆಗಳನ್ನು ನಾನು ಅನುಸರಿಸುತ್ತೇನೆ.
- ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ, ನಾನು ಅಧ್ಯಯನಕ್ಕೆ ರಾಜೀನಾಮೆ ನೀಡಲು ಬಯಸಿದರೆ, ನಾನು ಅದನ್ನು ಮಾಡಲು ಮುಕ್ತನಾಗಿರುತ್ತೇನೆ ಮತ್ತು ನನ್ನ ಚಿಕಿತ್ಸೆಯು ಇಲಾಖೆಯಲ್ಲಿ ಇನ್ನೂ ಪೂರ್ಣಗೊಳ್ಳುತ್ತದೆ.
- ನನ್ನ ಪೂರ್ಣ ಪ್ರಜ್ಞೆ ಮತ್ತು ಮನಸ್ಸಿನ ಉಪಸ್ಥಿತಿಯಲ್ಲಿ, ನನ್ನ ಸ್ಥಳೀಯ ಭಾಷೆಯಲ್ಲಿನ ಎಲ್ಲಾ ಕಾರ್ಯವಿಧಾನಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಂಡ ನಂತರ, ನಾನು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಸಿದ್ಧನಿದ್ದೇನೆ ಮತ್ತು ನನ್ನ ಒಪ್ಪಿಗೆಯನ್ನು ನೀಡುತ್ತೇನೆ.

ದಿನಾಂಕ:

ಸ್ಥಳ:

ಸಾಕ್ಷಿಯ ಸಹಿ ಸಹಿ

केएलई व्ही के इंस्टिट्यूट ऑफ डेंटल सायन्सेस,

बेलागावी -590010

रुग्णांची माहिती पत्रक

शीर्षक: स्माईल एस्टेटिक्स आणि नासोलाबियल फोल्ड दरम्यानचा सहसंबंध - क्रॉस सेक्शनल एनालिटिकल स्टडी

ऑपरेटर:

अभ्यासाचा उद्देश: आपल्याला क्लिनिकल अभ्यासामध्ये भाग घेण्यासाठी आमंत्रित केले आहे, परंतु आपण याशिवाय मी अभ्यासाबद्दल आणि आपण कोणत्या सहभागात सहभागी व्हावे हे समजून घेण्यास मदत करू इच्छित आहे. स्मित हास्यशास्त्र आणि नासोलेबियल फोल्ड दरम्यान सहसंबंधित करण्यासाठी मी एक क्रॉस सेक्शनल विश्लेषणात्मक अभ्यास करीत आहे. प्रमाणित व्हिडिओ फोटोग्राफी वापरणे.

अभ्यासाची प्रक्रिया: जर तुम्हाला सहभागी व्हायचं असेल तर तुम्हाला ओठच्या विश्रांतीपेक्षा विश्रांती घेण्यापेक्षा हसण्यास सांगितलं जाईल. व्हिडिओ मानक सेटिंग्जमध्ये हस्तगत केला जाईल आणि आपले स्मित रेकॉर्ड केले जाईल. तर फोटो क्रॉप केला जाईल जेणेकरून चेहऱ्याच्या खालच्या तृतीय भागाला, विशेषत: स्मित आणि विश्लेषित केले गेले.

मला, _____ वयाची _____ मला माझ्या

अभ्यासामध्ये सामील असल्याची माहिती दिली आहे:

- माझे वैयक्तिक तपशील जसे की नाव, वय, लिंग, पत्ता आणि अभ्यासासाठी आवश्यक असलेल्या तपशीलांना माझ्या सर्वोत्तम माहितीसाठी मी सहमती देतो.
- मला व्हीडियोग्राफीच्या प्रक्रियेविषयी माहिती देण्यात आली आहे आणि मी प्रक्रियेतून जात आहे. मी सहमत आहे आणि प्रक्रियेसाठी ऑर्थोडोन्टिस्टला माझी संमती देतो.
- मी दंतचिकित्सकांकडून माझ्याद्वारे दिलेली माहिती आणि या अभ्यासामधून प्राप्त झालेल्या सादरीकरणासाठी आणि प्रकाशनाच्या उद्देशाने वापरल्या जाणाऱ्या परवानग्यांना मी परवानगी देतो.
- अभ्यासामध्ये माझ्या सहकार्यासाठी कोणत्याही परतावाचा दावा मी करणार नाही, जरी ती कोणत्याही एजन्सीने प्रायोजित केली असेल. मी माझ्या स्वत: च्या इच्छेने आणि इच्छेने सहभाग घेत आहे.
- मी डॉक्टरांनी दिलेल्या सूचनांचे अनुसरण करेन.
- अभ्यासादरम्यान, मला अभ्यासाचा राजीनामा देण्याची इच्छा असल्यास, मी असे करण्यास मोकळे आहे आणि तरीही माझे उपचार विभागात पूर्ण होतील.
- माझ्या पूर्ण चेतने आणि मनाच्या उपस्थितीत, माझ्या स्थानिक भाषेतील सर्व प्रक्रिया समजल्यानंतर मी इच्छुक आहे आणि या अभ्यासामध्ये भाग घेण्यास मी संमती देतो.

तारीख:

ठिकाण:

साक्षीची सही सही

ANNEXURE – III

MASTER CHART

ESTHETICALLY ACCEPTED												
Sl No	**Age**	**Sex**	**Nlf1 Left**	**Nlf 1right**	**Nlf-2 Left**	**Nlf2 Right**	**Nlf Classification**	**Shape of Nasolabial Fold**	**Morphology of Nasolabial Fold**	**Shape of Nasolabial Fold**	**Morphology of Nasolabial Fold**	**Sex**
1	20	1	28.5	26.5	35.8	35	Moderate	1	2	1= Circle	1= simple skin	1=male
2	22	2	29.7	32.5	36.5	38.2	High	3	3	2= elipse	2= fat pad	2=female
3	21	1	31.7	30.3	38.6	35.4	Moderate	5	2	3=parabola	3= muscular	
4	23	1	29.7	33.1	31.6	35.6	Moderate	3	4	4= hyperbola	4= bone retrusion	
5	25	2	35	34	40.5	38	High	2	3	5= indistinct	5= hybrid	
6	24	2	35.3	36.1	38.3	36.1	Moderate	2	3			
7	21	1	2.73	2.95	3.14	31.4	Moderate	3	4			
8	22	1	2.66	28.9	35.4	36.3	Moderate	3	3			
9	23	2	30	27.6	33.6	29.3	Moderate	5	2			
10	24	2	32.5	36.5	42.2	43.8	High	3	4			
11	25	1	37.1	35.2	42.9	39.8	High	2	3			
12	20	1	29.5	31	32.9	37.1	Moderate	2	3			
13	21	1	36.3	33.1	37.5	34.7	Moderate	2	3			
14	22	1	26	29.3	31.8	36.4	Moderate	2	3			
15	24	2	34.8	31.4	39.8	34.8	High	2	1			
16	25	2	30	33.1	35.9	34.7	Moderate	2	1			
17	23	2	30.8	3.42	34.2	39.2	Moderate	3	2			
18	21	2	26	29.3	31.8	36.4	Moderate	2	3			
19	22	1	34.8	31.4	39.8	34.8	High	2	1			
20	23	2	30	33.1	35.9	34.7	Moderate	2	1			
21	22	1	29.7	33.1	31.6	35.6	Moderate	3	4			
22	24	2	35	34	40.5	38	High	2	3			
23	25	2	35.3	36.1	38.3	36.1	High	2	3			

24	24	1	2.73	2.95	3.14	31.4	Moderate	1	4			
25	23	2	2.66	28.9	35.4	36.3	Moderate	3	3			
26	22	1	30.4	27.6	33.6	29.3	Moderate	5	2			
27	20	1	32.5	36.5	42.2	43.8	High	3	4			
28	25	1	37.1	35.2	42.9	39.8	High	1	3			
29	24	1	29.5	31.4	32.9	37.1	Moderate	2	3			
30	21	2	36.3	33.1	37.5	34.7	Moderate	2	3			
31	20	2	29.7	32.5	36.5	38.2	High	3	3			
32	23	2	31.7	30.3	38.6	35.4	High	5	2			
33	25	1	28.5	26.5	35.8	35	Moderate	1	2			
34	24	1	30.8	3.42	34.2	39.2	High	3	2			
35	22	1	30	33.1	35.9	34.7	Moderate	2	1			
36	23	1	29.7	33.1	31.6	35.6	Moderate	3	4			
37	21	2	35	34	40.5	38	High	2	3			
38	20	2	35.3	36.1	38.3	36.1	High	2	3			
38	22	2	2.73	2.95	31.4	31.4	Moderate	1	4			
40	23	2	2.66	28.9	35.4	36.3	Moderate	3	3			
41	24	1	30.4	27.6	33.6	29.3	Moderate	5	2			
42	20	2	32.5	36.5	42.2	43.8	High	3	4			
43	25	2	37.1	35.2	42.9	39.8	High	1	3			
44	24	1	29.5	31.4	32.9	37.1	Moderate	2	3			
45	22	1	36.3	33.1	37.5	34.7	Moderate	2	3			
46	23	2	29.7	32.5	36.5	38.2	High	1	3			
47	24	2	31.7	30.3	38.6	35.4	Moderate	5	2			
48	20	1	28.5	26.5	35.8	35	Moderate	1	2			

ESTHETICALLY PLEASANT

SL NO	AGE	SEX	NLF1 LEFT	NLF 1RIGHT	NLF-2 left	NLF2 right	NLF classification	Shape of Nasolabial fold	Morphology of nasolabial fold	Shape of Nasolabial fold	Morphology of nasolabial fold	SEX
1	20	1	28.5	26.5	35.8	35	Moderate	1	2	1= Circle	1= simple skin	1=male
2	22	2	29.7	32.5	36.5	38.2	High	3	3	2= elipse	2= fat pad	2=female
3	21	1	31.7	30.3	38.6	35.4	Moderate	5	2	3=parabola	3= muscular	
4	23	1	29.7	33.1	31.6	35.6	Moderate	3	4	4= hyperbola	4= bone retrusion	
5	25	2	35	34	40.5	38	High	2	3	5= indistinct	5= hybrid	
6	24	2	35.3	36.1	38.3	36.1	Moderate	2	3			
7	21	1	2.73	2.95	3.14	31.4	Moderate	3	4			
8	22	1	2.66	28.9	35.4	36.3	Moderate	3	3			
9	23	2	30	27.6	33.6	29.3	Moderate	5	2			
10	24	2	32.5	36.5	42.2	43.8	High	3	4			
11	25	1	37.1	35.2	42.9	39.8	High	2	3			
12	20	1	29.5	31	32.9	37.1	Moderate	2	3			
13	21	1	36.3	33.1	37.5	34.7	Moderate	2	3			
14	22	1	26	29.3	31.8	36.4	Moderate	2	3			
15	24	2	34.8	31.4	39.8	34.8	High	2	1			
16	25	2	30	33.1	35.9	34.7	Moderate	2	1			
17	23	2	30.8	3.42	34.2	39.2	Moderate	3	2			
18	21	2	26	29.3	31.8	36.4	Moderate	2	3			
19	22	1	34.8	31.4	39.8	34.8	High	2	1			
20	23	2	30	33.1	35.9	34.7	Moderate	2	1			
21	22	1	29.7	33.1	31.6	35.6	Moderate	3	4			
22	24	2	35	34	40.5	38	High	2	3			

23	25	2	35.3	36.1	38.3	36.1	High	2	3			
24	24	1	2.73	2.95	3.14	31.4	Moderate	1	4			
25	23	2	2.66	28.9	35.4	36.3	Moderate	3	3			
26	22	1	30.4	27.6	33.6	29.3	Moderate	5	2			
27	20	1	32.5	36.5	42.2	43.8	High	3	4			
28	25	1	37.1	35.2	42.9	39.8	High	1	3			
29	24	1	29.5	31.4	32.9	37.1	Moderate	2	3			
30	21	2	36.3	33.1	37.5	34.7	Moderate	2	3			
31	20	2	29.7	32.5	36.5	38.2	High	3	3			
32	23	2	31.7	30.3	38.6	35.4	High	5	2			
33	25	1	28.5	26.5	35.8	35	Moderate	1	2			
34	24	1	30.8	3.42	34.2	39.2	High	3	2			
35	22	1	30	33.1	35.9	34.7	Moderate	2	1			
36	23	1	29.7	33.1	31.6	35.6	Moderate	3	4			
37	21	2	35	34	40.5	38	High	2	3			
38	20	2	35.3	36.1	38.3	36.1	High	2	3			
38	22	2	2.73	2.95	31.4	31.4	Moderate	1	4			
40	23	2	2.66	28.9	35.4	36.3	Moderate	3	3			
41	24	1	30.4	27.6	33.6	29.3	Moderate	5	2			
42	20	2	32.5	36.5	42.2	43.8	High	3	4			
43	25	2	37.1	35.2	42.9	39.8	High	1	3			
44	24	1	29.5	31.4	32.9	37.1	Moderate	2	3			
45	22	1	36.3	33.1	37.5	34.7	Moderate	2	3			
46	23	2	29.7	32.5	36.5	38.2	High	1	3			
47	24	2	31.7	30.3	38.6	35.4	Moderate	5	2			
48	20	1	28.5	26.5	35.8	35	Moderate	1	2			

ESTHETICALLY UNPLEASANT

Sl No	Nlf1 Left	Nfl1 Right	Nlf2 Left	Nlf2 Right	Nlf Classification	Shape of Nasolabial Fold	Morphology of Nasolabial Fold	Age	Sex	Shape of Nasolabial Fold	Morphology of Nasolabial Fold	Sex
1	29.3	32.8	33.8	34.8	Moderate	1	1	20	1	1= Circle	1= simple skin	1=male
2	32.6	29.4	35.4	34	Moderate	2	1	22	2	2= elipse	2= fat pad	2=female
3	32.8	32.8	37.6	39.3	High	1	1	21	1	3=parabola	3= muscular	
4	33.8	36.2	38.1	40.6	High	2	2	23	1	4= hyperbola	4= bone retrusion	
5	33.1	31.6	38.8	36.6	High	2	2	25	2	5= indistinct	5= hybrid	
6	34.1	27.2	33.8	29.1	Moderate	5	2	24	2			
7	32.5	28.1	38.3	33.3	Moderate	2	1	21	1			
8	28.9	27.1	34.9	30.3	Moderate	5	2	22	1			
9	32.5	28.1	38.3	33.3	Moderate	2	3	23	2			
10	32.2	30	33.1	34.7	Moderate	5	1	24	2			
11	35.6	34.7	43.1	40.6	High	5	2	25	1			
12	34.1	37.5	38.1	41.6	High	2	3	20	1			
13	35.2	31.8	39.2	33	Moderate	5	4	21	1			
14	30.3	31.7	33.1	36.3	Moderate	2	4	22	1			
15	27.2	29.7	34.7	29.7	Moderate	2	1	24	2			
16	32.1	33.8	33.5	35	Moderate	3	1	25	2			
17	29.5	27.8	36.5	33	Moderate	4	4	23	2			
18	37.2	38.8	42.2	40.6	High	3	2	21	2			
19	29.7	27.2	37.2	36.6	Moderate	2	3	22	1			
20	31.7	29.4	34.9	31.7	Moderate	5	5	23	2			
21	32.1	25.9	38.2	31.5	Moderate	5	5	22	1			
22	28.1	26.6	34.1	35.6	Moderate	2	2	24	2			
23	23.3	23.3	25.8	25.8	Mild	3	5	25	2			

24	22.2	22.5	27.5	26.6	Mild	5	5	24	1			
25	28.1	29.7	36.2	32.2	Moderate	5	5	23	2			
26	24.5	24.5	29.2	29.2	Mild	1	1	22	1			
27	28.8	26.5	35	30.3	Moderate	5	5	20	1			
28	36.6	35.6	43.1	40.6	High	5	2	25	1			
29	31.7	35.3	38.7	40.7	High	5	5	24	1			
30	34.7	30.6	38.8	35.6	High	2	1	21	2			
31	28	31.1	29.4	31.7	Moderate	5	1	20	2			
32	35.5	34.5	42.6	45.5	High	5	5	23	2			
33	28.9	28.9	34	34.9	Moderate	3	3	25	1			
34	34.9	30.3	37.7	35.4	Moderate	1	3	24	1			
35	30.3	31.2	35.9	35.9	Moderate	5	1	22	1			
36	33.8	31.6	36.6	36.2	Moderate	2	3	23	1			
37	37.2	36.2	41.2	40.6	High	2	1	21	2			
38	39.4	34	40	36.3	High	5	5	20	2			
38	38.1	39.7	31.6	37.2	Moderate	4	3	22	2			
40	38.1	31.6	39.7	37.2	High	5	5	23	2			
41	33.1	32.2	38.4	37.4	High	5	5	24	1			
42	30.3	31.1	35.4	32.6	Moderate	2	2	20	2			
43	32.2	31.6	36.2	35.6	Moderate	1	3	25	2			
44	32.6	35.4	38.6	41.7	High	5	1	24	1			
45	33.4	31.1	35.4	36.3	Moderate	5	1	22	1			
46	29.4	23.4	33.1	28	Moderate	5	4	23	2			
47	27.8	25.7	33.5	28.6	Moderate	2	2	24	2			
48	29.3	32.8	33.8	34.8	Moderate	1	1	20	1			

ANNEXURE – IV –

EVALUATION SHEET FOR ORTHODONTIST

Name of the Orthodontist: Date:

Si. No	Score	Small Teeth	Big Teeth	Excess Gingival Display	Little Gingival Display	Stained Teeth	Yellow Teeth	Uneven Teeth	Thin Lips	Thick Lips	Disproportionate Teeth