LIP PRINTS AND PALM PRINTS –

THE BARCODE OF SKELETAL MALOCCLUSION

A dissertation submitted

in partial fulfillment of the requirements

for the degree of

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BRANCH - V

ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI – 600 032

2016 – 2019

DECLARATION BY THE CANDIDIATE

I hereby declare that this dissertation titled **LIP PRINTS AND PALM PRINTS –**

THE BARCODE OF SKELETAL MALOCCLUSION is a bonafide and genuine

research work carried out by me under the guidance of **DR.K.S.PREMKUMAR,**

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"Research is to see what everyone else has seen and to think what nobody else has thought".

Without the support, patience and guidance of the following people, this study could not have been completed. It is to them that I owe my deepest gratitude.

First and Foremost I would like to thank the Almighty God. No endeavor can start, continue and reach completion without the blessings of him.

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CERTIFICATE- II

This is to certify that this dissertation work titled **"Lip Prints and Palm Prints – The Barcode Of Skeletal Malocclusion"** of the candidate **Dr. John Wilfred Young.A** with registration number **241619402** for the award of master of dental surgery in the branch of **Branch – V Orthodontics and Dentofacial Orthopedics**. I personally verified the urkund.com website for the purpose of plagiarism check. I found that uploaded thesis file contained from introduction to conclusion and the result shows **5%** of plagiarism in the dissertation

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PLACE OF STUDY	**BEST DENTAL SCIENCE COLLEGE, MADURAI – 625104**
DURATION OF THE COURSE	**3 YEARS**
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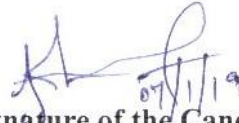**Signature of the Candidate**

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This agreement herein after the "Agreement" is entered into on this day of 7/1/2019 between the Best Dental Science College represented by its Principal having address at Best Dental Science College, Madurai – 625 104. (Hereafter referred to as "the College").

And

DR.K.S.PREMKUMAR aged 45 years, working as Professor and Head of the Department at the College, having residence address at 2/225 Vignesh Avenue, 2nd street Karupayurani ,Opp to Indian Oil Petrol Bunk, Madurai – 625 020

And

DR.JOHN WILFRED YOUNG.A, aged 25 years, studying as postgraduate student in the Department of Orthodontics and Dentofacial Orthopedics in Best dental Science College. Herein after referred to as the PG/research student and co-investigator.

Whereas PG / Research student as part of his curriculum undertakes to research **"LIP PRINTS AND PALM PRINTS – THE BARCODE OF SKELETAL MALOCCLUSION"** for which purpose PG/Principal Investigator shall act as Principal Investigator and the college shall provide requisite infrastructure based on availability and also provide facility to the PG /Research student as to the extent possible as a Co–investigator.

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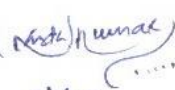
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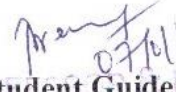
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ABSTRACT

Aim: The aim of the study is to evaluate the correlation of lip prints and dermal prints with skeletal base relationship, to find the correlation between lip prints and the dermal prints and to evaluate if any significant difference existed among genders.

Materials and Methods: The study involved 120 subjects: According to Reidel's classification of Malocclusion the samples were divided into 3 groups - 40 Class I, 40 Class II, 40 Class III. The lip prints, finger prints and palm prints of all 120 subjects were recorded using cellophane technique and the data analysis was accomplished using SPSS version 22.0. Chi square test was done for intergroup comparison. ANOVA test was done to find the statistical significance of atd angle and a-b ridge count.

Results: Branched lip pattern was seen in Class I and II skeletal malocclusion whereas Vertical lip pattern was observed in Class III patients. Right loop pattern was prevalent among the South Indian Population as well as in all the 3 study groups. The a-b ridge count and atd angle was higher in Class I individuals. Both males and females showed a majority of branched lip pattern.

Conclusion: Dermatoglyphics and Cheiloscopy can serve as an easy, accessible, inexpensive and noninvasive method of exploring the genetic associations of malocclusion and for timely prevention. But due to other ethnic, environmental factors they are not completely reliable.

Key Words: Lip prints, Palm prints, Finger prints, skeletal malocclusion.

LIST OF ABBREVATION

ANOVA	Analysis Of Variance
ANB	Subnasal, Nasion, Supramental
TRC	Total Ridge Count
SPSS	Statistical Package for Social Science
RL	Right Loop
LL	Left Loop
W	Whorl
CPW	Central Pocket Whorl
DL	Double Loop
AW	Accidental Loop
A	Arches
SD	Standard Deviation
F	Frequency
Sig	Significance

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INTRODUCTION

The basis of comprehensive plan of orthodontic therapy is done by appropriate diagnostic procedures and the analysis of pertinent diagnostic data. There is a wide array of diagnostic soft tissue analyses in which lips play a major role.[1]

Lip prints consist of normal lines and fissures numerous wrinkles and grooves which are present in between the inner labial mucosa and outer skin. The study of lip prints are referred to as Cheiloscopy. It is unaltered from sixth week of intrauterine life till death. It can be visibly seen with naked eyes like with lipstick while latent prints are not visible with naked eyes.[2]

Same as the lip prints, the finger prints also vary from an individual to individual. Lip prints are unique and do not change during the life of a person. It has been stated in the literature that lip prints can recover after undergoing alterations like minor trauma, inflammation and diseases like Herpes.[3]

The term Dermatoglyphics was coined by Cummins and Midlo in 1961. It deals with the study of epidermal ridges and their configuration on the fingers, palms and soles.[4] The studies involving pattern of dermal ridges and finger prints have fascinated many researchers. Dermatoglyphics has been investigated in various fields such as Forensic medicine, Genetics and Anthropology.[5] The pattern of dermal ridges is characteristic of a given individual, which occurs at the site of certain mounds of skin, appearing during the third and fourth months of intrauterine life.[6] As a result, certain disturbances of fetal growth during this period, whether due to hereditary or environmental factors, are faithfully recorded by modifications in the ridge configuration.[7]

The Dermatoglyphic patterns once established in intrauterine life never alters except in overall size. It is stated that finger and palm prints, the lip, alveolus and palate develop during the same embryonic period. Thus any factor causing changes in the lip, alveolus and

palate may also cause peculiarities in the appearance of finger and palm prints. Genetic expression is the basis for craniofacial development and is known to be responsible for skeletal malocclusions.[8] Dermal ridges start to appear during the 12th week of intrauterine life and are completed by the 24th week of intrauterine life. Thereafter, they remain constant.[4]

As genetic or chromosomal abnormalities might be reflected as alterations in dermal ridges, they can be used as an easily accessible tool in the study of genetically influenced diseases. Malocclusion is a developmental deformity which varies from minor to major deformities of dental or skeletal origin, including systemic syndromic anomalies.[9]

It is an established scientific fact that no two individuals, including twins, have the same fingerprints and other details of dermal ridges, which offer distinct advantages and may be used as a screening tool, which is easily accessible, economical and non-invasive marker to detect early malocclusion.[8] Hence the purpose of this study is to evaluate the different dermatoglyphic patterns and their correlation with skeletal malocclusions which in turn can be applied in preventive and interceptive orthodontics to the high risk groups and also for parent counseling.

Since the finger prints , palm prints and lip prints has a strong hereditary pattern, they can be used as suitable diagnostic tools in comprehensive plan of orthodontic therapy apart from aiding in personal identification and crime investigation in forensic dentistry.

There is a strong relationship which exists between the skeletal malocclusions (Class I,II,III) and soft tissue.[2] Therefore this study is designed to explore the correlation of lip prints and finger prints with skeletal base relationship and to assess the same correlation in South Indian population of adults.

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AIMS &

OBJECTIVES

AIMS AND OBJECTIVES:

1. To evaluate the correlation of lip prints with skeletal base relationship.
2. To study the dermal prints and correlate with skeletal base relationship.
3. To find the correlation between lip prints and the dermal prints.
4. To evaluate if any significant difference existed among gender.

NULL HYPOTHESIS

There is no association between Lip prints, Dermatoglyphics and Skeletal malocclusion

HYPOTHESIS (ALTERNATE)

There is relation between Lip prints, Dermatoglyphics and Skeletal malocclusion.

REVIEW OF LITERATURE

Julian Verbov et al (1970) in his review article stated that study of the patterns of the epidermal ridges of finger, palm and sole can serve as an aid to the diagnosis of many diseases, particularly those caused by chromosomal aberrations, which are frequently accompanied by distortion of patterns, but also in other diseases both genetically and non-genetically determined. In early pregnancy, an intrauterine growth disturbance affecting the extremities, whether due to hereditary or environmental factors, will be accompanied by abnormal dermatoglyphics. A clinical diagnosis should not be based on dermatoglyphic features alone because of the great natural variation found in print patterns, no single feature being specific to a particular disease. However, a complete examination of the patient with skin disease, particularly if the latter has a genetic component, should include observation of the epidermal ridges of hands and feet. The frequency of occurrence of different types of patterns and the pattern of distribution is significantly different between both the groups. Increased frequency of whorls were found both in Right & Left hands in Skeletal Class I pattern group. Increased frequency of Ulnar Loops was found in the right hand of Skeletal Class II pattern group.[10]

Perizigian et al (1977) examined dental metric traits in Indian tribes and found higher fluctuating asymmetry in the teeth of individuals that subsisted on hunting than in those who subsisted on farming; the latter also had better living conditions and suffered less from environmental pressures than the former. The investigation assumed that these inter-tribal differences stemmed from differences in the intensity of environmental pressures exerting an influence on them but did not rule out the possible existence of genetic differences on the influence of different levels of inter- tribal inbreeding.[11]

Kharbanda O.P et al (1982) conducted a study in 25 samples using dermatoglyphics to predict malocclusion. All the subjects were males. Based on Angle's malocclusion**,** the

groups were divided. Finger patterns were recorded**.** Increased frequency of radial loops was observed in Class 1 skeletal malocclusion.[12]

Reddy S et al (1997) aimed to predict malocclusion using Dermatoglyphics and so conducted a study using dermatoglyphics to predict and compare Class I, Class II, div.1, div. 2 and Class III malocclusions. A total of 96 subjects were divided into 3 malocclusion groups, i.e. Class I (control group), Class II div.1, div.2 and Class III (experimental group) in the ages of 12- 14 years. The dermatoglyphic findings revealed that the craniofacial Class II div.1, div.2 pattern was associated with increased frequency of arches and ulnar loops and decreased frequency of whorls, whereas in Class III, there was an increased frequency of arches and radial loops with decreased frequency of ulnar loops. In predicting Class III malocclusion, based on frequency of arches, the sensitivity values were found to be higher and more reliable than the sensitivity values of Class II div.1 and div.2 malocclusion.[13]

P.A. Mossey et al **(1999)** in their review article stated that the relative influence of genetics and environmental factors in the etiology of malocclusion has been a matter for discussion, debate and controversy in the orthodontic literature. This paper reviews the literature and summarizes the evidence for the influence of genetics in dental anomalies and malocclusion. Since there is evidence that these oro-facial structures are under genetic control and are significant in craniofacial development they must be considered in the etiology of malocclusion. Among the conclusions is that, while phenotype is inevitably the result of both genetic and environmental factors, there is irrefutable evidence for a significant genetic influence in many dental and occlusal variables. The influence of genetics however varies according to the trait under consideration and in general remains poorly understood.[14]

M Trehan et al (2000) conducted a study to find the correlation between dermatoglyphics and malocclusion. They analyzed and compared the dermatoglyphic

parameters of individuals with normal occlusion and various Classes of malocclusion, based on the fact that development of teeth and palate occurs during the same period as the development of dermal patterns. A total of 60 subjects under the age group of 15-26 years were divided into 4 experimental groups i.e. Class-I control group, Class-I type 2, Class-II div.1 and Class-III. The justification for dividing the sample into these 4 groups is that each group is representative of a single Class of Angle's Classification of malocclusion. The dermatoglyphic findings revealed that when compared with normal occlusion, Class-I and Class-III malocclusions were associated with an increased frequency of whorls and both Class-I and Class-II div.1 malocclusions were associated with an increased frequency of radial loops and arches. It was seen that total finger ridge count was higher in males as compared to females in controls as well as in experimental groups. The percentage of total finger ridge count decreased in all experiment group when compared to the control group except in Class-III in which it increased. Increased frequencies of patterns in hypothenar area were also observed in all malocclusion groups as compared to normal occlusion.[15]

S Tikare et al (2010) studied about the relationship between fingerprints and malocclusion among a group of 696 high school children aged 12-16 years in Dharwad, Karnataka, India. Their fingerprints were recorded using duplicating ink and malocclusion status was clinically assessed using Angle's Classification. The results of this study revealed that association between whorl patterns and Classes I and II malocclusion were statistically significant (p<0.05). However, no overall statistical association was observed between fingerprint patterns and malocclusion (p<0.05). Thus it was concluded that dermatoglyphics might be an appropriate marker for malocclusion and further studies are required to evaluate an association between fingerprint pattern and malocclusion.[16]

Kulkarni N et al (2012) conducted a study to find the relationship between lip prints and malocclusion for which they collected lip prints in a total of 90 patients with skeletal Class I, Class II, and Class III, comprising 30 patients in each group with equal gender distribution. It was observed that angle ANB (Angle formed between points nasion [N] to Subnasal [A] and nasion [N] to supramental [B]) and beta angle were statistically significant, revealing a strong negative correlation (-0.9060) with different Classes of jaw relation. Significant difference was observed between genders in all the three Classes. Significant difference was observed in relation to lip print and the quadrants of upper and lower lips. A statistical significance was noted on the right side of both upper and lower arches. This study shows that lip prints can be employed for sagittal jaw relation recognition. A further study on various ethnic backgrounds with a larger sample size in individual group is necessary for comparing lip prints and malocclusion.[17]

Karki et al (2012) conducted a study to find the correlation between lip prints and skeletal malocclusion in 150 medical students which included 75 males and 75 females of Kathmandu University School of Medical Sciences, Dhulikhel, Kavre in 2011. Lip prints were collected and analyzed as per Suzuki's Classification. There was significant difference between male and female lip print patterns. Type II was most common combining both. Type I and I' was more common in male whereas Type I was rare in female. Type II in fourth quadrant was seen in almost all female and also the commonest. Similar patterns in all four quadrants were common findings in female. The study showed that each lip print is unique and the sex of the person can be predicted on the basis of patterns present in prints.[3]

Raghav P et al (2013) evaluated 114 subjects to find the correlation between lip prints and skeletal malocclusion in the age group of 18-30 years with skeletal Class I, Class II and Class III malocclusion, each group comprising of 38 subjects with equal number of males

and females. Lip prints of all the individuals were recorded .On comparison of Lip prints with different skeletal malocclusions. It was found that prevalence of vertical lip pattern was significantly higher in subjects having skeletal Class III malocclusion revealing a definite correlation of vertical lip patterns with skeletal Class III malocclusion.[2]

Rajput S et al (2014) conducted a study to find the correlation between finger prints and malocclusion in 24 subjects of which 10 were Class I, 8 were Class II and 6 were Class III malocclusion. The finger patterns, ab ridge count and atd angle was noted. Significantly higher proportion of whorl pattern in Class I when compared to the Class II and III. Significantly higher proportion of subjects from Class II and III had Loop pattern compared to the Class I. Increased proportion loops in Class III when compared to Class II, but there was no statistical significance. The average of both was not significantly different between three study groups.[18]

Jindal G et al (2015) conducted a study to find if there was any relationship between dermatoglyphics and malocclusion. They collected Finger and palm prints in 237 children aged 12–16 years, and fingertip pattern frequencies, total ridge counts (TRCs), and atd angles (formed by the triradii below the first and last digits and that in the hypothenar region of the palm) were calculated. These parameters were analyzed with their Angle's Class of malocclusion. Although no fingerprint pattern was found to be specific for a particular Class of occlusion, increased tendencies toward high frequencies of whorls in subjects with Class II malocclusion and plain arches in those with Class III malocclusion were observed. Significant differences in atd angle and TRC were observed among malocclusion types (p = 0.0001) indicating that Dermatoglyphic analysis can be used to predict malocclusion at an early age, thereby aiding the development of treatments aiming to establish favourable occlusion. [19]

Ruchi S et al (2015) conducted a study to find the correlation between malocclusion and lip prints for which he analyzed 300 subjects out of which 234 subjects including males and females were found to be fit for the study having dental malocclusion with age range of 18–25 years. The subjects were classified into three groups according to Angles classification of malocclusion as Class I, Class II and Class III malocclusions. The impressions of the lips were taken on the self-adhesive cellophane tape and then immediately transferred onto the bond sheets. The analysis of these lip prints patterns was done with the help of magnifying lens. The statistical analysis with chi square test showed that lip print patterns were found to a have highly significant (p<0.001) association with malocclusion. The lip print patterns which are important tools for identification were found to have a highly significant association with malocclusion and it can also be said that the lip print patterns have a role in determining malocclusion.[20]

Shivani Y et al (2015) examined 30 patients with Skeletal Class III Malocclusion and recorded lip prints and analyzed. Descriptive statistical analysis was used to find the prevalence of lip prints patterns among sagittal Class III skeletal malocclusions. Central vertical grooves, Fork grooves, Intersected grooves, Reticulate Groove types of lip prints was the order of predominance in skeletal Class III group of individuals.[21]

Divyashree et al (2016) conducted a study on 40 individuals cephalometrically confirmed as Skeletal Class I and Skeletal Class II based on Downs and Steiner analysis between the age group of 15 – 30 years were selected. Fingerprint patterns of the study subjects were recorded using Ink and Paper method and the finger prints were studied .The study concluded that the Pattern distribution is significantly different between both the groups. Increased frequency of whorls were found both in Right & Left hands In Skeletal

Class I Pattern Group. Increased frequency of Ulnar Loops was found in the Right Hand of Skeletal Class II pattern group.[22]

Eslami N et al (2016) conducted a cross-sectional study to find the correlation between fingerprints and skeletal malocclusion in 323 patients who were referred to Orthodontic Department of Mashhad Dental School. The participants were classified into three groups according to Angle's Classification , i.e., Skeletal Class I (n = 163), Skeletal Class II (n = 111), and Skeletal Class III (n = 49). For all participants, atd angles, a-b ridge counts, and types of fingerprint patterns was recorded. Right and left - hand asymmetry scores were calculated. The Chi-square test was used to compare the dissimilarity of the types of patterns for each finger. Asymmetry of other parameters was analyzed statistically using the ANOVA or Kruskal-Wallis tests. A significant difference was determined between Class I and Class III patients in terms of a-b ridge count (p=0.049). Loop was the most frequent pattern among the 3 groups, whereas the arch pattern occurred with the lowest frequency. No significant difference was found in the other parameters that were studied. Although there were some slight variations in dermatoglyphic peculiarities of different skeletal malocclusions, most of the palm and fingerprint characteristics failed to indicate any significant differences.[7]

George SM et al (2017) conducted a study to find the relationship between dermatoglyphics and skeletal malocclusion in a total of 180 patients, aged 18-40 years, were selected from those who attended the outpatient clinic of the Department of Orthodontics and Dentofacial Orthopedics, Mar Baselios Dental College, Kothamangalam, Kerala, India. The fingerprints of both hands were taken by ink and stamp method after proper hand washing. The patterns of arches, loops and whorls in fingerprints were assessed. A significant association was observed between the dermatoglyphic pattern exhibited by eight fingers and the sagittal skeletal discrepancies (p<0.05). An increased distribution of whorl pattern was

observed in the skeletal Class II with maxillary excess group and skeletal Class II with mandibular deficiency group while an increased distribution of loop pattern was seen in the skeletal Class III with mandibular excess group and skeletal Class III with maxillary deficiency group. Higher mean of total ridge count was also seen in the groups of skeletal Class II with maxillary excess and skeletal Class II with mandibular deficiency. Multinomial regression predicting skeletal pattern with respect to the fingerprint pattern showed that the left thumb impression fits the best model for predicting the skeletal pattern.[23]

Cheeli S et al (2017) conducted a study to evaluate the relation between finger prints, palm prints and skeletal malocclusion. 800 children between 8-16 years were screened and among them, 150 were who met inclusion criteria were selected and divided into 2 Groups. Based on Angle's malocclusion, Group 1 (n = 90) was subdivided into Group 1A (30 - Class I), 1B (30 - Class II) and 1C (30 - Class III). Based on DMFT, Group 2 (n = 60) were subdivided as Group 2A (30 - Caries free) and 2B (30 - Caries active). Both Groups had an equal distribution of boys and girls. Finger and palm prints were analyzed using Cummins and Midlo. Rugae patterns were analyzed using Thomas and Kotze Classification. The obtained data were subjected to statistical analysis using Chi-square test. The study concluded that based on dermatoglyphics, predominant loop pattern was observed in all the subgroups of Group 1 (1A, 1B and 1C). Based on rugae pattern, predominant wavy pattern in Group 1A and curved pattern in both 1B and 1C were observed. In Group 2, loop dermatoglyphic pattern and wavy rugae pattern were predominant in Groups 2A and 2B. Atd angle was highest in Groups 1A (41.60) and 2B (42.36).[24]

Ponnusamy S et al (2017) conducted a study to find the correlation between skeletal malocclusion and lip prints analysed the Lip prints of 25 subjects with skeletal Class I and 25 with skeletal Class II malocclusion (age group of 18-35years) and found statistical significant difference between the two malocclusions. It was observed in the Vertical and Branched

patterns while the intersected, reticular and undermined patters showed no difference. This was evident in the female gender while the male gender showed differences in the vertical pattern only. This study concluded that since sagittal jaw and dental relationships get established before lip prints, lip print assessment may aid the clinical orthodontist by predicting the type of malocclusion.[25]

Kaushal et al (2018) conducted a study to find out the relationship between lip pattern and skeletal malocclusion which included 90 subjects in the age group of 18-30 years, from Distt Solan, (H.P.) population who were divided into two groups, Group I (Skeletal Class I) and Group II (Skeletal Class II). Lip prints of all the individuals were recorded and compared between Skeletal Class I and Class II malocclusions. From the results it was found that Branched lip pattern was most common in Distt Solan population with no sexual dimorphism. In overall, Skeletal Class I group, Branched lip pattern was most prevalent (28.9%), followed by Intersected (24.4%), Reticular (22.2%), Vertical (17.8%) and (6.7%) Undetermined lip patterns. In overall Skeletal Class II group, Branched lip pattern was most prevalent (31.1%), followed by Reticular lip pattern (28.9%), Intersected lip pattern (17.8%), Vertical lip pattern (13.3%) and Undetermined lip pattern (8.9%). In this study they concluded that there was no statistical significant association of lip prints with Skeletal Class I and Class II malocclusion.[26]

Maheswari et al (2018) studied about the significant relation between the type of lip print and the Angle's molar relation. In this study 60 subjects were included and were divided to three groups corresponding to the Angles Classification of malocclusion as Class-I, Class-II and Class-III with 20 subjects in each group respectively. The lip print pattern of all the 60 subjects was traced using lipstick on a cellophane tape and was pasted on a chart paper for future analysis. The relation between type of lip print and the type of molar relation was assessed. Results of the study proved that the correlation coefficient between the Angle's

Molar relation and lip prints were proved to be statistically insignificant (p->0.05). They found that Type I was the most prevalent lip print in all the 3 molar relations. This study had revealed unique 12 digit lip print which could further be explore established in this study can be further explored to prove the significance of lip print in biometrics.[27]

Achalli S et al (2018) assessed the relationship between the fingerprint patterns with different skeletal malocclusions. In this study fingerprint patterns were collected from 90 subjects using ink method who were grouped into skeletal Class I, skeletal Class II, skeletal Class III malocclusion consisting of 30 subjects each. Loop pattern was more frequent in skeletal Class I and skeletal Class II malocclusion; whorl pattern was present with increased frequency in skeletal Class III malocclusion. From this study results, they suggested that the relationship of dermatoglyphic patterns with skeletal malocclusion can be used as an indicator of developing malocclusion at an early age.[28]

Jalannavar P et al (2018) studied about the relationship between lip prints and malocclusion among 300 children aged 5-15 years was recorded by Angle's method. Lip prints were recorded on cellophane tape and analyzed by Tsuchihasi's Classification. The undetermined lip pattern showed the highest number of Angle's Class II malocclusion cases (21.6%) followed by the reticular pattern (15.4%). The reticular pattern showed the highest number of Angle's Class III malocclusion cases (4.6%) followed by the intersected pattern (2.7%). The p values for all these observations were > 0.05 and hence there was no statistically significant difference between the lip patterns and the malocclusions present. [29]

MATERIALS & METHODS

Prior to the commencement of the study, the research proposal was presented to the Institutional Review Board of Best Dental Science College, Madurai, Tamil Nadu and ethical clearance was obtained. Appropriate permissions were obtained from the patients who accepted to participate in the study.

SAMPLE SOURCE: This in vivo study was done by collecting the lip prints, finger prints and palm prints in Patients with skeletal Class I, Class II, Class III malocclusion who reported to the Department of Orthodontics and Dentofacial Orthopaedics, Best Dental Science College and Hospital, Madurai

STUDY SAMPLE SIZE:

A sample of 120 human subjects, age ranging from 21-25 years were selected on the basis of skeletal Class I,II and III malocclusion given by Riedel. The samples were divided into 3 groups.

Study sample group:

The study comprises of 3 groups

Group I - Class I (ANB 2^0-4^0) – Sample size 40

Group II - Class II (ANB $\geq 4^0$) – Sample size 40

Group III - Class III (ANB 0^0) – Sample size 40

INCLUSION CRITERIA

❖ Individuals with Skeletal Class I, II,III Malocclusion

❖ Individuals under the age range of 21-25 years

❖ Samples willing to participate in the study

EXCLUSION CRITERIA

❖ Subjects with any lesions on the lips

❖ Subjects with any congenital facial clefts and cleft lip and palate

❖ Subjects with any wounds or cuts in the fingers and palms

❖ Subjects with known hypersensitive to lip sticks and any orthodontic treatment undergone or maxillofacial surgery should not be included for the study.

MATERIALS NEEDED FOR THE STUDY:

1) Lip Stick (**Fig 1**)

2) Cellophane Tape

3) Graphite Powder (**Fig 2**)

4) Cotton (**Fig 3**)

5) Small Paint Brush

6) A3 Sheet

7) Magnifying Lens (**Fig 4**)

Fig 1 :Lipstick

Fig 2 :Graphite powder

Fig 3 : Cotton with graphite powder

Fig 4 : Magnifying Lens

METHODOLOGY/ PROCEDURES

DATA COLLECTION METHOD

Well-constructed pro-forma in English language containing various aspects of information about patients including finger prints in skeletal Class I, II and III, lip print details, and cephalometric analysis was framed. Subjects having malocclusion were explained about the study, the rationale and expected outcome of the study and then requested to volunteer with their written and verbal consent in their own language.

Subjects who consented for this study were asked to report to the Department of Orthodontics and Dentofacial Orthopaedics, Best Dental Science College, Madurai.

In this study, Cellophane technique was selected to record the lip prints and finger prints of the subjects. In order to obtain the lip prints of the subjects lipstick was applied, cellophane tape was used to transfer the print from the lips to the paper and to record the finger print the investigating region was blackened with graphite smeared on a piece of cardboard. The print was taken using a Cellophane tape which was then adhered to an A4 sheet.

EVALUATION CRITERIA:

For Lip Prints :

According to Tsuchihashi's[31] classification, lip prints were categorized as

Type 1: Clear-cut grooves running vertically across the lips (Vertical)

Type 2: Fork grooves in their course (Branched)

Type 3: Intersecting grooves

Type 4: Reticulate grooves

Type 5: Undetermined

For finger print

According to method used by Jindal G et al,[19]

There are 6 fingerprint patterns

Plain Arches, Loops, Whorls, Double Loop, Central Pocket Whorl, Arches

1. **Plain arch**: The plain arch is composed of ridges which pass across the finger with slight bow distally. There are no triradii. Since the pattern has no triradii, the ridge count cannot be done

2. **Whorl**: These are the patterns so constructed that the characteristic ridge courses follow circuits around the core. The shape of the pattern area may be either circular or elliptical. Whorls have two triradii.

3. **Loop**: It possesses only one triradius. Twist site of ridges is called head of the loop. From the opposite extremity of the pattern, the ridges flow to the margin of digits. If the loop opens to the ulnar side, it is an ulnar loop and if to the radial margin, it is called a radial loop

4. **Double loop**

5. **Central Pocket whorl**

6. **Accidental loop**

RESULTS

The clinical characteristics of the study sample:

The study group comprised of 120 cases which includes 40 samples of Class I skeletal malocclusion, 40 samples of Class II skeletal malocclusion and 40 samples of Class III skeletal malocclusion. The mean age of the patients included in the study was 23.2 years, which ranged from 21-25 years.

Table 1 shows 40 samples of class I Skeletal malocclusion of which 20(50%) males and 20(50%) females. The mean age was 22.7 years, which ranged from 21-25 years. 9 samples (22.5 %) were of 21 years, 8 samples (20%) were of 22 years, 11 samples (27.5%) were of 23 years, 9 samples (22.5%) were of 24 years, 3 samples (7.5%) were of 25 years.

40 samples of class II Skeletal malocclusion of which 20(50%) males and 20(50%) females. The mean age was 23.5 years which ranged from 21-25 years. 4 samples (10%) were of 21 years, 5 samples (12.5%) were of 22 years, 9 samples (22.5%) were of 23 years, 10 samples (25%) were of 24 years, 12 samples (30%) were of 25 years.

40 samples of class III Skeletal malocclusion of which 20(50%) males and 20(50%) females. The mean age was 23.4 years which ranged from 21-25 years. 1 sample (2.5%) was of 21 years, 6 samples (15%) were of 22 years, 15 samples (37%) were of 23 years, 14 samples (35%) were of 24 years, 4 samples (10%) were of 25 years.

Comparison of lip prints in the study groups:

Table 2 compares the lip prints in study groups. Among 120 subjects, a majority of 44(36.7%) subjects had branched lip pattern followed by 33 (27.5%) subjects with Vertical lip pattern , 19(15.8%) subjects had Intersected lip pattern, 12 (10%) subjects had Reticular lip pattern, 12 (10%) had Undetermined lip pattern.

Among group I, majority of 13(32.5%) samples had branched pattern 11(27.5%) had vertical lip prints, 6(15%) had Reticular lip pattern and Undetermined lip pattern and only4 (10%) samples had intersected lip pattern.

Among the group II, a majority of 19(47.5%) samples had Branched lip pattern, 10(25%) had intersected lip pattern, 7(17.5%) had vertical lip prints,

Among the group III, a majority of 15(37.5%) samples had vertical lip pattern, 12(30%) had branched lip pattern, 5(12.5%) had intersected and reticular lip pattern and 3(7.5%) had undetermined lip pattern.

In the present study of 120 subjects, 33.3% of Class I malocclusion, 21.2% of Class II malocclusion and 45.5% of Class III malocclusion cases had vertical lip pattern.29.5% of Class I, 43.2% of Class II and 27.3% of Class III malocclusion. 21.1% of Class I, 52.6% of Class II and 26.3% of Class III malocclusion had intersected lip pattern. 50% of Class I malocclusion, 8.3% of Class II malocclusion and 41.7% of Class III malocclusion had reticular lip pattern.50% of Class I malocclusion, 25% of Class II and Class III malocclusion had undetermined lip pattern. There is no significance in the comparison of lip patterns, since the p value is 0.108.

Comparison of finger prints in the study groups:

Table 3a compares the finger prints in the study groups. 280(46.6%) right loops, 45(17.5%) left loop, 93(15.5%) whorl, 54(9%) central pocket whorl, 24(4%) double loop, 20(3.3%) accidental loops were seen in 120 subjects. Among the study groups, group I with Class I malocclusion had a majority of 100 (50%) right loop pattern followed by 31(15.5%) arches, 24(12%) central pocket whorl, 23(11%) whorl, 9(4.5%) double loop, 8(4%) accidental loop and 6(3%) left loop. Group II with Class II malocclusion had a majority of

109 (54%) right loop pattern followed by 32(16%) arches, 31(15.5%) whorl, 9(4.5%) central pocket whorl, 8(4%) double loop, 6(3%) accidental loop and 5(2.5%) left loop. Group III with Class III malocclusion had a majority of 71(35.5%) right loop pattern followed by 39(19.5%) whorls, 34(17%) left loop, 21(10.5%) central pocket whorl, 9(4.5%) double loop, 8(4%) accidental loop and 6(3%) left loop.

Table 3b explains the count of different type of finger print patterns in the study groups.

In Group I, 25% of the subjects had right loop pattern in 4 fingers out of 5, 25% had right loop pattern in 2 fingers out of 5. 22.5% had right loop pattern in 3 fingers out of 5.20% had right loop pattern in 1 finger out of 5 fingers. 2.5% had right loop pattern in all 5 fingers and right loop pattern was absent in 5%. Left loop pattern was completely absent in 18%. 15% of the subjects had it in only in 1 finger out of 5. Whorls were absent in 67.5%. 20% of the subjects had it in only in 1 finger out of 5. 5% had whorl pattern in 2 fingers out of 5. 5.5% had whorl pattern in 4 fingers out of 5 .2.5% had whorl pattern in 3 fingers out of 5. Central pocket whorl were completely absent in 60% of the subjects. In 25% it was noted in 1 finger out of 5. 10% of the subjects had it in 2 fingers out of 5.5% had central pocket whorl in 3 fingers out of 5. Double loops were absent in 77.5%. In 22.5% it was seen in 1 finger out of 5. Accidental Whorls 82.5% of subjects, 17.5% had it only in 1 finger out of 5. Arches pattern was absent in 60% of the subjects .20% of the subjects had it only in 1 finger out of 5. 10% of the subjects had it in 2 fingers out of 5. In 7.5% cases it was noted in 4 fingers out of 5. 2.5% of the cases had it in 3 fingers out of 5.

In Group II, 2.5% did not have right loop pattern .30% of the subjects had right loop pattern in 4 fingers out of 5. 27.5% had right loop pattern in 3 fingers out of 5.20% had right loop pattern in 2 fingers out of 5. 17.5% had right loop pattern only in 1 finger out of 5 and 2.5% had in all 5 fingers. Left loop pattern was completely absent in 95%. 2.5% of the

subjects had it in 1 finger out of 5 and 4 fingers out of 5. Whorls were absent in 40% of the subjects. 45.5% of the subjects had it in 1 finger out of 5. 12.5% had whorl pattern in 2 fingers out of 5 and 2.5% had whorl pattern in 3 fingers out of 5. Central pocket whorl were completely absent in 80% of the subjects. In 17.5% it was noted only in 1 finger out of 5. 2.5% of the subjects had it in 2 fingers out of 5. Double loops were absent in 80%. In 20% it was seen only in 1 finger out of 5. In 90% of the subjects Accidental Whorl pattern were completely absent. 5% had it in only in 1 finger out of 5 and 5% had it in 2 fingers out of 5. Arches pattern was absent in 52.5% of the subjects. 22.5% of the subjects had it only in 1 finger out of 5. 17.5% of the subjects had it in 2 fingers out of 5. In 7.5% cases it was noted in 3 fingers out of 5.

In Group III, 32.5% of the subjects had right loop pattern in 2 fingers out of 5 .20% of subjects did not have right loop pattern and 20% in 1 finger out of 5. 15% had it in 3 fingers out of 5.12.5% had right loop pattern in 4 fingers out of 5. Left loop pattern was completely absent in 57.5%. 20% of the subjects had it only in 1 finger out of 5. 12% of the subjects had it in 2 fingers out of 5. 5% of the subjects had Left loop in 4 fingers out of 5.2.5% of the subjects had it in 3 fingers out of 5.2.5% of the subjects had it in 1 finger out of 5 .Whorls were absent in 47.5%. 22% of the subjects had it in 2 fingers out of 5. 20% had whorl pattern in 1 finger out of 5.7.5% had whorl pattern in 3 fingers out of 5. 2.5% had it in 4 fingers out of 5. Central pocket whorl were completely absent in 65% of the subjects. In 20% it was noted only in 1 finger out of 5. 12.5% of the subjects had it in 2 fingers out of 5.2.5% had central pocket whorl in 3 fingers out of 5. Double loops were absent in 85%. In 12.5% it was seen only in 1 finger out of 5. Double loop was seen in 2.5% of the subjects in 2 fingers out of 5. Accidental Whorls were completely absent in 87.5% of subjects, 10% had it only in 1 finger out of 5, 2.5% had it in 2 fingers out of 5. Arches pattern was absent in 67.5% of the

subjects .17.5% of the subjects had it in 1 finger out of 5. 7.5% of the subjects had it in 2 fingers out of 5. 7.5% of the subjects had it in 3 fingers out of 5.

Table 4 Compares the a-b ridge count and atd angle in the study groups:

The a-b ridge count was higher in Class I with a mean value of 42.95 followed by Class II with a mean of 40.28 and Class III with 39.28. The mean value of atd angle was higher in Class I with a mean value of 42.45 followed by Class II with a mean of 41.45 and Class III with 40.75.

Table 5 Compares lip prints among genders:

In Females, a majority of Branched pattern was observed in 31.7%. Vertical pattern was seen in 25%.Intersected pattern was seen in 18.3%. Reticular pattern was seen in 13.3%.Undetermined pattern was seen in 11.7%

In males, a majority of Branched pattern was observed in 41.7%. Vertical pattern was seen in 30%.Intersected pattern was seen in 13.3%. Undetermined pattern was seen in 8.3%Reticular pattern was seen in 6.7%.

TABLES & GRAPHS

TABLE 1.CLINICAL CHARACTERISTICS OF THE STUDY GROUP

CATEGORY	GENDER		AGE				
	MALE	FEMALE	21	22	23	24	25
CLASS I	20(50%)	20(50%)	9(22.5%)	8(20%)	11(27.5%)	9(22.5%)	3(7.5%)
CLASS II	20(50%)	20(50%)	4(10%)	5(12.5%)	9(22.5%)	10(25%)	12(30%)
CLASS III	20(50%)	20(50%)	1(2.5%)	6(15%)	15(37.5%)	14(35%)	4(10%)

TABLE 2.COMPARISON OF LIP PRINTS IN THE STUDY GROUPS

	N VALUE	VERTICAL	BRANCHED	INTERSECTED	RETICULAR	UNDETERMINED	P VALUE
CLASS I	Within group	11(27.5%)	13(32.5%)	4(10%)	6(15%)	6(15%)	
	Within lip print	33.3%	29.5%	21.1%	50%	50%	
CLASS II	Within group	7(17.5%)	19(47.5%)	10(25%)	1(2.5%)	3(7.5%)	
	Within lip print	21.2%	43.2%	52.6%	8.3%	25%	
CLASS III	Within group	15(37.5%)	12(30%)	5(12.5%)	5(12.5%)	3(7.5%)	0.108
	Within lip print	45.5%	27.3%	26.3%	41.7%	25%	
TOTAL	Within group	33(27.5%)	44(36.7%)	19(15.8%)	12(10%)	12(10%)	
	Within lip print	100%	100%	100%	100%	100%	

TABLE 3A.COMPARISON OF FINGER PRINTS IN THE STUDY GROUPS

	N VALUE	RIGHT LOOP	LEFT LOOP	WHORL	CENTRAL POCKET WHORL	DOUBLE LOOP	ACCIDENTAL LOOP	ARCHES
CLASS I	40	100(50%)	6(3%)	23(11.5%)	24(12%)	9(4.5%)	8(4%)	31(15.5%)
CLASS II	40	109(54.5%)	5(2.5%)	31(15.5%)	9(4.5%)	8(4%)	6(3%)	32(16%)
CLASS III	40	71(35.5%)	34(17%)	39(19.5%)	21(10.5%)	7(3.5%)	6(3%)	22(11%)
Total	120	280(46.6%)	45(17.5%)	93(15.5%)	54(9%)	24(4%)	20(3.3%)	85(14.2%)

TABLE 3B.COMPARISON OF FINGER PRINT COUNT IN THE FINGERS OF LEFT HAND

GROUP	N VALUE	R L	L L	W	C P W	D L	A L	A
CLASS I	0	2(5%)	34(18.0%)	27(67.5%)	25(60%)	31(77.5%)	33(82.5%)	24(60%)
	1	8(20%)	6(15.0%)	8(20%)	10(25%)	9(22.5%)	7(17.5%)	8(20%)
	2	10(25%)	0(0%)	2(5%)	4(10%)	0(0%)	0(0%)	4(10%)
	3	9(22.5%)	0(0%)	1(2.5%)	2(5%)	0(0%)	0(0%)	1(2.5%)
	4	10(25%)	0(0%)	2(5%)	0(0%)	0(0%)	0(0%)	3(7.5%)
	5	1(2.5%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
CLASS II	0	1(2.5%)	38(95%)	16(40%)	32(80%)	32(80%)	36(90%)	21(52.5%)
	1	7(17.5%)	1(2.5%)	18(45%)	7(17.5%)	8(20%)	2(5%)	9(22.5%)
	2	8(20%)	0(0%)	5(12.5%)	1(2.5%)	0(0%)	2(5%)	7(17.5%)
	3	11(27.5%)	0(0%)	1(2.5%)	0(0%)	0(0%)	0(0%)	3(7.5%)
	4	12(30%)	1(2.5%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
	5	1(2.5%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
CLASS III	0	8(20.0%)	23(57.5%)	19(47.5%)	26(65%)	34(85%)	35(87.5%)	27(67.5%)
	1	8(20.0%)	8(20%)	8(20%)	8(20%)	5(12.5%)	4(10%)	7(17.5%)
	2	13(32.5%)	5(12.5%)	9(22.5%)	5(12.5%)	1(2.5%)	1(2.5%)	3(7.5%)
	3	6(15%)	1(2.5%)	3(7.5%)	1(2.5%)	0(0%)	0(0%)	3(7.5%)
	4	5(12.5%)	2(5%)	1(2.5%)	0(0%)	0(0%)	0(0%)	0(0%)
	5	0(0%)	1(2.5%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)

TABLE 4A.COMPARISON OF PALM PRINTS IN THE STUDY GROUPS

		N	Mean	Std.Deviation	Std.Error
a-b RIDGE COUNT	CLASS I	40	42.95	4.063	.642
	CLASS II	40	40.28	4.512	.713
	CLASS III	40	39.28	5.402	.854
	TOTAL	120	40.83	4.906	.448
Atd angle	CLASS I	40	42.95	5.491	.868
	CLASS II	40	41.45	4.326	.684
	CLASS III	40	40.75	3.794	.600
	TOTAL	120	41.55	4.607	.421

TABLE 4B. INTERGROUP COMPARISON OF PALM PRINTS IN THE STUDY GROUPS

	SUM OF SQUARES	df	Mean Square	F	Sig
a-b RIDGE COUNT					
Between groups	288.817	2	144.408	6.559	.002
Within groups	2575.850	117	22.016		
Total	2864.667	119			
atd angle					
Between groups	58.400	2	29.200	1.385	.254
Within groups	2467.300	117	21.088		
Total	2525.700	119			

TABLE 5.COMPARISON OF LIP PRINTS AMONG GENDER

GENDER	FREQUENCY	PERCENTAGE
Females Vertical Branched Intersected Reticular Undetermined Total	15 19 11 8 7 60	25.0 31.7 18.3 13.3 11.7 100.0
Males Vertical Branched Intersected Reticular Undetermined Total	18 25 8 4 5 60	30.0 41.7 13.3 6.7 8.3 100.0

GRAPH 1.PERCENTAGE OF DIFFERENT LIP PATTERNS
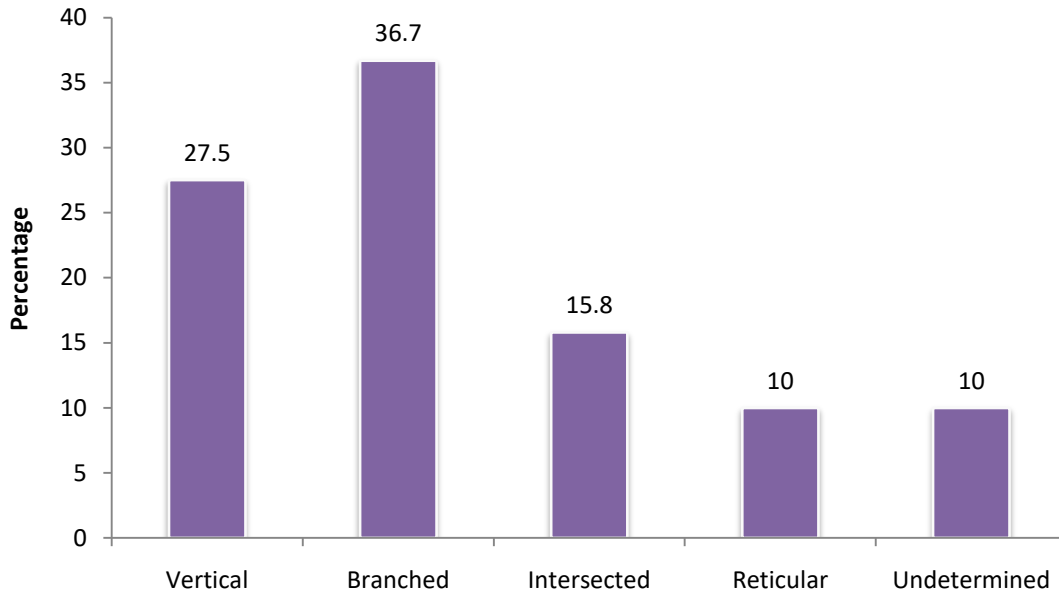
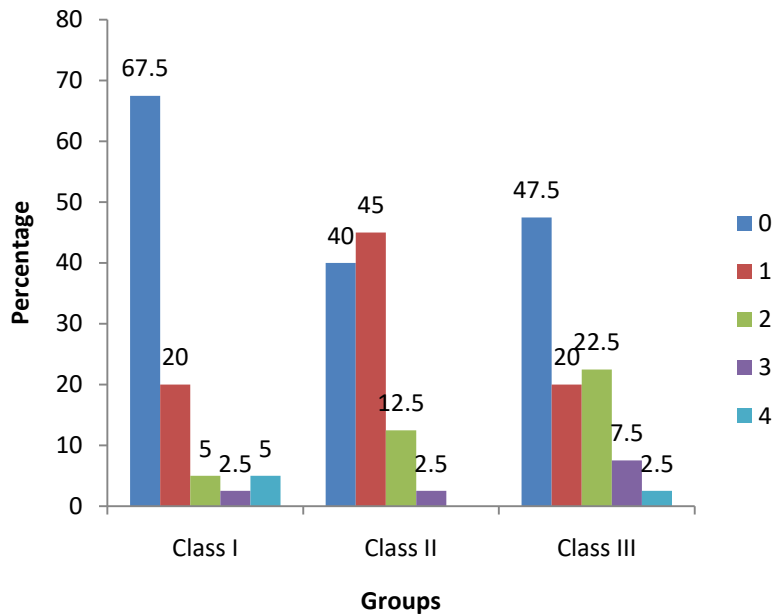## GRAPH 2.PERCENTAGE OF LIP PATTERNS – INTER GROUP COMPARISON
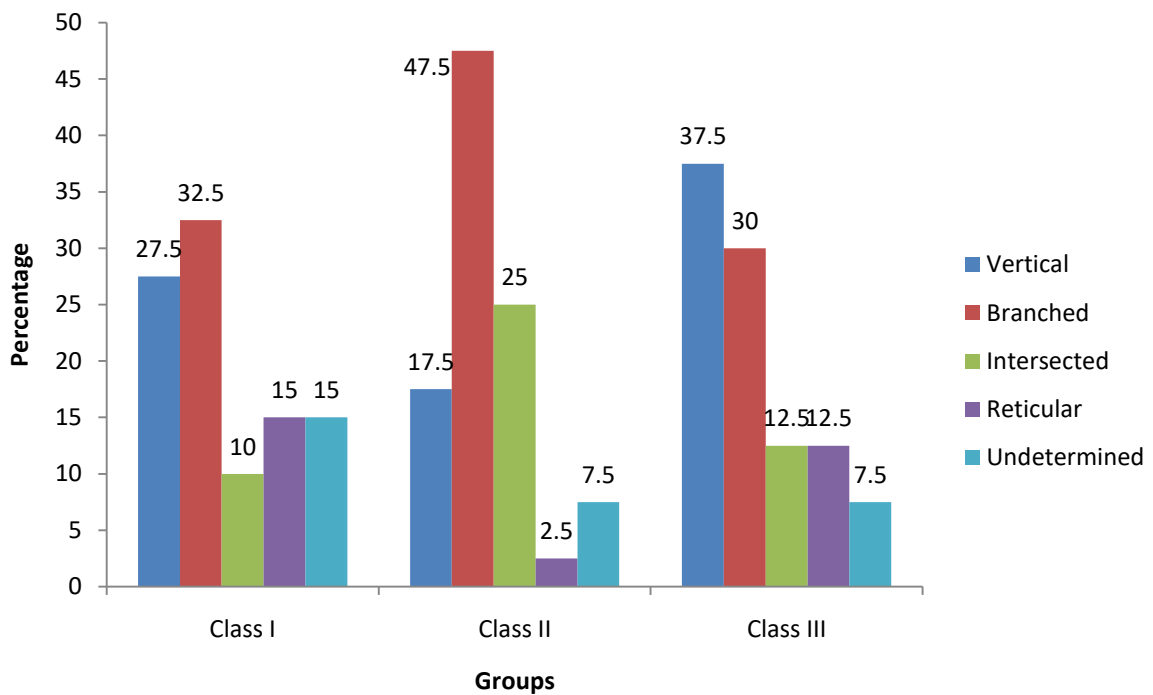
GRAPH 3.INTERGROUP COMPARISON OF PERCENTAGE OF RIGHT LOOP
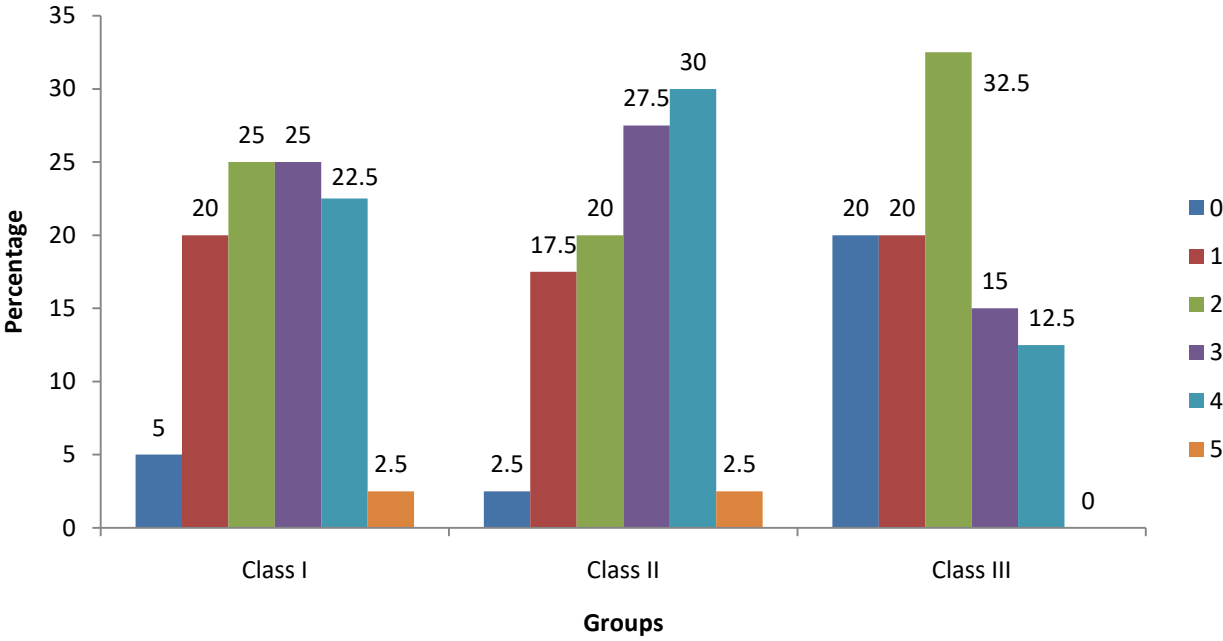
GRAPH 4.INTERGROUP COMPARISON OF PERCENTAGE OF LEFT LOOP
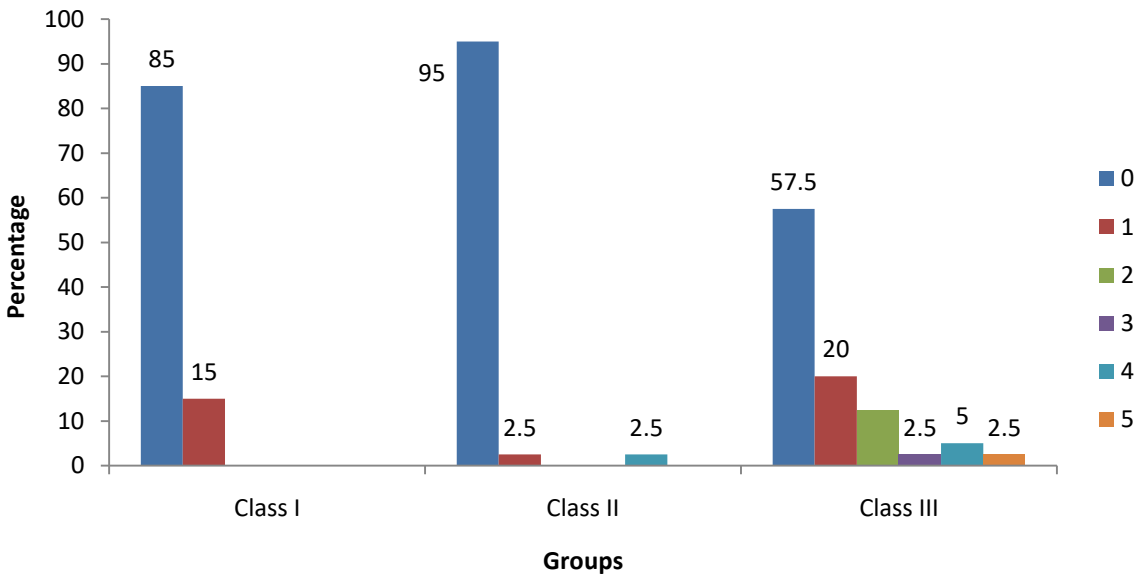
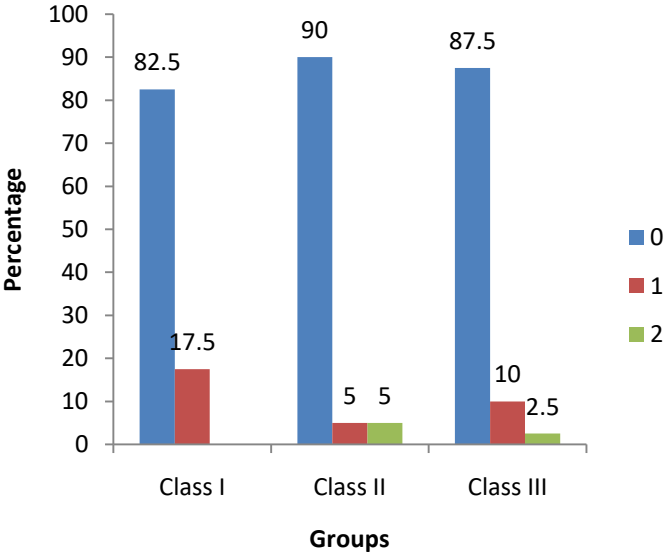**GRAPH 5.INTERGROUP COMPARISON OF PERCENTAGE OF WHORL**

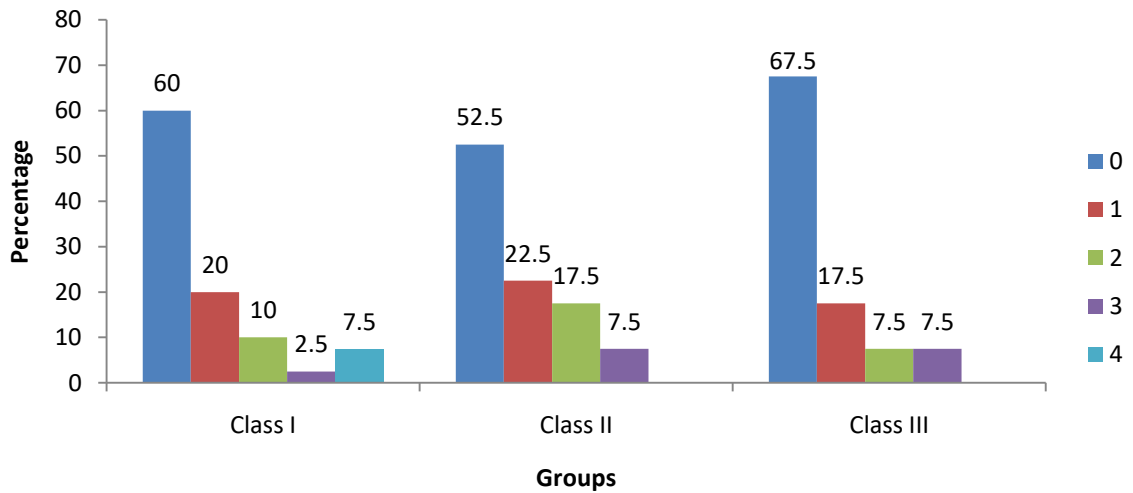**GRAPH 6.INTERGROUP COMPARISON OF PERCENTAGE OF CENTRAL POCKET WHORL**
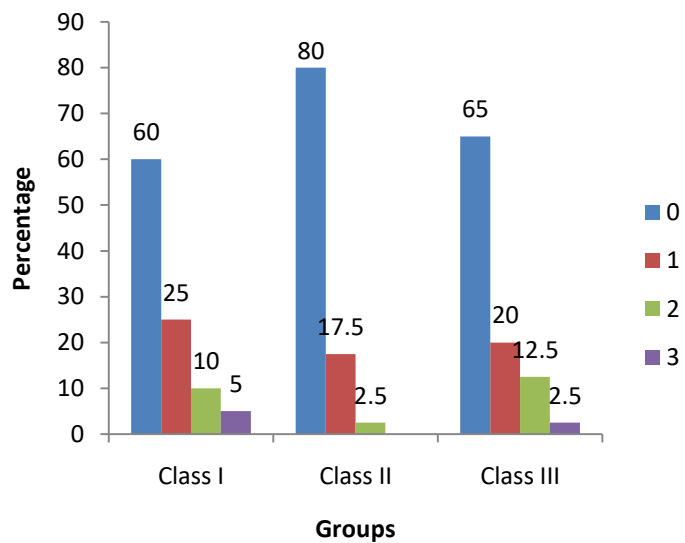
GRAPH 7.INTERGROUP COMPARISON OF PERCENTAGE OF DOUBLE LOOP
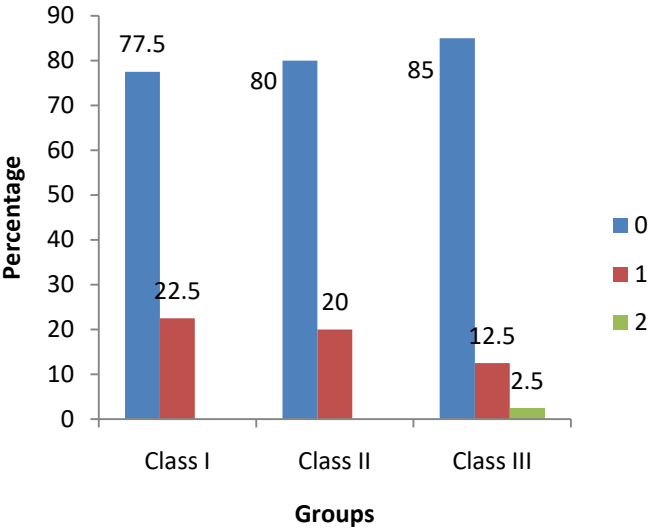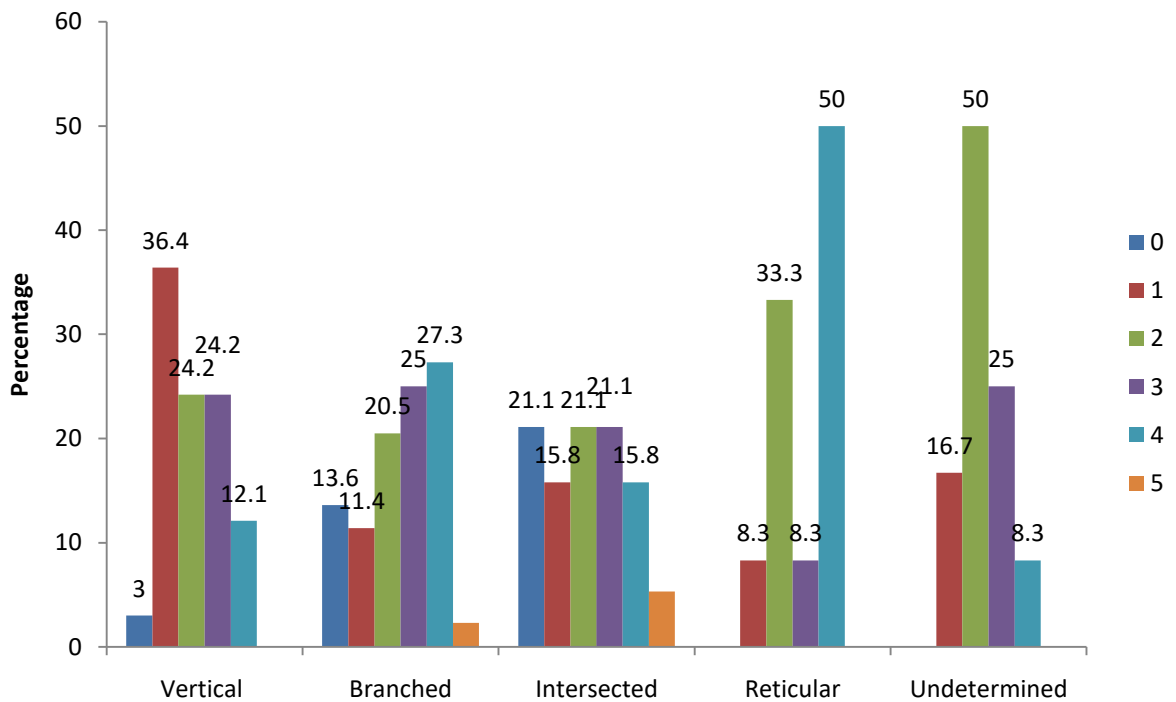

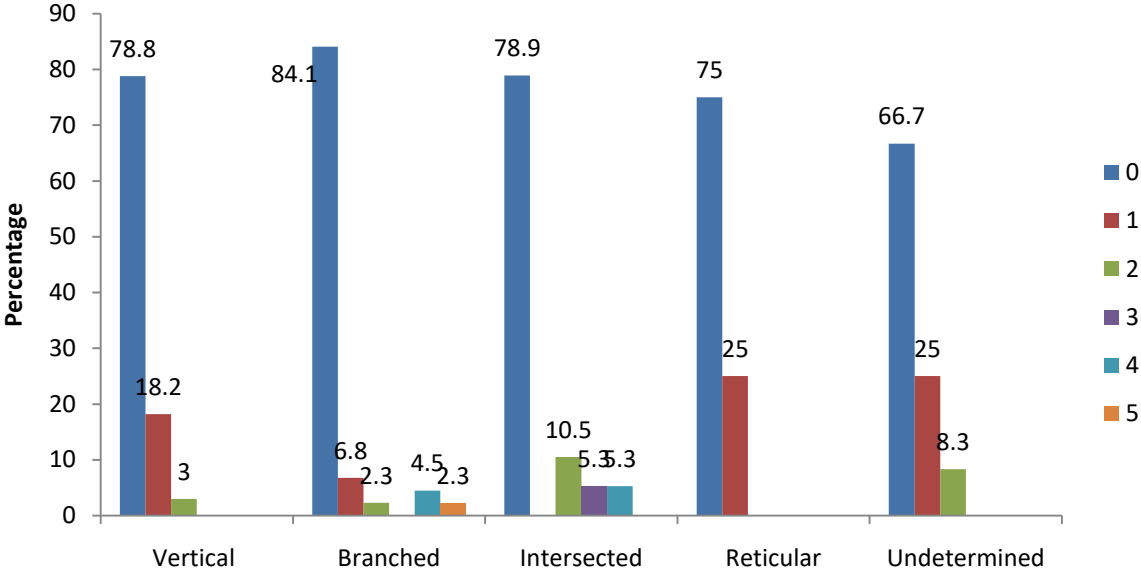## GRAPH 8.INTERGROUP COMPARISON OF PERCENTAGE OF ACCIDENTAL WHORL

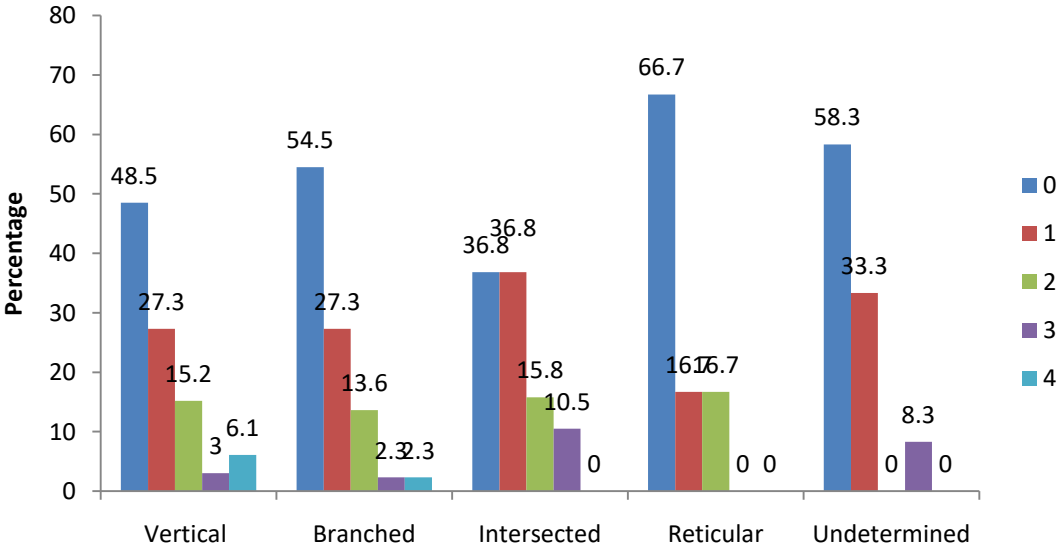## GRAPH 9.INTERGROUP COMPARISON OF PERCENTAGE OF ARCHES

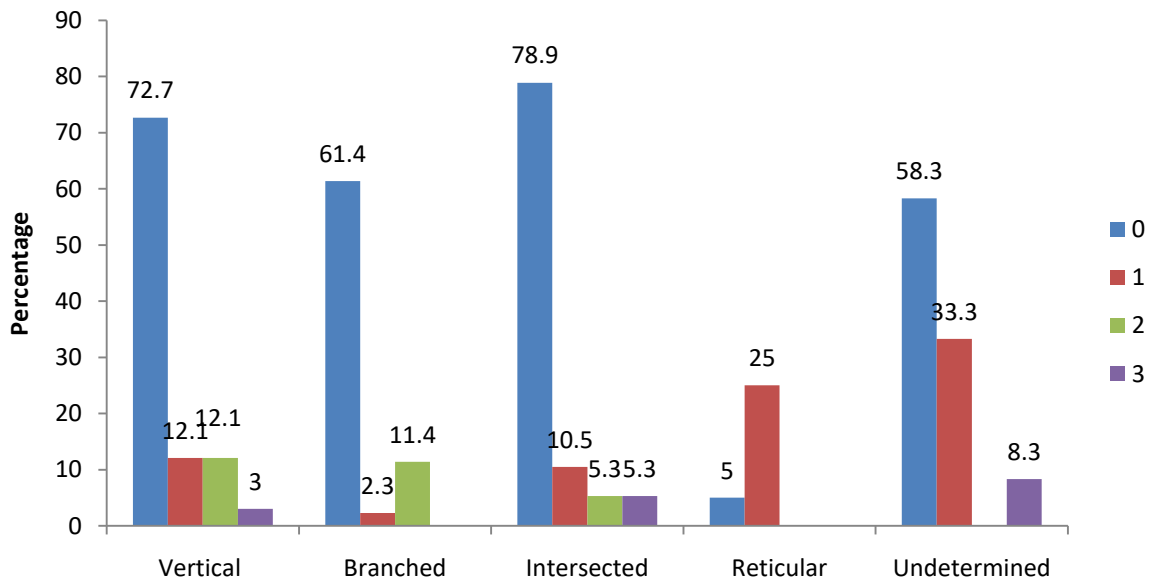## GRAPH 10.CORRELATION BETWEEN RIGHT LOOP AND LIP PATTERNS

GRAPH 11.CORRELATIONS BETWEEN LEFT LOOP AND LIP PATTERNS

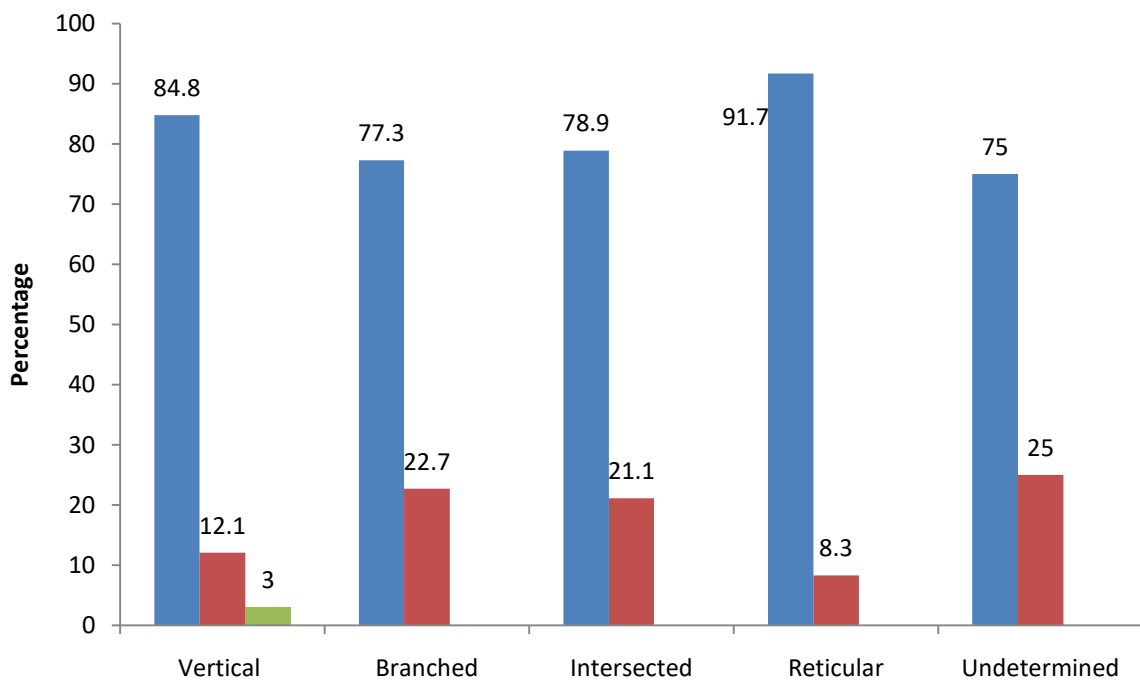## GRAPH 12.CORRELATIONS BETWEEN WHORL AND LIP PATTERNS

GRAPH 13.CORRELATIONS BETWEEN CENTRAL POCKET WHORL AND LIP PATTERNS

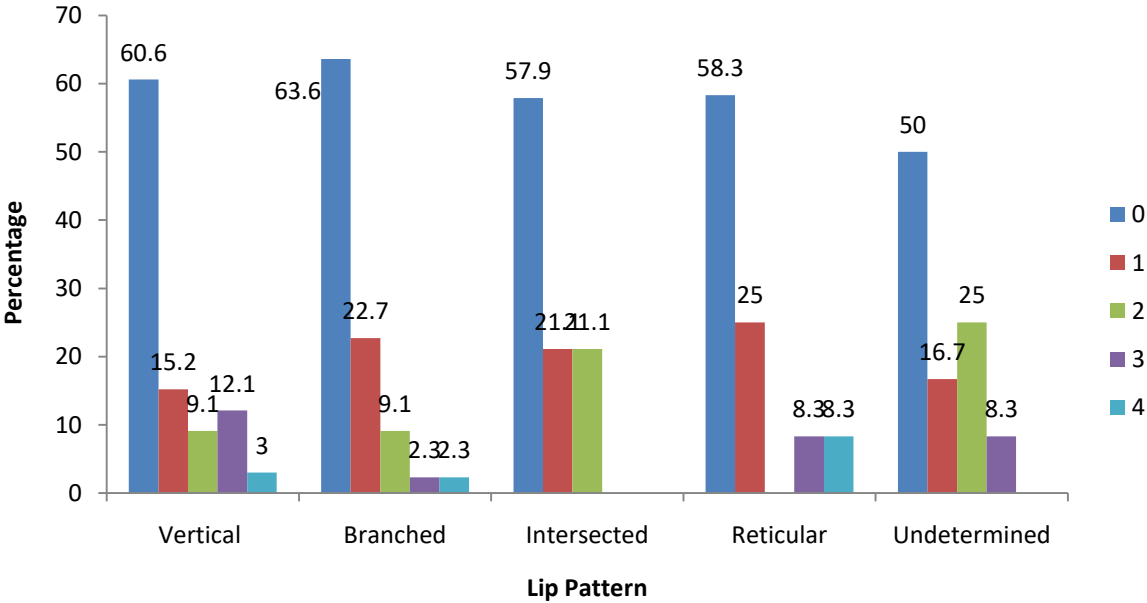## GRAPH 14.CORRELATIONS BETWEEN DOUBLE LOOP AND LIP PATTERNS
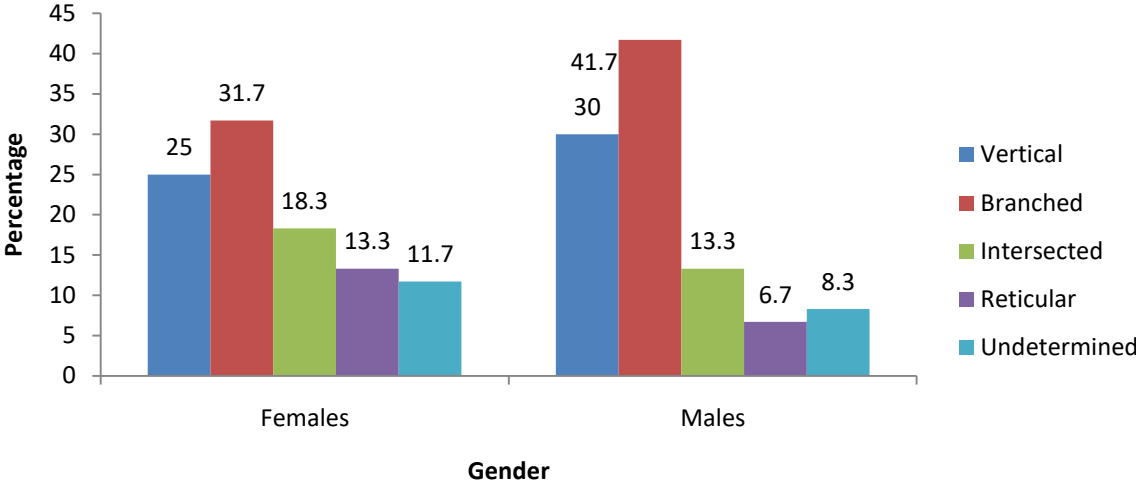
GRAPH 15.CORRELATION BETWEEN ACCIDENTAL WHORL AND LIP PATTERN
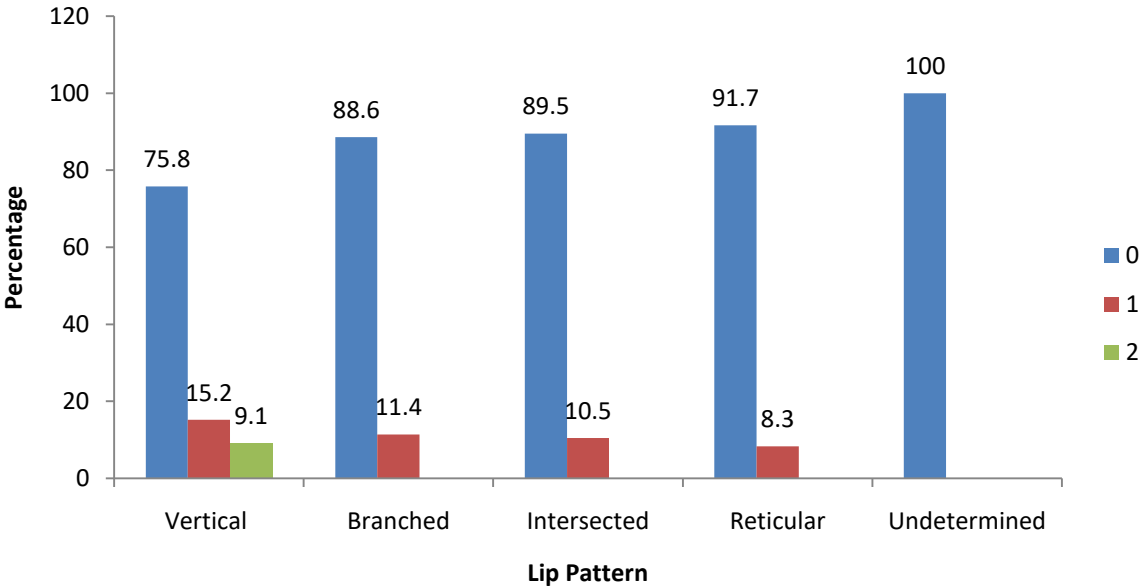
GRAPH 16.CORRELATIONS BETWEEN ARCHES AND LIP PATTERNS

GRAPH 17.COMPARISONS OF LIP PRINTS AMONG GENDERS IN THE STUDY GROUPS

PHOTOGRAPHS

Fig 5.LIP PRINT PATTERN

Fig 6 : FINGER PRINT PATTERN

Fig 7. a-b RIDGE COUNT and atd ANGLE

DISCUSSION

The development of occlusion is a result of the interaction and synergistic effects of genetic and environmental factors. The effect of a particular environmental factor on phenotype varies depending on genetic background, which ultimately determines facial and dental morphology. A number of methods are available for recording dermatoglyphics. The methods are ink method, inkless method, transparent adhesive tape method, photographic method. Special methods are hygrophotography, radiodermatography, plastic mould and automatic pattern recognition.

Studies Comparing LIP PRINTS and skeletal malocclusion:

In accordance with the study done by Raghav et al [2] Type I i.e., full vertical grooves and type I' i.e., partial vertical grooves (Tsuchihashi classification) were very difficult to differentiate between each other, therefore were considered as a single group in this study.

Different studies have yielded varying results, Tsuchihashi, in his study in Japanese population found that intersected lip pattern was the most frequent.[31] Vahanwala et al, in their study found that vertical lip pattern was most common.[32] Sivapathasundharam et al, studied the lip prints of Indo-Dravidian population and noted that intersected lip pattern was predominant.[33] Verghese *et al*., in Kerala found that reticular lip pattern showed the highest incidence.[34]

In the study population subjects, it was observed that branched lip pattern was most common in overall subjects (36.7 %) and the least common was undetermined lip pattern in overall subjects (10%). These results are similar to that of the results of Pradeep et al. [2]

A study conducted among Saudi subjects showed different results, with horizontal pattern of grooving reported to be more common among females. However, we could not compare our results with those of that study as it used a classification of 9 types of grooves.

The lip print pattern analysis criteria used in our study were different from those of previous studies. This might be due to lack of standard universal pattern for lip print analysis.[35]

In overall Class I, the subjects predominantly had branched (32.5%), vertical lip pattern (27.5%), Reticular and Undetermined lip pattern (15%). In overall Class II, the subjects predominantly had branched (47.5%), intersected (25%), vertical (17.5%).In overall Class III, the subjects predominantly showed Vertical (37.5%), Branched (30%) pattern. These results coincided with the results of Raghav P et al.[2] While in individuals with skeletal class III, vertical lip pattern was most prevalent. There was no significant difference between the lip print patterns of class I and class II subjects.

Comparison of Dermatoglyphics with other studies:

In the total study population, 46.6% presented with right loops ,17.5% left loop and 15.5% whorls, 9% central pocket whorl ,4% of double loop , 3.3% of accidental loop 14.2% of arches. Our study results coincided with the results of Eslami et al [7] but did not match with the results of Reddy et al [13], Trehan et al.[15]

In our study all the 3 groups had a majority of right loop pattern thereby stating that there is no association between dermatoglyphics and malocclusion. These findings are similar to that of Tikare et al [16] but Dhivyashree et al [22] who showed Class I with a majority of whorls and Class II with a majority of Loops supported by studies done by Sumedha Rajput et al [18], Tiwari et al.[38]

ab ridge count and atd angle :

The a-b ridge count was higher in Class I with a mean value of 42.95 followed by Class II with a mean of 40.28 and Class III with 39.28 whereas the mean value of a-b ridge count in the study by Eslami et al [7] had a mean value of 30.5, 32.1 and 33.1 in Class I, II and III respectively. In our study the mean value of atd angle was higher in Class I with a mean

value of 42.45 followed by Class II with a mean of 41.45 and Class III with 40.75 whereas it was 40 in all 3 groups of Eslami et al.[7]

Lip Pattern among Males and Females:

In the present study males and females had a majority of branched lip pattern and vertical lip pattern. These results were similar to the results of Vahanwalla et al [32] and Karki et al [3]except that vertical pattern is rare in females.

As documented by various researchers the lip prints, as well as skeletal class III malocclusion show strong inheritable tendency, may possibly explain the reason for having a significant relationship of vertical lip patterns and skeletal class III malocclusion. In our study the subjects were selected on the basis of ANB angle without considering the etiology i.e. heredity or environmental which could be a possible factor, for the absence of significant difference in lip patterns between subjects having skeletal class I and skeletal class I malocclusion.

The advantages of dermatoglyphics are that scanning or recording is cost-effective, rapid and can be done in the clinics without hospitalization and without causing any trauma. It also requires minimum equipment and data collected can be preserved for lifelong.[39]

LIMITATIONS OF THE STUDY:

One common problem that is encountered during the cheiloscopic studies is that of smudging or spoiling of lip prints leading to unidentifiable mark.

CONCLUSION

The present study was to explore the correlation of lip prints and finger prints with skeletal malocclusion the South Indian population – 120 individuals were selected for the study who were divided into 3 groups based on Reidel's classification. The lip prints and finger prints were recorded using cellophane technique. Comparison was made between Group 1, Group 2 and group 3 and between males and females in the 3 groups.

The following conclusions were drawn using the results of the study:

- ❖ -A majority of South Indian individuals had Branched Lip Pattern. Class I and Class II individuals had Branched lip pattern whereas Vertical lip pattern was seen in Class III individuals.

- ❖ Right loop pattern was prevalent among the South Indian Population as well as in all the 3 study groups.

- ❖ The a-b ridge count and atd angle was higher in Class I individuals

- ❖ Both Males and females showed a majority of branched lip pattern.

Dermatoglyphics and Cheiloscopy can serve as an easy, accessible, inexpensive and noninvasive method of exploring the genetic associations of malocclusion and for timely prevention. Due to the fact that numerous other factors such as ethnic and racial variations, environmental, congenital and other local factors influencing the development of malocclusions, they are not completely reliable. Extensive studies of lip prints, finger prints, ridge counts and patterns has to be done with several groups according to their racial and ethnic backgrounds.

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ANNEXURES

INSTITUTIONAL ETHICAL COMMITTEE
Best Dental Science College and Hospital
Ultra Nagar, Madurai - 625 104.
RECOGNIZED BY DENTAL COUNCIL OF INDIA, NEW DELHI
AFFLIATED TO THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY, CHENNAI)

CHAIRPERSON

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MEMBERS

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Mr. V. Chinnakaruppian, MA BL, DCFSc

PRINCIPAL

Dr. Vijayalakshmi. K, MDS

MEMBER SECRETARY

Dr. Sudarshan.R, MDS

IRB/IEC Reference No: 2016-STU-BrV-JWD-16

Project title: Lip print and palm print barcode of skeletal malocclusion

Principal Investigator: Dr. A. John Wilfred, PG student

Review: New/Revised/Expedited

Date of Review: 27/09/2016

Date of previous review, if revised application:

Decision of the IEC/IRB:

- Provisional approval to conduct the study is being given

- The results of this study, along with summary are to be submitted for obtaining final approval

Recommended time period: one year (28-09-17)

Signature of Member Secretary

PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104

NB:

- Inform IRB/IEC immediately in case of any issue(s)/adverse events

- Inform IRB/IEC in case of any change of study procedure, site and investigator

- This permission is only for the period mentioned above

- Annual report to be submitted to IEC/IRB

- Members of IEC/IRB have right to monitor the trail with prior intimation

INFORMATION FOR PARTICIPANTS OF THE STUDY

Respected Sir/Madam,

I Dr. A. John Wilfred Young, planned to conduct a study titled,

"Lip prints and palm prints: The barcode of skeletal malocclusion."

Since the finger, palm prints and lip prints remain unchanged during life time, they can be used for diagnostic purpose, personal identification and criminal investigation. If they are detected early, the malocclusion can be identified at young age itself so that suitable treatments can be carried at appropriate time and it can be taken as preventive measures in future.

The lip prints and palm prints right and left hand, age, sex and lateral skull x-rays will be collected for the study from the case sheet. The confidentiality will be maintained. There is no risk for the participants. The participants have all the freedom to withdraw from the study, at anytime during the study, without the loss of benefits that the participants would otherwise be entitled. We will be using the clinical information for our current study and would be using for further suitable studies.

Dr. John Wilfred Young. A
Department of Orthodontics and
Dentofacial Orthopaedics
Best Dental Science College and
Hospital
Madurai -625 104

PARTICIPATION CONSENT FORM

Participant Name: Date:

Age: O.P No:

Gender: Sample No:

Postal Address: Occupation:

Native Address:

Title of the project:

"LIP PRINTS AND PALM PRINTS – THE BARCODE OF SKELETAL MALOCCLUSION"

The details of the study have been provided to me in writing and explained to me

in my own language. I confirm that I have understood the above study and had the

opportunities to ask questions. I understand that my participation in this study is

voluntary and that I am free to withdraw at any time, without giving any reason, without

the medical care that will normally be provided by the hospital being affected. I agree

not to restrict the use of any data or results that arise from this study provided such a use

is only for scientific purpose(s). I have been given an information sheet giving details of

study. I fully consent to participate in above study.

Signature of the participant: ……………………   Date: ………………..

Signature of witness: ……………………….   Date: ………………

Form IV

Partcipant consent form

rticipant" name : Dr. K. UMA MAHESWARI

ddress/occupation/age/ mobile no :

PLOT NO: 17 RAMANA SRI GARDEN
THENDARA NAGAR, GOYALAN STREET
MA TVS NAGAR — MADURAI
AGE: 28yos   Mobile : 9600153007.

e of the project:

" Lip prints and palm prints: The barcode of skeletal malocclusion".

he details of the study have been provided to me in writing and explained to
in my own language. I confirm that I have understood the above study and
the opportunities to ask questions. I understand that my participation in
study is voluntary and that I am free to withdraw at any time, without
g any reason, without the medical care that will normally be provided by
hospital being affected. I agree not to restrict the use of any data or results
arise from this study provided such a use is only for scientific purpose(s). I
been given an information sheet giving details of the study. I fully consent
rticipate in the above study.

ture of the participant: ....Uma.K......   Date: 22/5/18

ture of witness : ....   Date: 22/5/47-53

படிவம்-IV

பங்குபெறுவோர் ஒப்புதல் படிவம்

பங்குபெறுபவர் பெயர் : K. UMAMAHESWARI (கு. உமா மகேஷ்வரி)

வயது: 28 வயது

முகவரி: No Plot No A RAMANA SRI GARDEN, THENDARNAGAR MADURAI
எண்: 17, ரமணா ஸ்ரீ தோட்டம், தென்றல் நகர், மதுரை
தொலைபேசி எண்: 9600153007

ஆய்வின் தலைப்பு:

கைரேகை, உதடுகளின் ரேகை மற்றும் மண்டை ஓட்டின் எக்ஸ்ரேவின் மூலம் பல்சீர்க்கேட்டை கண்டறிந்து ஒப்பிட்டுப்பார்க்கும் ஆய்வு.

இந்த ஆய்வின் அனைத்து தகவல்களும் எனக்கு தெளிவாக, விளக்கமாக எனது மொழியிலும், மற்றும் எழுத்துப்பூர்வமான முறையிலும் கூறப்பட்டது. நான் மேலே கூறப்பட்ட ஆய்வின் தகவல்களை நன்கு புரிந்துகொண்டேன். நான் எனது முழுமனதோடு எவ்வித கட்டாயமுமின்றி இதில் கலந்து கொள்கிறேன். எந்நேரத்திலும் இந்த ஆய்வில் இருந்து எவ்வித காரணமுமின்றி விலகிக்கொள்ளலாம் என்பதை அறிந்துகொண்டேன். நான் இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களை விஞ்ஞானப்பூர்வமான முறையில் பயன்படுத்த அனுமதிக்கிறேன். எனக்கு ஆய்வுப்பற்றிய தகவல்கள் எழுத்துப்பூர்வமாக காண்பிக்கப்பட்டது என்று ஒப்புக்கொள்கிறேன். எனவே நான் முழுமனதுடன் இந்த ஆய்வில் கலந்துக் கொள்ள சம்மதிக்கிறேன்.

Uma.U

பங்குபெறுவோரின் கையொப்பம்:   தேதி: 22.5.18.

ஆராய்சியாளரின் கையொப்பம் : R.Vidhya   தேதி: 22/5/18