



Dermatoglyphics – As a Marker for Detection of Malocclusion

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Abstract

Introduction

Dermatoglyphics is a study of fingerprint means epidermal ridges and skin patterns. Fingerprints start developing from 12th week of IUL to 24th week of IUL, and their configuration remains same throughout life of an individual.

At same period of intra uterine life, the lips, alveolar bone and palate develop. During development, factors causing changes in lips, alveolar bone and palate may causes changes in fingerprint pattern. In this study we have evaluated the association between fingerprint patterns and skeletal class III malocclusions.

Methodology

A total 50 subjects were taken having skeletal class III malocclusion (determined cephalometrically based on the skeletal relationship of maxilla and mandible). The dermatoglyphic patterns for the ten fingers of these 50 subjects were recorded using ink stamp method. The fingerprints were identified into different fingerprint patterns (arches, loops and whorls). These results were calculated for each subject (N=50). The frequency distribution of the different dermatoglyphic patterns on the right and left hands in 50 subjects were assessed.

Results

The percentage of frequency of arches, loops, and whorls were calculated using descriptive analysis. In this study, increased frequency of loop pattern was found in skeletal class III patients.

Conclusion

Fingerprint pattern can be used as marker for early prevention and interception of developing class III malocclusion, as it is non- invasive, economic and easily accessible method for detection of malocclusion.

Keywords: Dermatoglyphics, fingerprint pattern, Class III malocclusion

Introduction

Dermatoglyphics is the study of ridge patterns of skin and their configurations on fingers, palms, and soles.[1] Dermatoglyphics is the art and science of studying the patterns of fingerprints. The term Dermatoglyphics was coined by Cummins & Midlo in 1926. Cummins is known as the Father of Dermatoglyphics. The term Dermatoglyphics is

derived from a Greek word derma which means “skin” and glyph meaning “carving”. [2]

The basis of this study is, dermal configurations start to appear at the 12th week of intrauterine life and established by the 24th week. After that, they remain constant, except for the change in their sizes. Sir Francis had given a rule called proof of no changes in

19th century. No two persons, including the monozygotic twins have same dermal configuration. The time of development of embryological orodental structure coincides with the development of dermal configuration and may have some association.[3]

Genetic and some extrinsic or environmental factors are also responsible for the changes in development of orodental structures.

It is well known fact that if any factor is active during the period of genetic expression then it affects all the structures which are developing at that time. Therefore any deviation from normal occlusion due to extrinsic factors at the time of development should also reflect in the dermal configuration.[4]

Dermatoglyphics as a science have been useful in many fields such as criminology, anthropology, cytogenetic studies etc. In dentistry it also has been used to unveil some oral diseases like bruxism, anomalies of teeth, cleft lip, cleft palate, periodontal disease, dental fluorosis, dental caries, oral cancer.[2]

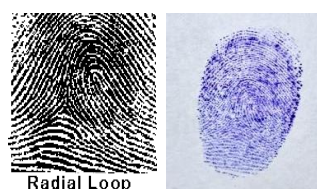
In this study the association between configuration of dermal ridge pattern and skeletal class III malocclusion of the patients between the age ranges of 15 to 26 yrs. has been studied.

Fingertip patterns

The ridge patterns on the distal phalanges of the fingertips are divided into the three groups.



Ulnar Loop



Radial Loop



Arch



Whorl

Simple or plain arch

i)Arches: The Arch pattern is made up of ridges lying one above the other in a general arching formation.

1. Composed of ridges that cross the fingertip from one side to the other without recovering.
2. Tented arch composed of ridges that meet at a point so that their smooth sweep is interrupted.

ii)Loops

1. Ulnar loop composed of ridges that open on the ulnar side
2. Radial loop composed of ridges that open on the radial side.

iii)Whorls: It is any ridge configuration with two or more tri-radii. One tri-radius is on radial and the other on the ulnar side of the pattern.

Malocclusion is one of the most prevalent oral conditions. Early diagnosis and correction of deviated growth patterns of the jaws have been among the main goals of orthodontics for many years. Genetic factors are one of the main etiologic factors of malocclusion. Since late diagnosis of skeletal malocclusions leads patients to orthognathic surgery, this study was undertaken to assess the possible correlation between fingerprints' characteristics and skeletal Class III malocclusion.[6]

Aim Of The Study

To assess the correlation between skeletal class III malocclusion and a specific pattern of finger print.

Material And Method

Total 50 subjects were included in the study. All 50 subject are diagnosed with skeletal class III

malocclusion by using cephalometric analysis. Both type of class III malocclusions that are because of mandibular excess or because of maxillary deficiency have been included in study. Parameter assessed in cephalometric analysis were

1. ANB angle = 0° or $<0^\circ$ 2. FMA $> 25^\circ$
2. Beta angle $>35^\circ$

Subjects with major anomalies like cleft lip and palate, were excluded from the study. Subjects who had indistinct palm patterns also were excluded.

The Dermatoglyphics patterns for the ten fingers of these 50 subjects were recorded using ink and roller method which was suggested by Cummins and Mildo.[7] The fingerprints were identified into different fingerprint patterns (arches, loops and whorls). These results were calculated for each subject (N=50). The frequency distribution of on the right and left hands of 50 subjects were assessed for the different dermatoglyphics patterns.

Statistical Analysis

Descriptive statistical analysis was done to calculate the percentage of distribution of different Dermatoglyphics pattern.

Results

The most frequent pattern of fingerprint was ulnar loops of left hand followed by whorls (Table 1). Most frequent pattern on right hand was ulnar loop followed by whorls (Table 2).

Discussion

Genetic or chromosomal anomalies can be reflected as alterations in dermal ridges; therefore they can be used as an easily accessible tool in the study of genetically-influenced diseases. Dermatoglyphic investigation is cost effective, convenient, non-invasive procedure and requires no hospitalization.

Prakash et al conducted a study over 210 individuals, the most common type of malocclusion was class I and most predominant fingertip pattern was loop pattern which was associated with class I and class II. In this study skeletal parameter was not considered, patient was classified I different group using Angle's classification.[1]

In this study total 50 individuals were included each one was with skeletal class III malocclusion.

Skeletal class III malocclusion was assessed using 3 parameters, 1. ANB angle = 0° or $<0^\circ$ 2. FMA $> 25^\circ$ 3. Beta angle $>35^\circ$. The most common fingertip pattern was ulnar loops followed by whorls.

Similar finding was found in a study published by Kharbanda et al in 1982. He conducted a study on 25 north Indian males with mandibular prognathism confirmed with Down's analysis stated that individual with class III malocclusion associated with ulnar loop and arches.[3]

Similar finding was found in another study conducted by Reddy et al in 1997 and came up with the conclusion that class III malocclusion was associated with increase in frequency with radial loop and arches.[3]

Reddy et al has done a study in 2013. He found that there were absence of radial loop in patients with class III malocclusion.[8] In present study the frequency of radial loop was least. Radial loop was only found on ring finger of right hand (4%) and left hand (16%).

Rajput et al. conducted a pilot study on 24 patients, the study revealed that there was an increased frequency of loops in Class III and Class II malocclusion patients.[9]

Study conducted by Tikare et al in 2010 found no significant association between the class of malocclusion and fingerprint pattern.[10]

Increase in frequency of loops and decrease in frequency of wholes in class III found in various studies conducted by George et al , Bhaswaraj et al, Tiwari et al, Mansata et al, Shetty et al. Similarity found with the present study that is increase in number of loops and decrease in number of wholes.[5,11,12,13,14]

Study conducted by Jindal et al found that increase in frequency of plane arches in class III pattern which was opposite the finding of present study.[9]

Till date many studies has been done over a period of time. Most of them are concluded that there is an association of finger print pattern and malocclusion.

Conclusion

Association was found between dematoglyphic pattern and malocclusion. The most common Dermatoglyphics pattern observe in skeletal class III

subject was ulnar loop pattern. More extensive research with large sample size is required to include dermaoglyphic as a tool for early diagnosing the malocclusion.

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	Thumb	Index Finger	Middle Finger	Ring Finger	Little Finger
Radial Loop	0(0%)	0(0%)	0(0%)	2(4%)	0(0%)
Ulnar Loop	45(90%)	28(56%)	50(100%)	35(70%)	48(96%)
Whorls	5(10%)	22(44%)	0(0%)	13(26%)	2(4%)
Total	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)

Table 1: Fingerprint Patterns Observed in Skeletal Class III Patients in right hand

	Thumb	Index Finger	Middle Finger	Ring Finger	Little Finger
Radial Loop	0(0%)	5(10%)	0(0%)	8(16%)	0(0%)
Ulnar Loop	48(96%)	40(80%)	45(90%)	22(44%)	48(96%)
Whorls	2(4%)	5(10%)	5(10%)	20(40%)	2(4%)
Total	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)

Table 2: Patterns Observed In Skeletal Class III Patients in left hand