ERN Review

DERMATOGLYPHICS IN ORAL DISEASES – A REVIEW

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ABSTRACT

The hand has drawn great attention in the diagnosis of various pathologies in the field of medical research. The specific pattern seen on the finger tip and palmar regions on the hand (dermatoglyphics) of a person are unique and forms a distinctive imprint of an individual.

The present paper throws light on various dermatoglyphic patterns reported in different oral diseases and speculates the use of these patterns as potential diagnostic tool in various pathologies of oral cavity. In addition, analysis of dermatoglyphic pattern can prove to be a significantly useful tool for preliminary investigations in those conditions with a suspected genetic base.

Key Words: Whorl, Arch, Loop, Dental caries, Periodontitis, Precancer, Cancer, Cleft lip/ palate, Diagnostic tool

INTRODUCTION

Through decades of scientific research, the hand has caught great attention as a powerful tool in the diagnosis of medical, psychological and genetic conditions.

Dermatoglyphics represent the dermal ridge configuration found on the digits, palms and soles. They are genetically determined and are influenced by environmental forces that operate before birth.

The word “Dermatoglyphics” is derived from two Greek words “Dermato” which means skin and “Glyphics” meaning carving.

Harold Cummins in 1926 first coined the term “dermatoglyphics” which refers to the study of the naturally occurring patterns of the surface of the hands and feet. As dermatoglyphic patterns are genetically determined, they remain unchanged from birth to death. It is considered as a window of intrauterine and congenital abnormalities.

Sir Francis Galton (1892) gave the basic types of fingerprint patterns, which are grouped as loops, whorls and arches. Additional parameters studied by various investigators are Total Finger Ridge Count (TFRC), Absolute Finger Ridge Count (AFRC), triradius at finger tips (trF), ab ridge count (the count of number of ridges that cross a line drawn between ‘a’ and ‘b’ triradii on palmar area) and atd angle (formed by the lines drawn from the digital triradius ‘a’ to axial triradius ‘t’, at the base of the palm and to the digital triradius’d’). Palmar dermatoglyphics represent permanent imprint of a person. Variations in patterns have been noted among the individuals.

There are several diseases where significant dermatoglyphic alterations have been reported.

The present paper aims at highlighting dermatoglyphic patterns reported in some of the oral diseases and speculating its potential use as a diagnostic tool.

DERMATOGLYPHICS IN DENTAL CARIES

Dental caries represents a common disease of the teeth, and is prevalent worldwide. The etiology of dental caries is multifactorial with genetic predisposition blamed as one.

Studies have been conducted by various investigators to find out the relation between dermatoglyphic pattern variations and dental caries. A study conducted by Sengupta AB and his co-workers (2013) on 300 Bengalee children of Kolkata showed variations in Total Finger Ridge Count (TFRC), Absolute Finger Ridge Count (AFRC), percentage of whorls and arch pattern variation in 200 cases under caries group when compared to 100 cases in control group.
The dermatoglyphic pattern of deaf and mute children showed more frequency of whorls in dental caries group when compared to higher frequency of loops in caries free group. 

**DERMATOGLYPHICS IN PERIODONTAL DISEASES**

Finger-tip, palm and sole prints in 36 patients of juvenile periodontitis (JP), 45 of rapidly progressive periodontitis (RPP) and 38 with adult periodontitis (AP) were studied and compared with 39 periodontally healthy individuals. In addition, finger-tip and palmar patterns of the patients were compared with 833 school children and sole patterns of the patients were compared with 500 school children. On comparing finger tip and palmar patterns of patients with periodontally healthy individuals, the observations made by authors in their study, were:

- Decreased frequencies of twinned and transversal ulnar loops on all fingers; an increased frequency of t’ triradii on the palms of the subjects with JP
- Decreased frequency of double loops on all fingers and an increased frequency of radial loops on the right second digits; the increased frequencies of IV and H loops and tb triradii on the palms of the patients with RPP
- Increased frequencies of concentric whorls and transversal ulnar loops on all fingers of subjects with AP

The authors of this study concluded that the dermatoglyphic findings could be used together with the other diagnostic methods such as clinical and radiologic investigations. 

**DERMATOGLYPHICS IN MALOCCLUSION AND DIFFERENT ARCH FORMS**

Reddy B R M and his co investigators had compared the dermatoglyphic parameters of subjects with normal occlusion and different classes of malocclusion (Class I, Class II Division I & Division II, Class III). Higher frequency percentage of arches was found in Class I & Class II Division I malocclusion. Significant increase in whorls was observed in Class II malocclusion. In subjects with Class III malocclusion, decreased frequency of radial loops, twinned loops and central pocket loops was observed. The authors concluded that different malocclusions were prone to exhibit a specific type of ridge pattern.

In another study, authors have studied 90 dentulous patients, categorizing into 3 groups on the basis of dental arch form (square, tapering or ovoid). Their finger and palm prints were observed. Finger tip patterns, distribution of palmar patterns, Total finger ridge count and angle atd were assessed. Patients with square arches revealed a significantly high frequency of loops and a large atd angle with most frequent palmar pattern in I3 region. People with tapering arch exhibited a high frequency of whorls, a small atd angle and greatest distribution of palmar prints in I4 region. In subjects with ovoid arch form, loops were most common and palmar patterns were observed mostly in I4 region. The authors have concluded that dermatoglyphics may be considered as a reliable tool for identifying original arch form in edentulous patients.

**DERMATOGLYPHICS IN ORAL CLEFTS**

Dermatoglyphic patterns like arches, ulnar loop, radial loop, and whorl patterns were studied among 95 Filipino subjects with nonsyndromic cleft lip with or without cleft palate (CL/P) and compared with 90 of their unaffected relatives. Significant increase in the frequency of arches and ulnar loops with a decreased number of whorls were observed in the affected individuals. The findings were more prominent in affected female patients when compared to those of unaffected female subjects. No significant differences were found between affected and unaffected male subjects. The authors have concluded that differences in the frequency of dermatoglyphic pattern types existed, along with dissimilar patterns between individuals having orofacial clefts and their unaffected relatives and also between both the groups and controls, with the significant variation seen in female subjects.

**DERMATOGLYPHICS IN ORAL PRECANCER AND CANCER**

A study was undertaken to determine whether specific dermatoglyphic patterns help in predicting the development of oral squamous cell carcinoma and oral leukoplakia. 30 healthy controls, 30 subjects of oral leukoplakia and 30 of oral squamous cell carcinoma were evaluated qualitatively and quantitatively. Arches and loops were more in disease groups than in controls and whorls were more frequent in control group. The authors have concluded that dermatoglyphic patterns may play a role in identifying people either with or at risk of developing oral leukoplakia and oral squamous cell carcinoma.

Dermatoglyphic analyses carried out among patients exhibiting Oral submucous fibrosis (OSF) and Squamous cell carcinoma (SCC) revealed significant findings. Authors have reported decrease in frequency of simple whorl patterns and increase in frequency of arch and ulnar loop pattern on fingertips. Right hand showed decrease in atd angle and decrease in frequency of palmar accessory triradii in OSMF patients. In patients with squamous cell carcinoma, the significant findings observed were: higher frequency of arch and ulnar loop patterns and reduced frequency of simple whorl patterns on finger tips. Right and left hands showed decrease in frequency of palmar accessory triradii. The authors have concluded that the field of dermatoglyphics holds promising results to determine the genetic susceptibility of individuals to develop oral submucous fibrosis and squamous cell carcinoma.
CONCLUSION

Dermatoglyphic pattern analyses have been carried out in a variety of clinical disorders including those seen in the oral cavity. Dermatoglyphics is a simple and inexpensive clinical test and research tool. The economical and feasible nature of this diagnostic tool may be used in screening of a variety of pathologies. Genetically predisposed individuals can be segregated, counselled accordingly and motivated to change the lifestyle. The expenses associated with genetic cytomarker studies may thus be prevented. With the help of simple tool, the frequency of developing serious diseases in later life may be prevented or postponed thereby extending the longevity of an individual.

AUTHOR’S CONTRIBUTION

The author has compiled the relevant information from various original studies pertaining to dermatoglyphic patterns reported in a spectrum of oral diseases. The author is at present working on a research project, studying dermatoglyphic patterns in oral potentially malignant disorders.

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