

Correlation of Dermatoglyphic Interpretation with Oral Diseases- Revisited

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Abstract

From the time of early civilization, the characteristic pattern of the hands have been an area of interest to predict the future. Over the years of scientific research, these features of hand has come to be considered as a useful tool in the diagnosis of psychological, genetic and other medical conditions. Epidermal ridge patterns form early in fetal development and they remain unchanged throughout life and hence they could be used to indicate gene or chromosomal abnormalities. Thus, the dermatoglyphic patterns may be utilized effectively to study the genetic basis of various diseases in developing countries, as it is a noninvasive, inexpensive and effective tool for screening and foretell the probability of occurrence of various diseases. The present review aims to discuss various pattern of fingerprints and briefly discusses importance of fingerprints in prediction of oral diseases.

Keywords: *Dermatoglyphics; Epidermal ridge patterns; Fingerprints*

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This article may be cited as: Manik A, Parekh M, Varshney R and Vyas T. Correlation of Dermatoglyphic interpretation with oral diseases- revisited. Int J Com Health and Med Res 2016;2(2):56-59

Article Received: 18-02-16

Accepted On: 05-05-2016

INTRODUCTION

The word 'dermatoglyphics' is derived from two Greek words i.e. *derma*, skin and *glyphe*, carve. It refers to the epidermal skin ridge formations which appear on the fingers, palms of the hands and soles of the feet. This term was coined by Harold Cummins in 1926.¹ The science of dermatoglyphics involves the study of epidermal ridges present on the surface of palms, fingers, soles and toes. These epidermal ridges form well-defined patterns that characterise individuals and they have been found useful in the clinical diagnoses of hereditary diseases. Epidermal ridge patterns form early in fetal development and they remain unchanged throughout life and hence they could be used to indicate gene or chromosomal abnormalities.² Abnormalities in these areas are influenced by a combination of hereditary and environmental

factors, but only when the combined factors exceed a certain level, can these abnormalities be expected to appear.³ Fuller IC⁴ conducted a study to evaluate dermatoglyphics of patients suffering from diabetes, schizophrenia, duodenal ulcer, asthma, and various cancers and reported significant differences in the digital ridge counts, maximum atd angles, and distal palmar loop ridge counts have been found. A discriminant analysis of the digital ridge counts was performed and the function was used to attempt differential diagnosis between these conditions on dermatoglyphic evidence alone. However, diagnostic trial failed, and the author revealed that the possible reasons for its failure are the relevance of dermatoglyphics is not to diagnosis, but to prognosis; not to the definition of existing disease, but to the identification of people with the genetic predisposition to develop certain diseases. Thus,

here lies the importance of the investigation of dermatoglyphics in diseases; i.e. not the academic identification of associations, but their practical application in screening inexpensively, populations at risk so that a watch may be kept for the early onset symptoms.

Types of fingerprints

In 1892, Sir Francis Galton published his highly influential book, 'Finger Prints' in which he described his classification system based on the number of triradii. Galton's fingerprint system included the three major patterns of fingerprint types:

- I) Arch: Arches have no triradii.⁵ Tri-radius is formed by the confluence of three ridge systems that form angles of approximately 120° with one another.¹

Arch pattern is further classified into plain and tented arch.

- II) Loop: Loops have one triradius, and is further classified into Ulnar and Radial loop.

- III) Whorl: whorls have two triradii. The 'whorl' is characterised by a pattern of concentric circles, or a spiral shape - some of the ridges make a turn through at least. This pattern is further classified into plain whorl; Central pocket loop; Double loop and Accidental whorl.⁵



Figure 1: Classification of fingerprint pattern⁵

Dermatoglyphics and oral diseases

Sharma R et al⁶ determine if there is any significant correlation between salivary bacteria interactions, dermatoglyphics, and dental caries

and found that subject group had a decreased frequency of loops, whereas control group had an increased frequency of loops on all palmar digits. Similarly, Abhilash PR et al⁷ investigated and analyzed the significance of dermatoglyphics in predicting the susceptibility of individuals to develop dental caries and reported that the dental caries susceptibility of an individual increased with incidence of whorl pattern and it decreased with incidence of loop pattern. Gupta A et al⁸ conducted a study to analyze the palmar dermatoglyphics in squamous cell carcinoma (SCC) and oral submucous fibrosis (OSF) and revealed that in SCC, there was an increase in frequency of arch and ulnar loop patterns on fingertips, decrease in frequency of simple whorl patterns on fingertips, decrease in frequency of palmar accessory triradii on right and left hands. Significant findings in OSF included an increase in frequency of arch and ulnar loop pattern, decrease in frequency of simple whorl patterns on fingertips, decrease in atd angle on right hand, decrease in frequency of palmar accessory triradii on right hand. The results revealed that the field of dermatoglyphics holds promising results for determining the genetic susceptibility of individuals to develop SCC and OSF. Ganvir SM et al⁹ evaluated the genetic predisposition and frequency of specific finger and palm-print patterns in OSCC and OSMF patients by dermatoglyphic analysis and found that whorl type of fingerprint pattern was predominant in significantly higher number of individuals of OSCC and OSMF group than in control groups, whereas individuals of both the control groups showed loop as a predominant fingerprint pattern. This indicates that the predominance of whorl type of fingerprint pattern would serve as a candidate screening marker for susceptibility to oral squamous cell carcinoma and oral submucous fibrosis in general population with or without tobacco chewing habit. Kumar S et al¹⁰ determined the fingerprint patterns in gutkha chewers with oral submucous fibrosis (OSMF) and in healthy controls without gutkha chewing habit and OSMF and found a marked decrease of tented arches, ulnar and radial loops, and an increase of simple whorls in OSMF subjects in comparison with normal individuals. Atasu M et al¹¹ evaluated dermatoglyphic findings in patients with periodontal diseases and reported that dermatoglyphics could be used together with the other diagnostic methods such as clinical and

radiologic investigations and in the identifying of the patients from distinct groups of periodontal diseases. Jahanbin A et al¹² conducted a study to test the hypothesis that unaffected parents with nonsyndromic bilateral cleft lip and palate children possess greater levels of dermatoglyphic asymmetry than the normal population and to test for the difference in the distribution of pattern types and the findings suggested that an increase in the asymmetry of atd angles and pattern types in parents of sporadically affected children may reflect more the genetic base of this congenital malformation. Maheshwari N et al¹³ conducted a study to observe and compare the differences in the dermatoglyphic patterns between cleft lip/palate (CL/P) and normal healthy children and concluded that any deviation in dermatoglyphics features indicates a genetic etiology. Madura MG¹⁴ carried out a review of literature and concluded that analysis of dermatoglyphic pattern can prove to be a significantly useful tool for preliminary investigations in those conditions with a suspected genetic base.

CONCLUSION

The individuality of a person's finger prints led to the analysis of one's potential, personality and preferences by analyzing dermatoglyphics. The individuality is because of the reason that Dermatoglyphics is the reflection of DNA and consequently does not change.³ Thus, the dermatoglyphic patterns may be utilized effectively to study the genetic basis of various diseases. in developing countries, as it is a noninvasive, inexpensive and effective tool for screening and foretell the probability of occurrence of various diseases.

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Source of support: Nil

Conflict of interest: None declared

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