

THE SCIENTIFIC MAZE: DERMATOGLYPHICS

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ABSTRACT

Dermatoglyphics is defined as the scientific study of fingerprints on the surfaces of palms, soles, fingers and toes. The term is derived from Greek word *derma* means skin and *glyphics* meaning curved. Cummins and Midlo first coined this term in 1926. Harold Cummins is considered to be the father of dermatoglyphics.

The fingerprints are comprised of epidermal ridges, which are of two types, namely, primary and secondary. These ridges are differentiated during the third and fourth month of fetal life. The primary ridges are mainly responsible for the characteristic dermatoglyphics pattern. Secondary ridges are present at regular intervals on the apex of primary ridges. They have distinct patterns to them mainly: loops, arch and whorls.

Galton in 19th century stated that dermatoglyphics in every individual remains unchanged throughout the lifetime. They are unique for each individual, varying even in monozygotic twins. This uniqueness is thus considered as an important tool for the study of genetics, genetic disorders and also in forensics, as they are the last to decompose after a person dies. Its study has various uses in dentistry since a number of parameters can be determined because of their uniqueness that can help in diagnosing various dental anomalies.

Key Words: Dermatoglyphics, Forensic Dentistry, Fingerprints

INTRODUCTION:

According Humans are all unique and the major predictors of it have been our fingerprints. Decades of scientific research have led to recognition of study of hand as a

powerful tool for diagnosis of various psychological, genetic and medical conditions.

Dermatoglyphics have been applied in various fields of medicine, genetics,

education, human resources and management, etc. Lately there have been remarkable discoveries based on theory of multi-intelligence forming the basics of chirology. Inclusion of dermatoglyphics with physical examination can provide information on otherwise difficult to diagnose disorders. This scientific maze comprised of lines and patterns has been a tool of identification in forensics to deciphering of future for traditional palmists also.

Though Cummins and Midlo coined the term first in 1926, the significance of fingerprints had started with experiments conducted by William Hersched in 1858. This furthermore led to demonstration of its biological variations and hereditary significance with different racial groups by Sir Francis Galton in 1892. The first book on classification and uses of fingerprints by Sir Edward Henry was published in 1893.^{1,2,3}

Since then it has been a series of evaluation and experiments on deciphering this code that our genetic system has given us right on our finger tips.

EMBRYOGENESIS

The configurations of dermal ridge are direct consequence of surface topography of fetal hand during dermal ridge development between thirteenth and nineteenth weeks of prenatal life. These are the immediate results of physical and

topographic growth forces affecting volar skin.^{1,4}

PATTERNS AND CLASSIFICATION

There are three basic types of patterns for fingerprints:

- 1) Arch type: In these the ridges traverse from one side to another with no backward turns. These are of plain and tented types. The ridges in plain type flow from one side to the other side with rise or wave in center. In tented arches however the ridge in the center forms angle or upthrust.
- 2) Loops comprise 60-70% of fingerprints. The ridges terminate in the direction they entered after recurving. The radial loops open on the radial side and ulnar loops on the ulnar side.
- 3) Whorls are of 6 types and comprise of about 25-35% of fingerprint patterns. The concentric whorls are arranged as concentric rings in succession. The ones that spiral around a core are known as spiral whorl. A small whorl enclosed by a loop is a central pocket whorl. Any complex patterns are included in accidental whorls. Variable combinations are categorized as mixed. Two separate loop formations with two shoulders and deltas comprise of double loop whorl. Central pocket whorl has recurving ridges or a

right angle obstruction to the inner flow line.

Alongwith these patterns there are various ridge characteristics comprised of bifurcation, trifurcation, dots, spur, bridge, ridge crossing and ending ridge depending upon the terminations, intersections and branching of the various ridges.^{5,6,7,8,9,10}

CORRELATION WITH INDIVIDUAL CHARACTERISTICS AND DISEASE

An individual is defined by their unique set of functional, physical, psychic and pathological characteristics. Since fingerprints are a mirror to the unique genetic characteristics, their value has been established in identification at sites of mass disaster, at crime scenes, accidents, uncertainty of paternity, gender identification and for national identification.¹¹

Nowadays there have been various centers where dermatoglyphics is evaluated to define the characteristics and intelligence of an individual. Especially when parents want to evaluate the capabilities of their child so that a proper career for further persuasion can be chosen. These centers are using dermatoglyphics multi-intelligence tests to further evaluate the capabilities of individuals and to help them in making a right career choice. The fingerprint patterns have also been established as characteristic for brain mapping and intelligence quotient.^{12,13}

According to various studies a particular pattern has been correlated with a type of learning behavior and each finger correlated with a brain lobe. High performers have been revealed to have a high average total ridge count with percentages ranging from 65-100%, average performers have 50-64% and low performers below 50% of average total ridge count.¹²

Since time immemorial various studies have been done to establish correlation of various dental diseases with a particular fingerprint pattern. Individuals with high susceptibility to dental caries were found to have increased whorl pattern. Decreased frequency of radial loops has been correlated with periodontitis. Oral submucous fibrosis has been shown to be present in individuals with increased arches. Presence of increased whorls in lower half of palm has been reported in squamous cell carcinoma. Subsequent correlations have been observed in cases of cleft lip and palate with an increased frequency of ulnar and radial loops. Breakthrough studies have furthermore revealed dermatoglyphics as a mirror to many congenital anomalies and genetic disorders.^{6,9,14,15,16,17,18}

CONCLUSION

This review is a brief insight into the simple yet complex scientific structure of

dermatoglyphics. Though being just as simple as fingerprints it gives an insight into many complexities of human body and nature. There have been many correlative studies, which have led to various breakthroughs asserting the presence of particular pattern of fingerprints with an individualistic behavior or disease. The science of anything is an insight and inquisitiveness into what may be hidden, thus being a never ending quench for further evaluations and studies.

Conflict of interest: None

Financial assistance: None

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