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Short Communication

Practical Application of Dermatoglyphics in Disease Identification

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Practical Application of Dermatoglyphics in Disease Identification

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Abstract
Dermatoglyphics (fingerprint) indicates epidermal ridge patterns of sole, palm, fingers, and toes. It is unique for each person, because it is determined by interaction of genes and intrauterine environment. Once dermatoglyphic patterns are formed, it is not affected by age, development, and environmental changes in postnatal life. Therefore, they exhibit positive values in predicting various genetically influenced disorders. Dermatoglyphics plays an important role in medicolegal, anthropology, and genetic studies. Diabetes mellitus, hypertension, Down syndrome, bronchial asthma, schizophrenia, and breast cancer are some of the diseases that can be screened by dermatoglyphic identification.

Keywords: Dermatoglyphics; Genetic; Identification.

1. INTRODUCTION

The term dermatoglyphic (fingerprint) indicates epidermal ridge patterns of sole, palm, fingers, and toes [1]. It comprises two words: derma/dermatos (skin) and glyphos/glyphein (carvings) [2,3]. Each individual's dermal ridge is unique, because it is determined by how the fetus moves around inside the uterus, and also how fast and big the fetus grows. Therefore, identical twins will not have the same fingerprints [4,5]. Dermatoglyphics, which indicates the patterns of skin ridges, is derived from the hypodermal neural system and is genetically formed on the 10th until 17th embryological period [6]. Fingerprints are not merely genetic characteristic. However, they are also a part of "phenotype." This is because they are determined by the interaction of genes and intrauterine environment (blood supply, nerve supply, hormone, nutrition, growth rate of finger, and position in the uterus) [1,7]. Fingerprint is not changed since the middle of pregnancy time [5]. Dermatoglyphics is permanent throughout the life, and it survives superficial injuries and environmental changes after 21 weeks of intrauterine life [2]. Once dermatoglyphic patterns are formed, it is not affected by age, development, and environmental changes in postnatal life. Therefore, they exhibit positive values in predicting various genetically influenced disorders [8].

2. ROLE OF DERMATOGLYPHICS

Dermatoglyphics plays an important role in medicolegal (forensic), anthropological, and genetic studies [1]. In addition, we use thumbprints as a form of signature, because they do not change their form and could be used as personal identification [9]. It is an economical diagnostic tool nowadays [5]. Nowadays, dermatoglyphic patterns serve as a tool to describe some biomedical events such as in biology, anthropology, genetics, and medicine [10].

Dermatoglyphic patterns are inherited by polygenic system with individual gene contributing a small additive effect. They can be used as diagnostic aid in the screening of genetically inherited diseases [11]. In congenital diseases, significant dermatoglyphic patterns are useful in identifying Down syndrome (mongolism) in babies [9]. The presence of Simian crease in Down syndrome patients revealed a strong genetic background. Meanwhile, diabetes and hypertension exhibit a partial genetic background [12].

Tarca and Tuluc studied type 1 diabetes mellitus patients by using dermatoglyphics, and the results revealed that there were some anomalies in those patients such as substantial reduction of the loops, increased frequency of whorls, arches, radial orientation of digital models, and unexpected growth of frequency for left and right hand monomorphism. They concluded that dermatoglyphics played a role in predicting potential diabetogenic risk at the population level [13]. Meanwhile, Shrivastava *et al.* studied 100 diabetic subjects (type 2) and found that the whorls are the most common pattern in diabetic subjects [14].

Bronchial asthma, as one of allergy manifestation, is influenced by genetic factors. Dermatoglyphic patterns are also genetically arranged. Therefore, dermatoglyphics might have correlation with bronchial asthma [3]. There was increased ridge count (>10) and deep grid pattern in the thenar area [6]. Palmar dermatoglyphics was also used in carcinoma breast study in Indian women [15]. Reflection in interdigital areas III and IV was found in cases of brachial plexus palsy [10].

3. STEPS IN DERMATOGLYPHICS STUDY

The count of palm dermal ridges is very essential in determining the quantitative fingerprint characteristics. The dermal ridges in fingers exhibit different shapes, loop, arch, and whorl, which influence qualitative characteristics [16].

Steps in obtaining dermatoglyphics of patients [1,14]:
1. The purpose and procedure of the study are explained to all patients, and their consent is taken.
2. The modified Purvis-Smith ink method was used.
3. Patients are asked to clean their hands with soap and water to remove dirt.
4. Fingertips to wrist creases are impregnated with black ink and pressed on an A4 paper (abducted to maximum extent). Pressure is applied on dorsum of the hand to obtain triradius patterns on the palm.
5. Clear prints are classified into digital pattern arches, loops, whorls, and composite.
6. The counting is performed using a hand lens.
7. Each fingerprint is independently scored.
8. Patients with deformed fingers and palms, infections, injuries (burn), and scar on fingers and/or palms are excluded.
9. The prints are studied with the help of a hand lens.
10. The dermatoglyphic prints are recorded, tabulated, and analyzed by statistical tests.

4. CONCLUSION

Palmar dermatoglyphics is a simple, user friendly, economic, and less invasive anatomical procedure that might be used for screening of some disease in developing countries. It is easily accessible and a lifelong marker. This is the most practical method, and dermatoglyphic patterns serve as simple mass screening tools for preventing or postponing the onset of disease. The limitation of dermatoglyphics is that the characteristics of a disease may be found in a perfectly normal person because of a great variability of pattern in normal population.

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