Study of fingerprint patterns to evaluate the role of dermatoglyphics in early detection of bronchial asthma

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Abstract

Background: Dermatoglyphics and bronchial asthma (BA) are both influenced by genetic factors. Hence, we assessed the diagnostic potential of correlation between fingerprint pattern and BA. Materials and Methods: The study was carried out in out-patient Department of Pulmonary Medicine of All India Institute of Medical Sciences Bhopal. It included 36 patients of BA and 50 nonasthmatic individuals as controls. The following parameters were studied and analyzed: (a) Whorls, (b) arches, (c) radial loops, (d) ulnar loops, (e) the absolute finger ridge count (AFRC), (f) total finger ridge count (TFRC). Results: A significant decrease in the mean value of the arches and increase in the mean value of the ulnar loops were observed in BA patients compared to the control group. The mean values of TFRC, AFRC, and whorls were similar in both groups. Conclusion: Evaluation of dermatoglyphic patterns may be useful in identifying patients prone to developing BA.

Key words: Bronchial asthma, dermatoglyphics, fingerprints

INTRODUCTION

The study of the epidermal ridge patterns of the skin of the fingers, palms, toes, and soles is known as “dermatoglyphics.”1,2 The dermatoglyphic science is based on two major facts; first, the ridges are slightly different for different fingers and no two persons, not even monozygotic twins, show exactly similar fingerprint patterns, and second, the ridges are permanent throughout life and they survive superficial injuries and also environmental changes after the 21st week intra-uterine life. Fingerprint patterns of dermal ridges can be classified into three major groups3 [Figure 1]: (1) Arches, (2) Loops, and (3) whorls.

The arches are the simplest and least frequent pattern, which pass across the finger with slight bow distally. They may be subclassified as “plain” when the ridges rise slightly over the middle of the finger or “tented” when the ridges rise to a point. The loop pattern has a triradius and a core. A triradius is a point at which three groups of ridges coming from three directions meet at angles of about 120°. The core is essentially a ridge that

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Bronchial asthma (BA) is a syndrome characterized by airflow obstruction that varies both spontaneously and with a specific treatment.[7] Common symptoms include wheezing, coughing, chest tightness, and shortness of breath. Asthma is thought to be caused by a combination of genetic and environmental factors. Its diagnosis is usually based on the pattern of symptoms, response to therapy over time, and spirometry. Asthma has increased dramatically in prevalence and is now recognized as a major cause of disability, medical expense, and preventable death. BA occurs at all ages but predominantly in early life. About one-half of cases develop before age 10, and another third occur before age 40. BA is influenced by genetic factors.[8] Considering the genetic association of both dermatoglyphic patterns and BA, we assessed if there is any correlation between these two. Only a few studies have shown links between fingerprint pattern and BA,[4,7-9] which are of help in predicting the occurrence of BA among relatives of patients suffering from the disease. Hence, this study was designed to assess the correlation between fingerprint pattern and BA.

MATERIALS AND METHODS

Study design
Phase-I Diagnostic Study.

Study settings
Out-patient Department (OPD) of Pulmonary Medicine of All India Institute of Medical Sciences Bhopal, India. All suspected patients of BA were subjected to pulmonary function test, and BA was confirmed on a predefined criterion. The present study was conducted on two groups that is, Group A including 36 patients of BA and Group B including 50 healthy controls. Following approval from Institutional Ethical Committee, informed consent was taken from all patients prior to study. The objectives of the study were explained to all participants. They were asked to relax and co-operate to achieve the required movement of the fingers. Their fingers were cleaned with soap, water, and spirit to remove any oily dirt and sweat. Nontoxic Kores Ink was applied to the tips of the fingers, and then the tips were pressed and rolled against the white glossy paper. The fingers were cleaned after taking the prints. The fingerprints from both hands of Group A and Group B were obtained for present study. The thumb was placed with the ulnar edge downward and rolled toward the body, and other digits were placed with the radial edge downward and rolled away from the body. The prints were analyzed with the help of the hand lens. The following parameters were studied and analyzed:

a. Whorls
b. Arches
c. Radial loops
d. Ulnar loops
e. AFRC
f. TFRC.

These parameters were compared with the previous study values to confirm if there is any correlation between control and study group. The data were also analyzed for any abnormal new pattern particular to the study group.

**Study participants, inclusion and exclusion criterion**
The study was planned to be conducted on the clinically diagnosed BA patients attending the OPD. Patients of all age groups were selected. Nonasthmatic participants were considered as controls and selected from among the OPD visitors and residents around health facility (those not having any respiratory problem or any symptoms related to asthma).

**Statistical methods**
Data were analyzed with Epi Info Software (Epi Info™ 7.1.5, CDC Atlanta, USA). Data were summarized with descriptive measures like mean, median and standard deviation.

Mann-Whitney U test was used to test difference between fingerprint patterns among two groups. A p-value less than 0.05 was considered as statistically significant.

**RESULTS**

Fingerprints of 86 individuals (36 patients and 50 controls) were analyzed, and indices were calculated [Table 1 and Figure 1]. A highly significant decrease in the mean value of the arches was observed in BA patients compared to the control group. The mean value of the ulnar loops in the BA patients was significantly more than that in the control group.

While the mean values of the radial loops, whorls, TFRC, and AFRC were similar in both groups.

**DISCUSSION**

The present study was aimed to evaluate whether the dermatoglyphic parameters have any diagnostic significance in BA patients. Indeed, the number of arches was lower, and the ulnar loop was significantly higher among BA patients compared to control group. A qualitative and quantitative analysis on dermatoglyphic patterns in patients with BA was previously reported. In this study, similar to our observation, significantly higher number of ulnar loops and lower number of arches were observed in the BA group compared to that of the control group. Additionally, significantly higher TFRC with no changes in AFRC was also reported. However, we did not observe any differences in radial loops, whorls, TFRC, and AFRC as previously reported. The low number of patients in our study may have resulted in such differences in addition to the contribution from variation in patient demographics. Higher values for a-b angle and less TFRC counts are also reported in BA patients; however, we did not observe such differences in our study.

**CONCLUSION**

From the present study, we conclude that the decreased number of arches, increased number of ulnar loops in association with some respiratory ailments can be used as the early diagnostic criteria for BA. Nevertheless, due to small sample size in our study, more elaborated studies are required to further validate our observations.

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**Conflicts of interest**
There are no conflicts of interest.

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