

Dermatoglyphic Patterns of Finger Tips in the Patients with Pulmonary Tuberculosis

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Abstract:

Context: The word dermatoglyphics denotes as the scientific study of the epidermal ridge patterns of fingertips, palm and sole. There are three major classes of dermatoglyphic patterns of finger tips: loops, whorls and arches. Analysis of finger dermatoglyphic is beginning to prove itself as a useful tool for preliminary investigation in conditions with a suspected genetic basis. The genetic contribution is one of the causes of pulmonary tuberculosis. The present study on finger dermatoglyphics pattern was carried out to provide dermatoglyphic as a tool for early prediction of pulmonary tuberculosis by comparing dermatoglyphic patterns of pulmonary tuberculosis patients with the normal healthy individuals.

Materials and Methods: A Cross-sectional, analytical type of study was conducted in Department of Anatomy, Dhaka Medical College, Dhaka, from January 2012 to December 2012. The study was performed on 100 patients suffering from pulmonary tuberculosis and 100 healthy individuals.

Results: The percentage of whorl in pulmonary tuberculosis patients was significantly higher than control group ($P < 0.001$). On the other hand, in pulmonary tuberculosis patients ulnar loop, radial loop and arch were 30.4%, 0.1% and 4.9% respectively and in control group were 72.3%, 2.5% and 10.3% respectively. Ulnar loop, radial loop and arch were significantly decreased in the patients group as compared to controls.

Conclusion: In the present study the percentage of whorl was predominantly higher in the pulmonary tuberculosis patient than the control subjects.

Key words: dermatoglyphics, pulmonary tuberculosis, finger tips.

Introduction

The term Dermatoglyphic is derived from two ancient Greek words 'Derma' means Skin; 'Glyphe' means Carve. It gives the impression that carved out of the skin. In 1926 Cummin first time coined the term dermatoglyphic in the field of science⁴. The epidermal ridges form definite local design on the terminal segment of finger. Sir Francis Galton, in 1892, classified finger tips dermatoglyphic patterns into: Loop pattern, Whorl pattern and Arch pattern. The whorl patterns are constructed in such a way that the characteristic ridge courses follow

circuits around the core. The shape may be either circular or elliptical. In loop pattern, ridges enter on one side, recurve and exit on the same side of the finger. The opening of loop may be towards the ulnar or radial side. In arch pattern, ridges enter from one side and flow to the other side of the finger with slightly convex distally⁵.

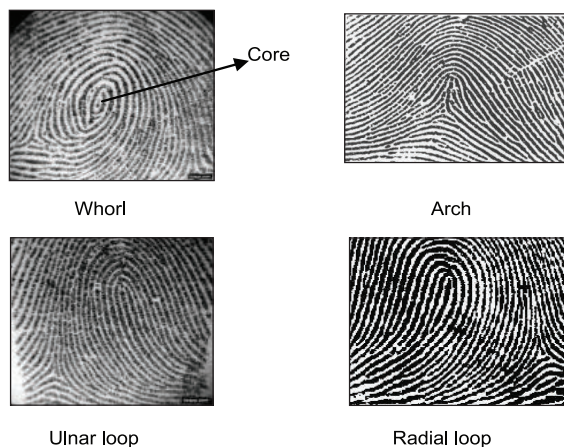


Fig.-1: Different types of finger tips dermatoglyphics

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Dermatoglyphic patterns are age stable⁶. Once established, dermatoglyphic patterns remain unchanged in the arrangement and structure throughout life⁴. Differentiation of dermal ridge occurs during early fetal life. It is genetically determined and is influenced by physical, topographical and environmental factors¹. Any disturbance by genetic or environmental factors at the time of ridge differentiation can produce variant ridge configuration⁷. Abnormal dermatoglyphic pattern have been observed in several diseases like diabetes, hypertension, bronchial asthma, leprosy, congenital heart diseases, Down's syndrome, Turner's syndrome etc².

Pulmonary tuberculosis is a worldwide public health problem especially in the developing countries, like Bangladesh. In 1993, the World Health Organization (WHO) declared TB a global public health emergency. TB is the second leading cause of death from an infectious disease worldwide after HIV. According to "National Tuberculosis Control Program -2009" of Bangladesh by WHO reported that approximately 875 new TB cases and 180 TB deaths occur daily in the country. In "Fifth Joint Monitoring of the Bangladesh National Tuberculosis Control Program

2-12 October 2010" by WHO reported that in 2008 there were approximately 660,000 TB cases (range 420,000 – 980,000) in the country and about 79,000 patients (range 31,000 – 150,000) were died from TB⁸. According to "WHO report 2011 – Global Tuberculosis control" –TB is more common in men than in women and affects mostly adult in the economically productive age group around 15 to 59 years⁹. Pulmonary tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. The genetic contribution is one of the causes of pulmonary tuberculosis. The susceptibility to pulmonary tuberculosis linked to Mannose Binding Protein gene was found by Sevaraj P, Narayanan PR and Reetha A.M in 1999. Significant association has been found between IL-1 gene cluster and host susceptibility to tuberculosis by Bellamy R, Ruwende C, Corrah Ts, Mc Adam K P, Whittle HC and A.V in 1998³. Mannose binding protein gene, Interleukin-1 (IL-

1), gamma interferon (IFN-³) cause destruction of mycobacterium tuberculosis from cell wall to DNA¹⁰. Thus deficiency of Mannose binding protein gene and IL-1 gene cause spread of infection. The types of patterns of ridges that develop are determined genetically¹¹. Any deficiency of these genetic factors causes development of unusual dermatoglyphics.

The present study was designed to find any variation present in dermatoglyphic patterns of fingers between pulmonary tuberculosis patients and normal individuals in Bangladesh. The findings of the study are expected to be useful tool in early prediction of pulmonary tuberculosis.

Materials and Methods:

The study was performed on 200 individuals. Among them, 100 were patients suffering from pulmonary tuberculosis and 100 were healthy individual (not suffering from pulmonary tuberculosis) who served as control group. The patients suffering from pulmonary tuberculosis were selected from diagnosed cases. Diagnosis was done by the pulmonologist of National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka. Diagnosis of the patients were based on – Sputum (+)ve for AFB, Mantoux test(+)ve and X-ray chest . The control group was selected from National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka. They attended the outpatient department of NIDCH with history of cough/ fever / chest pain. They were not suffering from Pulmonary Tuberculosis and were confirmed by the pulmonologist of that institute. Their sputum for AFB and Mantoux test were (-) ve, and chest X-ray was normal. The control group had no history of known contact with pulmonary tuberculosis patient. Data sheet of personal information was filled up for both groups to avoid duplication and to exclude diseases like diabetes mellitus, hypertension, congenital heart disease, neurological disorders, asthma, carcinoma breast etc from history. Those individuals who were suffering from any of these diseases were excluded from sample. The age was ranged from 18 to 60 years of ages for both patients and control group. The age of these two groups

were according to the national identity card of Bangladesh. An informed written consent was taken from each individual. Data was collected with due permission from the Director of National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka.

The materials used in present study were white paper, a clip board, printing ink, hand roller, a flat bottom container, optical grade hand lens with 4X & 6X magnification, spirit or turpentine oil and liquid soap.

Hand print was taken, studied and different finger tips dermatoglyphic patterns were classified as described by Sir Francis Galton, in 1892 as:

Whorls, Loops and Arches. The patterns were recorded separately in a data sheet. The data were analyzed with the help of SPSS (Statistical Package for Social Science) program and Chi Square (χ^2) test was done.

Ethical Clearance

This study was approved by Ethical Review Committee of Dhaka Medical College, Dhaka.

Results

Comparison of finger tips patterns between pulmonary tuberculosis patients and control subjects are shown in Table-I, Fig – 2.

Table-I
Finger tips patterns in pulmonary tuberculosis patients and control subjects.

Group	No. of subjects (n)	Percentage of finger tips patterns			
		Radial loop	Ulnar loop	Whorls	Arch
Patients	100	0.1	30.4	64.6	4.9
Control	100	2.5	72.3	14.9	10.3
P value		0.001***	0.001***	0.001***	0.012**

Comparison of finger tips patterns between pulmonary tuberculosis patients and control subjects was done by chi-square test. ** = significant and ***=highly significant.

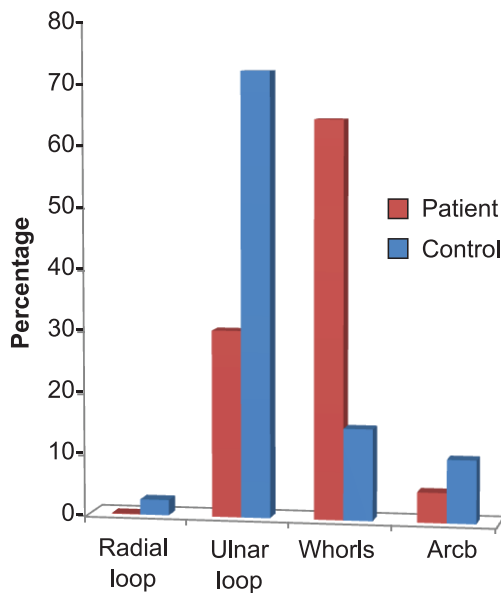


Fig -2 : *Finger tips patterns in Pulmonary Tuberculosis patients and control subjects.*

Discussion

Different finger tips dermatoglyphic patterns (loop, whorl and arch) were studied in this work. It was noticed that loop patterns (ulnar loop 72.3% and radial loop 2.5%) were predominant in the healthy individuals who served as control subjects, followed by 14.9% whorl pattern and 3% arches. This result is similar with the findings of Sangita S. Babu, B. P. Power, O. N. Khare. They conducted a study in 2006 in 100 pulmonary tuberculosis patients and 100 healthy subjects from Madhaya - Pradesh, India. They reported 73.3% loop pattern, 23.8% whorl pattern and 11.3% arch pattern in control subjects³.

The findings of the present study are also similar with the findings of L. S. Sidhu, D.P. Bhatnagar, R. Malhotra and H.S. Sodhi. They conducted a study on pulmonary tuberculosis patients and control subjects in 1977 in Patiala, Panjab, India¹².

Dr. Jagdish Chandhari, Dr. Bharat Sarvaiya, Dr. S. V. Patel, Dr. S.P. Rathod, Dr. T.C. Singel in 2011 carried out a study on 100 cases of pulmonary tuberculosis and 100 healthy subjects from Bhavnagar, Gujarat, India. They found higher loop pattern (ulnar loop 60.5% and radial loop 2.1%) in control group than in pulmonary tuberculosis patient group¹³. These findings are similar with the findings of the present study.

In the present study, whorl pattern was predominant (64.6%) in pulmonary tuberculosis patients. It was followed by loop pattern (ulnar loop 30.4% and radial loop 0.1%) and then 4.9% arch pattern. These findings are supported by findings of Babu SS, Power BP & Khare ON³ from Madhay - Prodesh, India.

They mentioned the presence of higher frequency of whorl pattern (56.6%), followed by 32.1% loop pattern and then 3.3% arch pattern³. But Shidhu LS, Bhatnagar DP, Malhotra R & Sodhi HS¹² in Patiala, Panjab, India found higher loop pattern (54.2%) in pulmonary tuberculosis patients. Their findings are dissimilar with the present study. Dr. Jagdish Chandhari, Dr. Bharat Sarvaiya, Dr. S. V. Patel, Dr. S.P. Rathod, Dr. T.C. Singel in Bhatnagar, Gujarat, India also found higher frequency of loop pattern (ulnar loop 59.3% and radial loop 2.2%) in pulmonary tuberculosis patients¹³. These findings are also dissimilar with the findings of present study.

Conclusion

The present study was undertaken with an objective to evaluate the role of dermatoglyphics in early prediction of pulmonary tuberculosis patients. The percentage of whorl in pulmonary tuberculosis patients (64.6%) was more as compared to controls (14.9%). Statistically it was highly significant ($P < 0.001$). On the other hand, in pulmonary tuberculosis patients ulnar loop, radial loop and arch (30.4%, 0.1% and 4.9% respectively) significantly reduced as compared to controls (72.3%, 2.5% and 10.3%).

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