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STUDY OF PALMAR DERMATOGLYPHICS IN PULMONARY TUBERCULOSIS

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ABSTRACT

Tuberculosis is one of the major health problems in developing countries. The aim of present study was to find out differences in dermatoglyphic patterns between diagnosed pulmonary tuberculosis patients and normal healthy persons and to determine the usefulness of dermatoglyphics in studying genetic susceptibility to pulmonary tuberculosis. The sample constituted 100 diagnosed pulmonary tuberculosis patients (cases) and 100 unrelated healthy subjects (controls). Dermatoglyphic patterns studied were total finger ridge count (TFRC), absolute finger ridge count (AFRC), 'atd' angle and finger tip patterns. The statistical analysis of data showed significant increase in total finger ridge count (TFRC) and absolute finger ridge count (AFRC) in both hands of pulmonary tuberculosis cases as compared to controls. The 'atd' angle in both hands of pulmonary tuberculosis cases was lower than controls and that difference was statistically significant. This indicates that the axial triradius was placed proximally in both hands of pulmonary tuberculosis cases than in controls. There were no statistically significant differences observed in fingertip patterns among pulmonary tuberculosis cases and controls.

Keywords: Palmar dermatoglyphics, Pulmonary tuberculosis, Axial triradius, Genetics

INTRODUCTION

The skin on palms and soles is exclusively designed with epidermal ridges in various patterns. These patterns are characteristic of the individual and differ from one person to another. Dermatoglyphics is scientific study of epidermal ridges and their configurations on the volar aspect of palmar and plantar regions¹. Dermatoglyphic analysis can be added to the broad spectrum of diagnostic indications because ridge configurations are genetically determined. They are 'permanent' in that they are formed in the fetal stage, in intrauterine life and remain the same throughout life².

Pulmonary Tuberculosis caused by *Mycobacterium tuberculosis*, remains a worldwide public health problem. Tuberculosis has been for many years the most important of

human infections, in its global prevalence, devastating morbidity and massive mortality. Tuberculosis is not a hereditary disease; however twin studies indicate that susceptibility is an important risk factor³. The importance of host genetic factors on the susceptibility or resistance to tuberculosis has been emphasized by many workers. The susceptibility to pulmonary tuberculosis has been linked to Mannose binding protein gene⁴ and interleukin-1 gene clusters⁵.

The study was carried out to evaluate the significance of dermatoglyphics in cases of pulmonary tuberculosis and to certain extent predict the chance of acquiring pulmonary tuberculosis from certain dermatoglyphics parameters.

MATERIALS AND METHODS

The sample included 100 diagnosed sputum positive pulmonary tuberculosis patients in the age group of 15-49 years and of both genders. Diagnosis of the patients were based on detailed history, clinical examination, chest X-ray and confirmed by sputum smear examination for acid fast bacilli. Patients with sputum smear negative pulmonary tuberculosis (At least two negative smears but tuberculosis suggestive symptoms and X-ray abnormalities or positive culture) ⁶ as well as with extra pulmonary tuberculosis were excluded from study. Also patients with deformities, infections, injuries, burns over fingers and palms of both hands were excluded from the study. The control group included 100 unrelated healthy subjects of identical age group. Dermatoglyphic prints were taken by 'INK METHOD' described by Cummins (1936)⁷ and Cummins and Midlo (1961)⁸. The less amount of ink was placed on glass slab and it was uniformly spread by rubber roller to get thin even film, and this film of ink was applied on palm and digits of subjects. Prints were taken from right and left hand separately. These prints were immediately examined with magnifying hand lens for detail dermatoglyphic analysis. The qualitative study includes fingertip patterns (whorls, ulnar loops, radial loops and arches). The quantitative study includes total finger ridge count (TFRC), absolute finger ridge count (AFRC) and 'atd' angle.

All statistical analyses were done by using descriptive statistics and inferential statistics using Chi-square test and Z-test. For statistical analysis of qualitative data Chi-square test and for quantitative data Z-test was applied. Results were tested at 5% level of significance.

OBSERVATIONS AND RESULTS

In present study, there was significant increase in total finger ridge count (TFRC) ($p = 0.010$) and absolute finger ridge count (AFRC) ($p = 0.001$) in both hands of pulmonary tuberculosis cases as compared to controls. There was significant

decrease in 'atd' angle in right ($p = 0.038$), left ($p = 0.008$) and both hands ($p = 0.004$) of pulmonary tuberculosis cases as compared to controls. There were no statistically significant differences observed in fingertip patterns of pulmonary tuberculosis cases and controls.

DISCUSSION

Pulmonary Tuberculosis caused by *Mycobacterium tuberculosis* is now becoming the major health problem in developing countries. Host genetic factors such as Human Leucocyte Antigen (HLA) and non-HLA genes are associated with the susceptibility of tuberculosis. As there is link between susceptibility of tuberculosis with genetic markers, present study was done to predict the genetic susceptibility of tuberculosis.

Babu S S *et al*⁹ reported significant increase in total finger ridge count in cases as compared to controls. Present study also revealed a significant increase in total finger ridge count in cases ($p < 0.05$). A significant increase ($p < 0.05$) in absolute finger ridge count in pulmonary tuberculosis cases as compared to controls was observed in present study which was in accordance with finding of Babu SS *et al*⁹.

Babu SS *et al*⁹ reported significant decrease in the value of 'atd' angle in both hands of pulmonary tuberculosis cases as compared to controls. In present study the value of 'atd' angle was found to be decreased significantly ($p < 0.05$) in both hands of pulmonary tuberculosis cases which were similar with finding of Babu SS *et al*⁹. This indicates that the triradius was placed proximally in both hands of tuberculosis cases than in controls.

In present study the differences in all finger tip patterns were statistically not significant ($p > 0.05$). The findings in present study were matched with findings of Sidhu LS *et al*^{10, 11} and Chaudhari Jagdish *et al*¹² but not in accordance with Viswanathan Geetha *et al*¹³ and Babu SS *et al*⁹ who found that whorl pattern was most

common in cases and the difference was highly significant.

CONCLUSION

From the present study, it is possible to certain extent to predict the chance of acquiring pulmonary tuberculosis from certain dermatoglyphic parameters which are increased total finger ridge count (TFRC), absolute finger ridge count (AFRC) and decrease in 'atd' angle. The dermatoglyphics can play an important role in revealing the individuals who are susceptible to pulmonary tuberculosis owing to genetic constitution. It will also be contributory in the evaluation of genetic susceptibility to the disease of known contacts of pulmonary tuberculosis, so that appropriate intervention can be done.

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Table 1: Statistical evaluation of Total Finger Ridge Count (TFRC) and Absolute Finger Ridge Count (AFRC) in pulmonary tuberculosis cases and controls (Mean \pm S.D.)

Parameters	Cases	Controls
TFRC	141.44 \pm 42.55*	128.02 \pm 28.07
AFRC	189.30 \pm 74.90*	161.53 \pm 24.62

Table 2: Statistical evaluation 'atd' angle in pulmonary tuberculosis cases and controls (Mean \pm S.D.)

Group	R	L	R+L
Cases	41.07 \pm 5.90*	41.66 \pm 5.89*	41.36 \pm 4.88*
Controls	42.89 \pm 6.41	44.09 \pm 6.90	43.49 \pm 5.30

Table 3: Frequency percentage Distribution of Fingertip tip patterns in pulmonary tuberculosis cases and controls

Fingertip pattern	R		L		R+L	
	Cases	Controls	Cases	Controls	Cases	Controls
Whorl	45.8	49.2	50	48.8	47.9	49
UL	47.2	43.2	44.2	45.6	45.7	44.4
RL	2.2	3	0.8	2	1.5	2.5
Arch	4.8	4.6	5	3.6	4.9	4.1

Abbreviations: R- Right hand, L- Left hand, RL- Radial loop, UL- Ulnar loop, TFRC- Total finger ridge count, AFRC- Absolute finger ridge count, S.D.- Slandered deviation, * p- <0.05.



Fig 1: Photograph Showing Dermatoglyphic Pattern