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Original Research Article

Palmar Dermatoglyphics and Pulmonary Tuberculosis

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ABSTRACT

Dermatoglyphics is scientific study of epidermal ridges and their configuration on palmar and plantar region. Functional mutants of mannose binding protein are associated with pulmonary tuberculosis, which plays important role in inheritance. Epidermal ridge pattern is also determined by genetics. The study was done to find out various Dermatoglyphic features in patients of pulmonary tuberculosis, to compare Dermatoglyphic features in normal and patients of pulmonary tuberculosis and to study statistical significance of the difference found in patients and normal individuals. This anatomical study was undertaken with both arms from the age group between 20-45, one with 100 patients (72-males, 28-females) having pulmonary tuberculosis and the other with 100 healthy adult (72-males, 28-females).We found Decrease in 'atd' angle in both hands of male & female patients as compared to controls and there is decrease in number of male patients having '7' triradii in their left hands as compared to male controls. Dermatoglyphic analysis proven to have advantages as a diagnostic tool in certain diseases including pulmonary tuberculosis.It can use as screening tools for pulmonary tuberculosis.
Key words: Dermatoglyphics, tuberculosis, mannose binding protein, inheritance.

INTRODUCTION

Harold Cummins coined the term Dermatoglyphics in 1926. [1] Dermatoglyphics literally means skin carvings. Ridges are genetically determined & influenced by environmental, physical & topographical factors. Dermatoglyphics is a scientific method for anthropological, medico legal & genetic studies. The tuberculosis is partly genetic & partly environmental .So an attempt has been made, to study Dermatoglyphic patterns in tuberculosis, to compare them with normal individuals. The study of Dermatoglyphics was pioneered long back by Galton (1892).[2] Tuberculosis caused by mycobacterium tuberculosis and is wide public health problem. The Dermatoglyphic science is based upon two major facts that

the ridges are slightly different for fingers and no two persons, not even uniovular twins, show exactly similar finger print patterns. The ridges are permanent throughout life and survive superficial injury and also environmental changes after 21st week of intrauterine life. The dermal ridge differentiation takes place early in fetal development. The resulting ridge patterns are genetically determined and influenced by environmental factors. Patterns once established never change throughout life. [3] Functional mutants of mannose binding protein are associated with pulmonary tuberculosis, which plays important role in inheritance and epidermal ridge pattern is also determined by genetics. [4] Very little study has been conducted so far, as far as Dermatoglyphics in pulmonary tuberculosis is concerned. Considering all above facts, the present study is under taken to find out various Dermatoglyphic features in pulmonary tuberculosis patients and compare them with normal individuals and to see differences found are statistically significant or not.

Aims and objectives:

- To find out various Dermatoglyphic features in palms patients of pulmonary tuberculosis
- To study the statistical significance of the difference found in patients and normal individuals
- To compare the findings with those of the previous workers

MATERIAL AND METHODS

The present study has been carried out on 200 individuals: Negative controlled study with two arms from the age group between 20-45 yrs, one with 100 patients (72-males; 28-females) having pulmonary tuberculosis and other with 100 healthy adult (72-males; 28-females).As tuberculosis prevalence is more in males than females, more no. of male patient and control was selected than females. For all of whom written informed consent was obtained.

Materials used for fingerprint are as follows:

'Kores' duplicating ink, Porcelain tile, Wooden table of suitable height, Cotton gauge ball, Printing paper, Towel, Pressure pad , Spirit, Soap , Water. Disposable Mask

Instruments used for qualitative and quantitative analysis for the study are: Scale, Protractor, Pencil, Needle, Compound magnifying lens.

Collection of data:
The patients selected for the study are from West Maharashtra region. The patients selected were diagnosed clinically as having pulmonary tuberculosis and by doing investigations like sputum positive test. Controls are selected randomly without any respiratory problem or any symptoms related to pulmonary tuberculosis. Family history was taken to exclude other diseases.

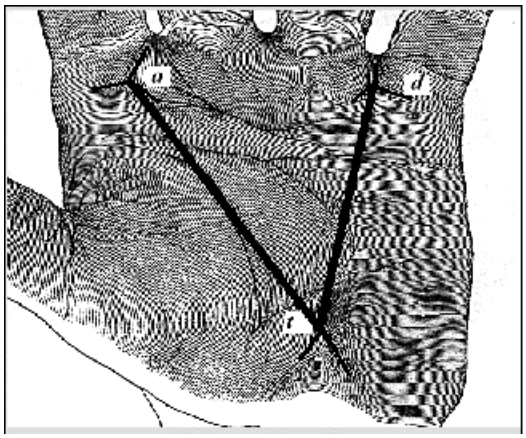
Method:
Standard ink method is used in present study. [5] The instruments cleaned before and after taking the prints. Palms were cleaned with soap and water to remove oily dirt, sweat and other dirt. Spirit was used to remove remaining oil and other dirt and keep the hand clean and dry. A dab of ink was applied on the porcelain tile and spread on slab evenly with the help of cotton gauge ball so that a thin layer of ink is formed on the tile surface. The hands were cleaned after taking the prints also.

Palm printing:
Palm prints of both hands were obtained after inking with the help of cotton gauge ball. A uniform film of ink was obtained on the tile with cotton gauge ball. Then with the help of same cotton gauge ball ink was spread uniformly on right hand. The hand was extended at wrist joint and touches the paper kept along with pressure pad beneath it on the table and then slowly whole of the hand was kept on the paper. Pressure was applied on the interphalangeal joints, head of metacarpals and dorsum of hand. With the help of fingers or blunt end of pencil little pressure was applied on the web-space between the fingers. Complete palm impression including the hollow of palm was obtained over the paper. The same procedure was followed for recording the palm prints of left hand. Thus palm prints of both hands were obtained and recorded.

Following palmar patterns were studied and analyzed in the present study:

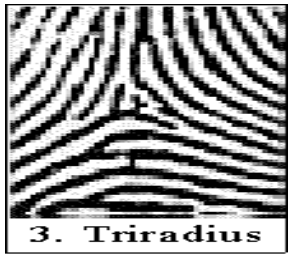
1. **atd angle:** Lines drawn from the digital triradius ‘a’ and ‘d’ to the axial triradius ‘t’ forms ‘atd’ angle. Triradius is the point of confluence from where, the ridges usually radiate in three different directions. They are termed as a, b, c, and d proceeding in radio-ulnar direction. (Photograph no.1)

Photograph No 1- Showing ‘atd’ angle (line diagram)



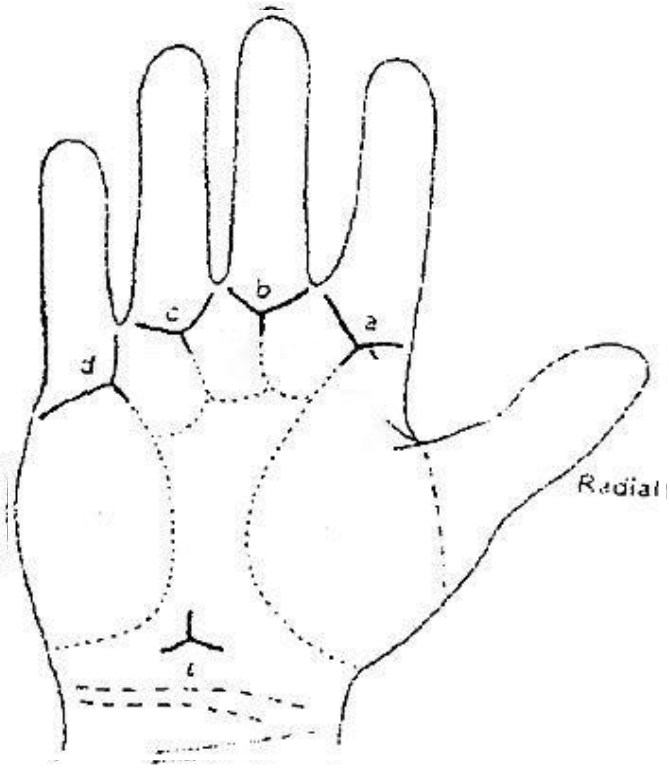
2. **‘a-b’ ridge count:** Ridges on palms are often counted between two interdigital triradii. The ridge count most frequently obtained is in between triradii ‘a’ and ‘b’, which is denoted as ‘a-b’ ridge count. The ‘b-c’ and ‘c-d’ ridge counts are rarely used in dermatoglyphic analysis for medical purpose.

3. **Triradius:** Triradius is the point of confluence from where, the ridges usually radiate in three different directions. On the palm generally there are four digital triradii in the distal portion. They are termed as a, b, c, and d proceeding in radio- ulnar direction. The axial triradius ‘t’ is found usually near the proximal palmar margin.(Photograph no.2).



Photograph No 2- Single triradius (line diagram)

Photograph No 3- Showing digital triradii a, b, c, d & t (line diagram)



Photograph no.4 Showing palmar patterns

STATISTICAL METHODS

Data was tabulated and analyzed. Comparison of each study variable in patients and controls was done by applying student t-test in case of quantitative data and qualitative data was analyzed by using Chi-square test. Student t-test was run on the data by Microsoft excel software. The difference is said to be significant if significance i.e. 'P' value is less than 0.05.

RESULTS AND DISCUSSION

Table no1. Showing comparison of atd angle between male Patients and Controls

Hand	Male Patients	Male Controls	't' Value	Statistical Significance
	Mean ± S.D.			
Right	35.75± 3.34	40.19± 4.23	6.99	**Very highly Significant**
Left	36.06± 4.29	39.83± 4.45	5.159	**Very highly Significant**

P (0.001) =3.37

Table no2.showing comparison of atd angle between female Patients and Controls

Hand	Female Patients	Female Controls	't' Value	Statistical Significance
	Mean ± S.D.			
Right	37.14 ±5.06	40.53± 6.35	2.21	**Significant**
Left	36.64±4.00	42.42± 5.87	4.3	**Very highly Significant**

P (0.05) =2.05 P (0.001) =3.69

Table no 3. Showing comparison of 'ab' ridge count between Male Patients and Controls

Hand	Male Patients	Male Controls	't' Value	Statistical Significance
	Mean ± S.D.			
Right	35.78±6.50	37.76±5.034	2.048	**Significant**
Left	38.25±5.63	37.76±4.194	0.587	Not Significant

P (0.05) =2.0 P (0.1) =1.67

Table no. 4. Showing comparison of 'ab' ridge count between Female Patients and Controls

Hand	Female Patients	Female Controls	't' Value	Statistical Significance
	Mean ± S.D.			
Right	37.21± 5.65	35.54± 3.75	1.309	Not Significant
Left	37.75± 4.84	36.5± 5.33	0.918	Not Significant

P (0.1) =1.70 P (0.1) =1.70

Table No.5.Showing comparison of total number of tri-radii in right hands of Male Patients and Controls

Total number Of Tri-radii	Total Value	MP %	Total Value	MC %	Chi-square value	Statistical Significance
5	62	86.12	61	84.73	0.0557	Not Significant
6	9	12.5	8	11.11	0.0667	Not Significant
7	1	1.38	3	4.16	1.029	Not Significant

X^2=0.0557, p(0.5) = 0.46
X^2=0.0667, p(0.5) = 0.46
X^2= 1.029, p(0.5) = 0.46

Table No.6.Showing comparison of total number of tri-radii in left hands of Male Patients and Controls

Total number of Tri-radii	Total Value	MP%	Total Value	MC%	Chi-square value	Statistical significance
5	60	83.34	53	73.62	2.014	Not Significant
6	12	16.66	13	18.05	0.0484	Not Significant
7	0	0	6	8.33	6.261	**Highly significant**

X^2=2.014, p(0.1) =2.71

X^2=0.0484, p(0.5)=0.46

X^2=6.261, p(0.01)=6.64

Palmar pattern:

Atd angle: The "atd" angle significantly narrowed in male & female patients as compared to controls **(Table no.1&2).**

Ab ridge count: There is slight decrease in mean value of 'ab' ridge count in right hands of male patients than male controls which is statistically significant **(Table no.3&4).**

Triradii: There is decrease in number of male patients having '7' triradii in their left hands as compared to male controls, which is statistically highly significant**(Table no.5&6).**

There is very little study done in Dermatoglyphics in diseases like pulmonary tuberculosis. Sidhu LS [6] in 1977 and Nechaeva OB et al [7] 1996 found statistical significant differences in distribution of various subtypes in index fingers of both hands and little finger of right hand. Sangita S Babu et al [8] 2005 studied the whorl pattern significantly predominant with decrease in loop pattern, Difference in mean TFRC and AFRC of controls and study group was found to be highly significant. In the present study many Dermatoglyphic parameters were studied and found to be statistically significant

CONCLUSION

Genetic contribution is one of the causes of pulmonary tuberculosis. Some studies indicate that inherited susceptibility is important risk factor. Many Dermatoglyphic patterns seen in pulmonary tuberculosis patients are found to be statistically significant in comparison with controls. The result of this study establishes the fact that there is a random relation between palmar pattern and incidence of pulmonary tuberculosis. Qualitative and quantitative analysis of Dermatoglyphic patterns/traits can be safely and effectively performed using simple resources.Further validation using larger data sets warranted prior to applying this in clinical use. We recommend further quantitative study to confirm the findings of present study.

REFERENCES

1. Cummins H, Midlow C. Palmar and plantar epidermal configuration in European Americans Am. J. Phy. Anthropology.1926; (9): 471.
2. Galton F. Fingerprints McMillan and Company, London; 1892: 197 Cited by Cummins and Midlow 1961
3. Penrose LS. Medical significance of Fingerprints and related Phenomenon Bri. Med. J.; 1968: (2): 321-325.
4. Selvaraj P, Narayanan PR, Reetha AM. Association of mannose binding protein gene with susceptibility to pulmonary tuberculosis Tuber Lung Dis; 1999: 79 (4): 221-7.
5. Blanka S, Alter M. Dermatoglyphics in Medical disorders Library of congress: Springer, Verlag New York: Heidelberg, Berlin; 1976.
6. Sidhu LS, Bhatnagar DP, Malhotra R, Sodhi HS. Association of finger ball Dermatoglyphics with pulmonary tuberculosis Anthropology Anz.; 1977 Aug; 36(1):36-42.
7. Nechaeva OB, Polzik EV, Iakusheva MIu, Kazantsev VS. The Dermatoglyphics of patients with different forms of tuberculosis of respiratory organs Tsitol Genet. 1996 Nov-Dec; 30(6):65-9.
8. Sangita S Babu, Powar BP, Khare ON. Palmar Dermatoglyphics in pulmonary tuberculosis J.Anat.Soc.India 54(2): 64-66; 2005.

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