

STUDY OF ATD ANGLE, FINGER RIDGE COUNT IN PULMONARY TUBERCULOSIS PATIENTS

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ABSTRACT

Objective: To determine whether the Dermatoglyphics parameters in Pulmonary tuberculosis patients (sputum smear positive cases) and normal healthy controls were differ or not.

Materials and Methods: In present study 100 cases (77 males and 23 females) of Pulmonary tuberculosis (sputum smear positive) in the age group of 18 to 70 were collected and studied for Dermatoglyphics parameters such as 'ATD' angle, total and absolute finger ridge counts. These parameters of cases were compared to those of 100 unrelated healthy subjects (controls) and analyzed for statistical significance.

Results and conclusion: In present study we observed decrease 'ATD' angle in both hands of male and female cases as compared to controls that difference was statistically highly significant. There were no statistically significant difference observed in total finger ridge count (TFRC) and absolute finger ridge count (AFRC) of cases compared to controls. Dermatoglyphics can be used for screening tool for Pulmonary tuberculosis contacts for genetic susceptibility to disease as a cost effective, noninvasive harmless technique.

KEY WORDS: Dermatoglyphics, Pulmonary tuberculosis, Genetics, 'ATD' angle.

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Access this Article online

Quick Response code



DOI: 10.16965/ijar.2015.288

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 27 Sep 2015

Accepted: 15 Oct 2015

Peer Review: 27 Sep 2015

Published (O): 31 Oct 2015

Revised: None

Published (P): 31 Dec 2015

INTRODUCTION

Dermatoglyphics, the ridged skin covering our palms and sole are not only found in human beings. All primates have ridged skin and it can also be found on the paws of certain mammals and on the tails of some monkey species.

The term 'Dermatoglyphics' is derived from the two Greek word (derma=skin, glyph= carve) and was coined by Harold Cummins and Midlo [1].

Palmar creases develop during the 2nd and 3rd month of intrauterine life and are not influenced by movement of hand in utero [2].

Epidermal ridges begin to appear in embryos at 10th week and are permanently established by 17th weeks. The types of pattern develop in palm and soles including the digits (fingers & toes) are genetically determined and any developmental anomalies in embryo affect the development of ridge pattern [3].

Abnormal Dermatoglyphics patterns have been observed in several non chromosomal genetic disorders and other diseases whose etiology may be influenced directly or indirectly, by genetic inheritance [4,5]. A significant link has been established by pioneer workers between

Dermatoglyphics and Leprosy [6, 7], Congenital heart diseases [8], and Lung Tuberculosis [9].

The genetic contribution is one of the causes of Pulmonary tuberculosis. Susceptibility to Pulmonary tuberculosis in India has been linked to Mannose Binding Protein Gene [10]. Significant association has been found between IL – 1 Gene clusters and host susceptibility to tuberculosis [11].

The study of Dermatoglyphics pattern in patients of Pulmonary tuberculosis has been done with aim to determine whether the Dermatoglyphics in patients of Pulmonary tuberculosis and of control differ or not and to determine whether the Dermatoglyphics in patients of Pulmonary tuberculosis male and female differ or not.

MATERIALS AND METHODS

The present study deals with finger and palmar patterns in an individual with Pulmonary tuberculosis.

The present study was carried out with prior permission of institutional review board (human ethics committee) of Govt. Medical College, Bhavnagar, Gujarat, India. Inform consent of all subjects was taken.

The sample consists of 100 cases of Pulmonary tuberculosis in the age group of 18 to 70 years. All cases are Indian belonging to Bhavnagar region, Gujarat.

In the present study 100 patients of Pulmonary tuberculosis (sputum smear positive) were collected from the department of TB & Chest diseases, Government Medical College, Bhavnagar (Gujarat) and from DOT (directly observed therapy) centres of Bhavnagar (Gujarat). Out of 100 cases, (77 males and 23 females) were of Pulmonary tuberculosis (sputum smear positive).

The cases were diagnosed by TB & Chest diseases physician, department of TB & Chest diseases, Sir. T. Hospital, Government Medical College, Bhavnagar (Gujarat).

Diagnosis of the patients were based on their detailed history, clinical examination, chest X-ray and confirmed by sputum test. They were matched with 100 healthy subjects (75 Male & 25 Female) of same age group, those who are residing in the same locality and having no family

history of tuberculosis or any other inheritable disease. Patients having sputum smear negative pulmonary tuberculosis or extra pulmonary tuberculosis were excluded. All the cases and control subjects having injuries, infections, deformities, burns over their palms and fingers were also excluded from this study. Finger prints and palm prints were taken with the help of thumb impression ink / printers ink on white drawing sheet by 'ink & pad' method described by HAROLD CUMMINS and MIDLO 1961 [12] with little modification.

Material used for study was thumb impression ink/printers ink, Zink plate, roller, white drawing sheet and magnifying hand lens (Fig. 1), disposable mask, pen, scale, protractor, needles, cotton gauge balls, spirit, soap, water, towel.

Fig. 1: Showing thumb impression ink/ printers ink, Zink plate, roller and magnifying hand glass.



The Zink plate and roller were cleaned with spirit swabs to make them free of any dust or oil. Patient's hands were washed with soap and water and dried thoroughly with clean towel for obtaining clear finger and palmer prints. Drawing sheet was kept on a hard and uniform surface. The thumb impression ink was then equally distributed on the Zink plate with the help of roller. Then palmer surface of the distal segment of each digit of both hands of the patients were placed with radial edge downward and rolled away from his or her body on Zink plate smeared with thumb impression ink except the thumb was placed with ulnar edge downward and rolled toward his or her body followed by smeared digits rolled over blank white drawing sheet (with applying gentle pressure) one by one in same manner for recording of finger prints. Digits were numbered

as I to V from thumb to little finger. For palmer print, roller smeared with thumb impression ink was rolled over palmer surface of the hand and then palm placed over blank white drawing sheet with gentle pressure applied over dorsum of the hand. Similar procedure was used for control group.

After taking these prints were immediately studied for total finger ridge count (TFRC), absolute finger ridge count (AFRC) and 'ATD' angle (Fig. 2,3) with the help of magnifying hand lens.

Fig. 2: Dermatoglyphics of control group showing 'ATD' angle is 45°.

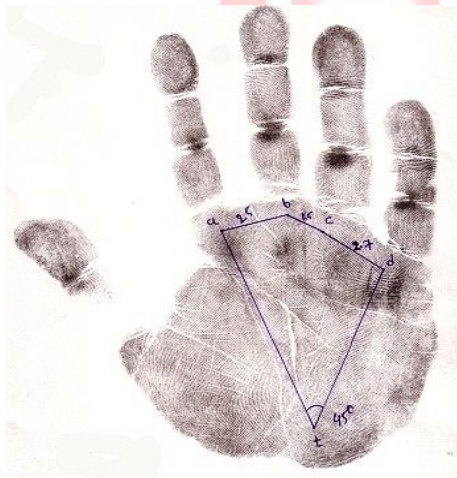


Fig. 3: Dermatoglyphics of Pulmonary Tuberculosis Patient showing 'ATD' angle is 30°



RESULT AND OBSERVATIONS

We have collected the data and evaluated for statistical significance by applying student t-test using Microsoft excel software. (If p value < 0.05 is statistically significant).

In present study, we observed the 'ATD' angle was decreased in right and left hand of

Pulmonary tuberculosis cases as compared to controls and the difference was statistically highly significant (p<0.001). There was no statistically significant difference observed in total finger ridge count (TFRC) and absolute finger ridge count (AFRC) of cases compared to controls (Table 1, 2 and 3).

Table 1: Comparison of 'ATD' angle, TFRC and AFRC of Total cases and Controls.

Parameters	Hand	Total Cases Mean +/- SD	Total Control Mean +/- SD	P value
ATD angle	Right	35.88+/-2.324	39.08+/-4.074	<0.001
	Left	35.96+/-2.817	39.31+/-4.366	<0.001
	Right + Left	71.84+/-4.620	78.39+/-8.094	<0.001
TFRC	Right	66.54+/-17.65	70.65+/-20.38	>0.05
	Left	68.52+/-20.30	69.7+/-20.46	>0.05
	Right + Left	135.06+/-36.25	140.35+/-39.68	>0.05
AFRC	Right	85.43+/-31.92	90.44+/-37.34	>0.05
	Left	85.33+/-31.79	87.48+/-32.97	>0.05
	Right + Left	170.76+/-61.74	177.92+/-67.96	>0.05

Table 2: Comparison of 'ATD' angle, TFRC and AFRC of male cases and Controls.

Parameters	Hand	Cases Male Mean +/- SD	Control Male Mean +/- SD	P value
ATD angle	Right	36.285+/-2.37	38.55+/-3.99	<0.001
	Left	36.18+/-2.97	38.94+/-4.20	<0.001
	Right + Left	72.46+/-4.79	77.57+/-7.82	<0.001
TFRC	Right	68.35+/-18.37	72.78+/-20.22	>0.05
	Left	70.96+/-21.25	72.04+/-20.64	>0.05
	Right + Left	139.31+/-37.83	144.83+/-39.68	>0.05
AFRC	Right	89.39+/-33.38	94.93+/-37.68	>0.05
	Left	88.87+/-32.52	91.81+/-33.08	>0.05
	Right + Left	178.26+/-64.18	186.75+/-68.31	>0.05

Table 3: Comparison of 'ATD' angle, TFRC and AFRC of female cases and Controls.

Parameters	Hand	Cases Female Mean +/- SD	Control Female Mean +/- SD	P value
ATD angle	Right	34.521+/-1.53	40.44+/-4.02	<0.001
	Left	35.217+/-2.08	40.4+/-4.74	<0.001
	Right + Left	69.73+/-3.278	80.84+/-8.547	<0.001
TFRC	Right	60.48+/-13.65	64.24+/-19.91	>0.05
	Left	60.35+/-14.28	62.68+/-18.57	>0.05
	Right + Left	120.83+/-26.31	126.92+/-37.28	>0.05
AFRC	Right	72.17+/-22.31	76.96+/-33.49	>0.05
	Left	73.48+/-24.74	74.48+/-29.58	>0.05
	Right + Left	145.65+/-45.46	151.44+/-60.71	>0.05

DISCUSSION

Palm and Fingerprint patterns of both hands of cases and controls were recorded.

Following parameters of Dermatoglyphics of cases were compared to those of controls and analyzed for statistical significance in the

present study.

- 'ATD' Angle.
- Total Finger Ridge Count (TFRC).
- Absolute Finger Ridge Count (AFRC).

The palmer Dermatoglyphics in Sputum positive Pulmonary tuberculosis patients were studied by few workers and their findings are similar to the observations of the present study in some aspect.

'ATD' angle: Sangita S Babu, B.P. Powar, O.N. Khare in 2005 [13], observed that the 'ATD' angle was narrowed in both hands of the study group when compared to controls and the difference was highly significant ($p < 0.02$).

Khairnar KB, Kate DP et al in 2012 [14], observed the 'ATD' angle was significantly narrowed in both hands of male and female patients as compared to controls.

Navgire Varsha R., Meshram Meena M. in 2014 [15], observed the 'ATD' angle was decreased significantly ($p < 0.05$) in both hands of pulmonary tuberculosis cases as compared to controls.

In present study we observed the 'ATD' angle was significantly decreased in both hands of male and female patients as compared to controls.

In present study our finding were similar to and supported by the finding of Sangita S Babu et al [13], Khairnar KB, Kate DP et al [14] and Navgire Varsha R. et al [15], as there was statistically highly significant ($p < 0.001$) difference in Sputum smear positive Pulmonary tuberculosis patients as compared to control group were observed. (Ref. table no.1, 2 and 3).

Total Finger Ridge Count (TFRC): Sangita S Babu, B.P. Powar, O.N. Khare in 2005 [13], observed that the difference in the mean total finger ridge count (TFRC) of the controls and study group was found to be highly significant ($P < 0.02$).

Navgire Varsha R., Meshram Meena M. in 2014 [15], observed significantly ($p < 0.05$) increase total finger ridge count (TFRC) in Pulmonary tuberculosis cases as compared to controls.

In present study our findings were contrary to the findings of Sangita S Babu et al [13] and Navgire Varsha R. et al [15], as there was no statistically significant difference in total finger

ridge count (TFRC) in both hands of Sputum positive Pulmonary tuberculosis patients with control group were observed (Table no.1, 2 and 3).

Absolute Finger Ridge Count (AFRC): Sangita S Babu, B.P. Powar, O.N. Khare in 2005 [13], observed that the difference in mean absolute finger ridge count of the controls and of the patients of pulmonary tuberculosis was found to be statistically significant ($P < 0.05$).

Navgire Varsha R., Meshram Meena M. in 2014 [15], observed significantly ($p < 0.05$) increase absolute finger ridge count (AFRC) in pulmonary tuberculosis cases as compared to controls.

In present study our findings were contrary to the findings of Sangita S Babu et al [13] and Navgire Varsha R. et al [15], as there was no statistically significant difference in absolute finger ridge count (AFRC) in both hands of Sputum positive pulmonary tuberculosis patients with control group were observed (Table no.1, 2 and 3).

CONCLUSION

Dermatoglyphics can be used for screening tool for Pulmonary tuberculosis contacts for genetic susceptibility to disease as a cost effective, noninvasive, harmless technique to provide early interventions to them, so we can control one of the major health problems in developing countries. But further evaluation of Dermatoglyphics in Pulmonary tuberculosis by data analysis using large number of cases and control groups to establish application of this data clinically because less studies done until now.

Conflicts of Interests: None

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How to cite this article:

Jagdish S. Chaudhari, Bharat J. Sarvaiya, S.M. Patel, S.V. Patel.
STUDY OF ATD ANGLE, FINGER RIDGE COUNT IN PULMONARY
TUBERCULOSIS PATIENTS. Int J Anat Res 2015;3(4):1520-1524.
DOI: 10.16965/ijar.2015.288