

A Quantitative Study of Palmar Dermatoglyphics in Congenital Heart Diseases

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Abstract

Introduction: Dermatoglyphics refers to the branch of science which studies the patterns of skin ridges present on fingers, toes and soles of human being. Since ancient times these ridge patterns and lines were used by palmists and future tellers for predicting the future. Recently the scope of dermatoglyphics has been amply recognized with expanding horizons of medical science in explaining certain diagnostic and aetiopathological riddle in various diseases, especially with heridofamilial background. The present study is undertaken to study the dermatoglyphic pattern in congenital heart diseases (CHD) and to compare it with previous studies. **Materials & Methods:** The cross sectional study with comparison group was designed. Hundred patients of congenital heart diseases (CHD) i.e. CHD group and hundred patients without CHD i.e. control group were examined during study period. Dermatoglyphic prints were obtained by using standard protocol method and finger tip patterns i.e. Arches, whorls, radial loops and ulnar loops were studied. The quantitative parameters like whorl loop index, triradial count, pattern intensity index and 'atd' angle were studied and analysed. **Results:** Among the quantitative parameters, whorl loop index, triradial count and pattern intensity index showed statistically insignificant difference in CHD group and control group. But 'atd' angle was increased significantly in CHD group as compared to control group. **Conclusion:** There was statistically significant increase in the values of 'atd' angle in CHD group as compared to control group.

Keywords: Dermatoglyphics; Whorl Loop Index; Triradial Count; Pattern Intensity Index; 'ATD' Angle.

Introduction

Dermatoglyphics refers to the branch of science which studies the patterns of skin ridges present on fingers, toes and soles of human being. Since ancient times these ridge patterns and lines were used by palmists and future tellers for predicting the future. In 17th century it was studied scientifically for the first time by anatomist Midlow. Thumb print is used till date by illiterates as a mark of signature. Recently the scope of dermatoglyphics has been amply recognized with expanding horizons of medical science in explaining certain diagnostic and aetiopathological riddle in various diseases, especially with heridofamilial background.

Certain definitive dermatoglyphic patterns were released when many workers observed that significant deviations were present on dermatoglyphic pattern in some conditions which are thought to be genetically influenced like Mongolism, Turner's syndrome, Mental retardation and Leukemia. The dermatoglyphic patterns were also studied in Cardiovascular disorders, Diabetes, Schizophrenia and ABO blood groups, which are thought to have genetic influence.

The present study is undertaken to study the dermatoglyphic pattern in congenital heart diseases (CHD) and to compare it with previous studies.

Aims & Objectives

- To study the quantitative parameters of palmar dermatoglyphics in normal and CHD patients
- To compare the quantitative parameters of palmar dermatoglyphics of CHD group with control group
- To compare and correlate the findings of present study with previous studies

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Materials & Methods

The present study was carried out in one hundred patients of CHD and one hundred control individuals. Out of one hundred patients of CHD, sixty two were males and thirty eight were females. The control cases were fifty six males and forty four females.

The palmar prints of patients with CHD and control group were collected. The age group of CHD patients was ranging from 6 – 24 years and that of control group was from 18 – 25 years.

The dermatoglyphic prints were taken using following method:

- Subjects were asked to wash their hands with soap and dry, to remove dust from palms
- Kores duplicating ink was applied on palms and palmar prints were taken on a white drawing paper
- For smearing the ink special ball was used, which was prepared from cotton gauze and linen
- Paper was kept on clean hard surface and the inked hand was placed on the paper
- At first, palmar aspect of patients wrist placed firmly on paper then all the fingers were firmly pressed on paper one by one
- Each finger tip was rolled for getting complete prints
- The prints were studied with the help of hand lens and following quantitative parameters were studied

1. *Whorl Loop Index*: This is a ratio of the number of whorls to the number of loops (Radial and Ulnar) in each palm

2. *Triradial Count*: This is a count of the total number of triradii in the palm print of an individual

3. *Pattern Intensity Index*: It gives an idea about the frequency of triradii per digit

$$\text{Pattern Intensity Index} = [(2 \times \text{Whorls}) + \text{Loops}] \div n$$

Where, n = Number of fingers

4. *'ATD' angle*: It is formed by lines drawn from digital triradius 'a' to the axial triradius 't' and from axial triradius 't' to digital triradius 'd' (Fig. 2)

In case of more than one axial triradius, the widest 'atd' angle, the angle emanating from the distal axial triradius is counted.

The more distal the position of 't', larger the 'atd' angle. It is most widely used method in interpreting the position of triradius 't'.

The prints were studied with help of above parameters.



Fig. 1. Materials used for taking dermatoglyphic

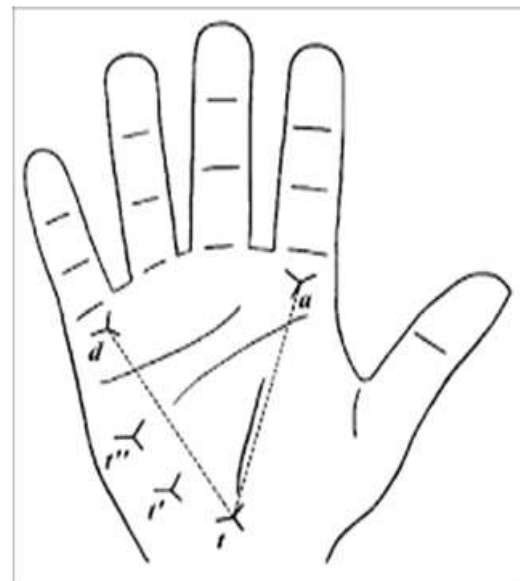


Fig. 2: Measurement of 'atd' angle prints



Fig. 3. Finger tip patterns

Statistical Analysis

- For statistical analysis mean, standard deviation (S.D.) and Z test were used
- For example: For parameter Y
Mean in cases is P1; Standard deviation is S.D.1; Number of cases studied are N1
Mean in controls is P2; Standard deviation is S.D.2; Number of controls studied are N2
- Standard error of difference between two means (SEM)
 $SEM = \text{Square root of } [(S.D.1 \times S.D.1 \div N1) + (S.D.2 \times S.D.2 \div N2)]$
 $Z = (P1 - P2) \div SEM$
- If $Z > 1.96$ i.e. $p < 0.05$ then it indicates statistically significant difference in the frequency of parameter Y in cases and control group
- Observations were tabulated and analysed

Results

Out of 100 patients with CHD, 62 were males and 38 were females. The incidence of CHD was more in males (62%) than in females (38%)

Table 1: Mean of Whorl Loop Index in right and left hands combined

Cases	CHD group Whorl Loop Index Mean \pm S. D.	Cases	Control group Whorl Loop Index Mean \pm S. D.	
200 Palms	0.27 \pm 0.12	200 Palms	0.36 \pm 0.19	Z = 0.8 P > 0.05 Insignificant

Table 2: Mean of Triradial Count in right and left hands combined

Cases	CHD group Total Triradial Count	Triradial Count Mean \pm S. D.	Cases	Control group Total Triradial Count	Triradial Count Mean \pm S. D.	
200 Palms	2286	11.43 \pm 1.04	200 Palms	2203	11.01 \pm 0.83	Z = 1.93 P > 0.05 Insignificant

Table 3: Mean of Pattern Intensity Index in right and left hands combined

Cases	CHD group Pattern Intensity Index Mean \pm S. D.	Cases	Control group Pattern Intensity Index Mean \pm S. D.	
200 Palms	1.18 \pm 0.17	200 Palms	1.18 \pm 0.21	Z = 0.76 P > 0.05 Insignificant

Table 4: Mean of 'atd' angle in right and left hands combined

Cases	CHD group 'atd' angle Mean \pm S. D.	Cases	Control group 'atd' angle Mean \pm S. D.	
200 Palms	49.29 \pm 3.31	200 Palms	44.21 \pm 3.11	Z = 6.83 P < 0.05 Significant

In the present study, following quantitative parameters were studied for statistical analysis

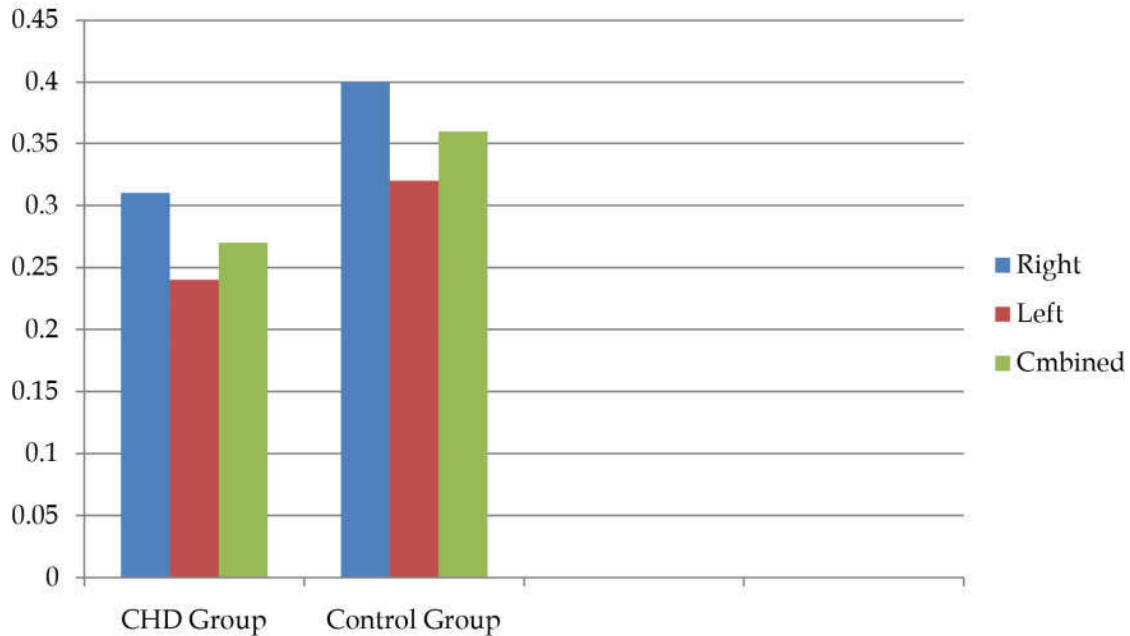
1. Whorl Loop index
2. Triradial Count
3. Pattern Intensity Index
4. 'atd' Angle

These parameters were observed in male and female respectively. The observations were tabulated and analysed taking the findings of male and female together.

Discussion**1. Whorl Loop Index**

This parameter was not studied by any worker before, we have studied this parameter to find any significant correlation of whorl loop index between CHD group and control group.

The present study shows that there was high whorl loop index in right hand than left hand in both CHD and control groups. This difference was not significant. The difference in the mean values of whorl loop index in CHD group and control group was found to be statistically insignificant.



Graph 1: Mean values of Whorl Loop Index in right and left hands

2. Triradial Count

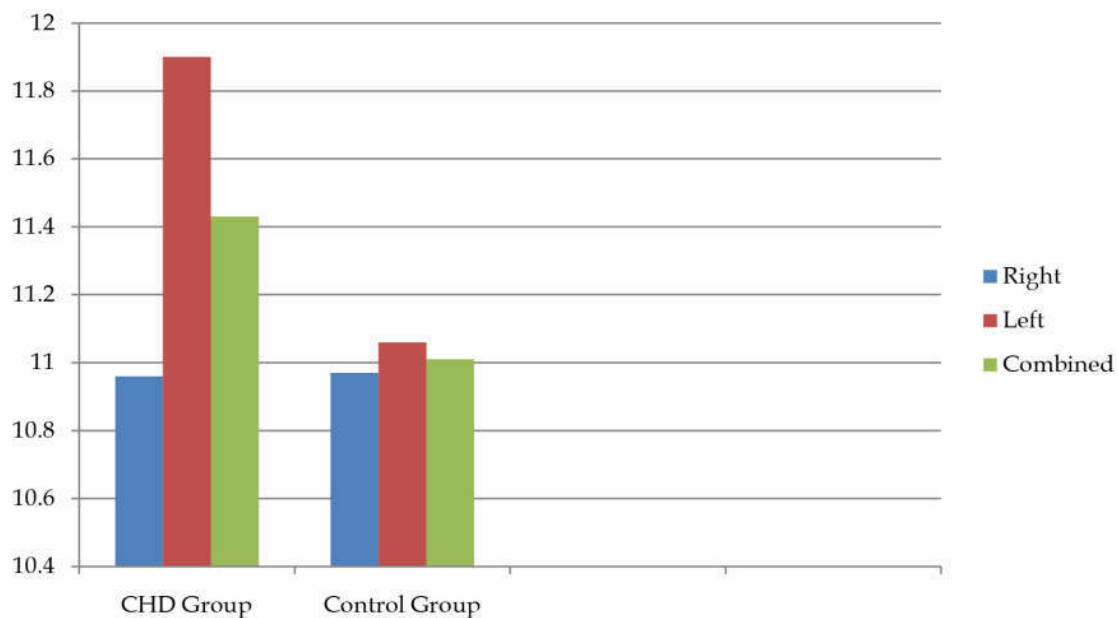
This parameter was not studied by any worker previously. It was studied here to find any significant difference in the triradial count in CHD group and control group.

This graph shows that there was lower triradial count in right hand than in left hand in both CHD and control groups. There was increase in the mean values of triradial count in CHD group in left hand

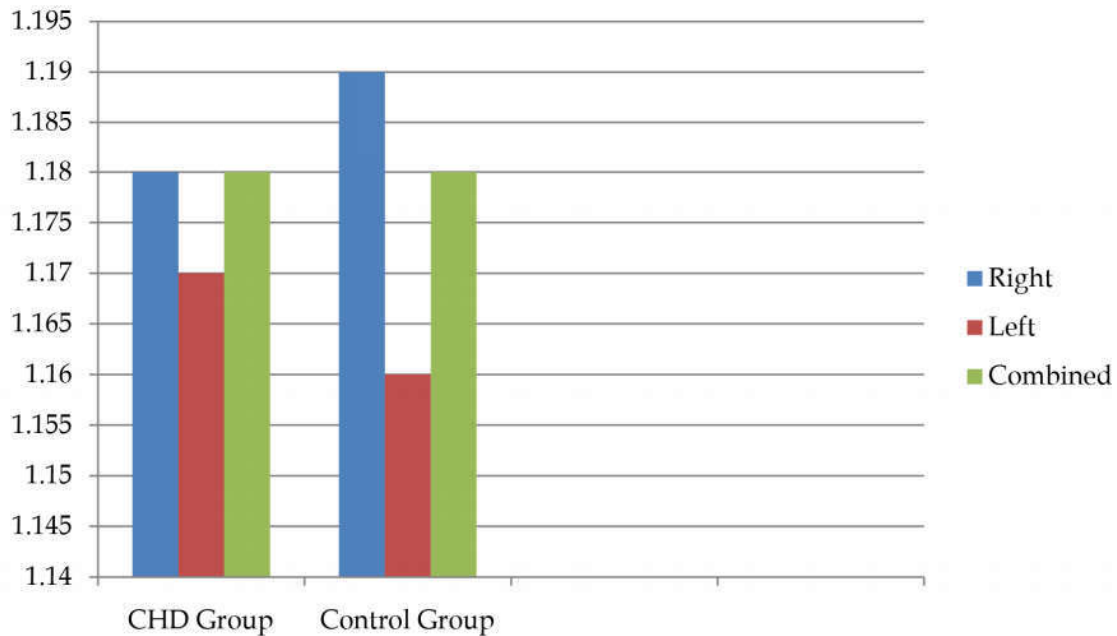
as compared to control group. This difference was found to be statistically insignificant.

3. Pattern Intensity Index

This parameter was also not studied by any of the previous workers. It was studied here to find any significant difference in pattern intensity index in CHD group and control group.



Graph 2: Mean values of Triradial Count in right and left hands



Graph 3: Mean values of Pattern Intensity Index right and left hands

This graph shows that there was increase in the pattern intensity index in right hand than that of left hand in both the groups. There was slight increase in the mean values of pattern intensity index in left hand in CHD group as compared to control group. All these differences were found to be statistically insignificant. The mean values of pattern intensity index in both the groups are almost same.

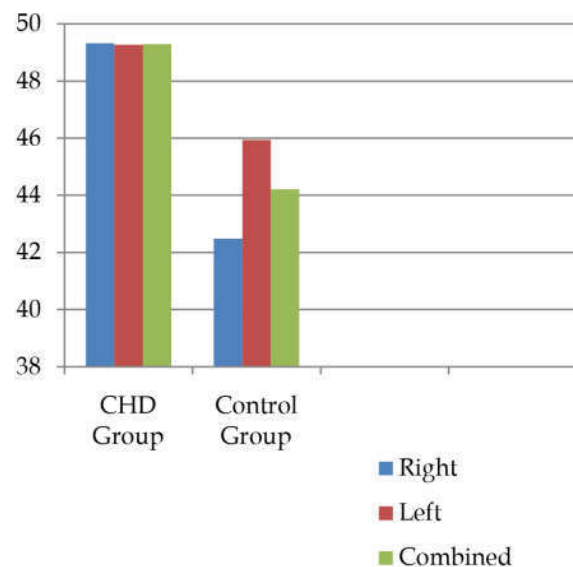
4. 'atd' Angle

In CHD group the mean values of 'atd' angle in right hand was 49.32 and in left hand it was 49.27. In control group mean values of 'atd' angle in right hand was 42.48 and in left hand it was 45.94.

The mean value of 'atd' angle in CHD group was significantly higher than that of control group and this difference was statistically significant.

This graph shows that there is significant increase in the values of 'atd' angle in both right and left hands in CHD group as compared to control group. Hence the mean value of 'atd' angle is also increased in CHD group as compared to control group.

The quantitative parameters like whorl loop index, triradial count and pattern intensity index were not studied by any of the previous workers, hence comparison was not possible.



Graph 4: Mean values of 'atd' Angle right and left hands

Table 5: Comparison of the mean values of 'atd' angle (Right and left hands combined)

Workers (Year of study)	CHD Group	Control Group
A Sanchez Cascos (1964)	55.23	47.23
Rathod (1993)	43.50	41.50
Present study	49.29	44.21

A Sanchez Cascos found significant increase in the values of 'atd' angle in CHD group as compared to control group. Hence present study correlates with the study done by A Sanchez Cascos.

According to Rathod the difference in the mean values of 'atd' angle in CHD group and control group was not statistically significant.

Conclusions

- The palmar axial triradius is shifted distally in CHD group as compared to control group
- There is significant increase in the mean values of 'atd' angle in CHD group as compared to control group
- No statistically significant difference is found in the values of whorl loop index, triradial count and pattern intensity index in CHD group and control group
- A large scale study should be undertaken to draw more useful and definitive conclusions regarding the value of dermatoglyphics in congenital heart diseases.

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