

**Original article:**

## **Dermatoglyphic patterns in congenital heart diseases**

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### **Abstract:**

**Introduction:** Dermatoglyphic patterns have been observed in various diseases associated with chromosomal abnormalities . Ulnar loops were more frequent in CHD. Radial loops also showed significant decrease in CHD. It seems that dermatoglyphic studies in CHD affected cases has not been done in India so far. This study was undertaken with a view to explore this virgin territory.

**Material and methods :** Present study was carried out in ninety three patients of congenital heart diseases (CHD) and ninety three normal individuals. Out of ninety three congenital heart diseases sixty nine were males and twenty four were female. The normal cases studied were thirty three female and sixty male.

**Observations:** Total ninety three patients of CHD were compared with ninety three normal individuals with the ages ranging from ten to thirty two years. Normal prints were obtained from schools, colleges and residential colonies.

**Conclusion:** Present study outlines strong correlation of dermatoglyphics pattern and heart diseases.

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### **Introduction**

The word “Dermatoglyphics” indicates the study of epidermal ridge configuration on palms, soles and finger tips. It has long been recognized as a scientific and valuable method for medico legal, anthropological and genetic studies. Since ancient times these ridge patterns and lines were used by palmists and future tellers for predicting the future.<sup>1</sup> Dermatoglyphic patterns have been observed in various diseases associated with chromosomal abnormalities . Ulnar loops were more frequent in CHD. Radial loops also showed significant decrease in CHD. It seems that dermatoglyphic studies in CHD affected cases has not been done in India so far. This study was undertaken with a view to explore this virgin territory.<sup>2</sup>

### **Material and methods**

Present study was carried out in ninety three patients of congenital heart diseases (CHD) and ninety three normal individuals. Out of ninety three congenital heart diseases sixty nine were males and twenty four were female. The normal cases studied were thirty three female and sixty male.

The prints of congenital heart diseases were collected from Bombay Hospital Cardiac Clinic, Bombay. The prints of the normal individuals were obtained from Jawahar Colony, Vasant Nagar, New Shantiniketan Colony, Aurangabad.

The age group of the CHD patient’s was ranging from twelve years to thirty years and of the normal, age group was from 10 to 40 years.

The dermatoglyphic prints were taken using following method:<sup>3</sup>

- 1) Subject were asked to wash their hands with soap and dried so as to remove the dust from the palms.
- 2) Prints were taken on white drawing paper. Kore's duplicating ink was used for taking the prints.
- 3) For smearing the ink special ball was used prepared from cotton, gauze and linen.
- 4) Paper was kept on clear hard surface
- 5) The inked hand was placed on paper.
- 6) At first the palmar aspect of wrist placed firmly on the paper then, all the fingers were firmly pressed on the paper one by one.
- 7) Each finger tip was rolled for getting complete prints. Due to non co-operation of patients interdigital prints and theanar and hypothenar prints were not obtained in all the cases.

The prints were studied with the help of hand lens and following parameters were studied:

- 1) Finger tip patterns:
  - a) Ulnar loops
  - b) Radial lops
  - c) Worls

- d) Arches
- 2) Triradial counts
- 3) 'atd' angle
- 4) Ab ridge count.

The prints were studied with the help of above parameters. Observation were then tabulated and analysed for statistical significance by applying 'chi' test.

**Observation**

Dermatoglyphic prints of ninety three cases of congenital heart diseases were taken. The patients were diagnosed as CHD at Bombay Hospital Cardiac Clinic by clinical and diagnostic tests (ECG, Echo, color dopler).

The age group of the patients of CHD was ranging from twelve to thirty years.

For the present study all these cases are grouped under the title 'CHD'

Total ninety three patients of CHD were compared with ninety three normal individuals with the ages ranging from ten to thirty two years. Normal prints were obtained from schools, colleges and residential colonies.

TABLE NO. 1 : Showing the prevalance of CHD

No. OF PATIENTS	CHD	Others	Total
5000	93	4904	5000

From the above table it is evident that the incidence of CHD is 2% of the total number of patients with cardiac complaints attending the cardiac clinic.

TABLE NO. 2 : Showing incidence of CHD in male and female

No. of patients of CHD	MALE No (%)	FEMALE No (%)
93	69 (74%)	24 (26%)

From the above table it is clear that the incidence of CHD is more in the males (74%) than females (26%). In the present study, following qualitative and quantitative parameters were studied for statistical analysis.

- 1) Qualitative patterns:
  - A) Ulnar loop
  - B) Radial loop
  - C) Whorl
  - D) Arche
- 2) Quantitative analysis:
  - A) atd angle
  - B) a-b ridge count

The dermatoglyphic patterns mentioned above were observed in males and females respectively. These observations were tabulated and analyzed taking the findings of males and females together. Same pattern was followed for control also.

TABLE NO. 3 SHOWING % Frequency of prevalence of arches (RT HAND)

Cases	CHD		cases	Control	
	Arche	%		Archs	%
93	27	5.8	93	23	4.9
465 digits)					

Above table shows that incidence of arches in right hand of CHD is 5.8% and in control it is 4.9%.

Table No. 4 : Showing number of cases with range of Arches in Right Hand

Range of Arches	CHD	Control
0-1	88	92
1-2	05	01
2+	--	--

Chi sq. = 2.74. D.F. =2 and (p=0.3) p> 0.50 not significant.

Table no. 4 shows that the number of arches with range 0-2 is more frequent in both the central and CHD groups of the 93 cases studied.

Table No. 5 : Showing percentage frequency of Arches in left Hand

No. of cases	CHD (%)	Control (%)
93	39 (08.38)	35 (07.52)
465 digital		

Table No. 6 Showing number of cases with range of Arches in left Hand

Range of Arches	CHD	Control
0-1	83	86
1-2	10	07
2+	--	--

Chi sq. = 0.58. D.F. =2 and (p=0.50) (p> 0.05) not significant.

It is evident from the table no. 6 that the frequency of arches in left hand does not show any significant difference in control and CHD.

Table No. 7 : Showing percentage frequency of Arches in Right and Left Hand

No. of cases	CHD (%)	Control (%)
93	66 (07.09)	58 (06.23)
465 digital		

It is clear from the above table that there is no significant increase of arches in CHD than the controls.

Table No. 8 : Showing percentage frequency of Arches radial loops in Right Hand

No. of cases	CHD (%)	Control (%)
93	18 (03.87)	39 (08.38)

Table No. 9 : Showing number of cases with range of Radial loops in Right Hand

Range of Arches	CHD	Control
0-1	86	89
1-2	07	04
2+	--	--

Chi sq. = 6.08. D.F. =2 and (p=0.04) (p< 0.05) significant.

From the above it is obvious that radial loops of the right hand show statistically significant difference in both the groups in right hand i.e. decrease in number of radial loops in CHD (3.87%) and 8.38% in control which is.

Table No. 10 : Showing percentage frequency of Arches radial loops in Left Hand

No. of cases	CHD (%)	Control (%)
93	22 (04.7)	37 (07.9)
465 digits		

Table No. 11 : Showing number of cases with range of Radial loops in Left Hand

Range of Arches	CHD	Control
0-1	87	90
1-2	16	03
2+	--	--

Chi sq. = 8.82. D.F. =2 and (p=0.02) (p< 0.05) significant.

Above tables show lower percentage of radial loops in CHD which is statistically significant.

Table No. 12 : Showing percentage frequency of Arches radial loops in Left Hand

No. of cases	CHD (%)	Control (%)
93	40 (04.30)	76 (07.87)
930 digits		

The table no. 12 shows lower percentage of radial loops in both hands in CHD as compared to control. It is statistically significant.

Table No. 13 : Showing percentage frequency of ulnar loops in Right hand

No. of cases	CHD (%)	Control (%)
93	178 (38.27)	146 (31.39)
465 digits		

Table No. 13 shows, higher percentage of ulnar loops in right hand of CHD (38.27%) than the control (11.39%) group.

Table No. 14 Showing number of cases with range of Ulnar loops in Right Hand

Range of Arches	CHD	Control
0-1	69	87
2-4	21	04
4+	03	--

Chi sq. = 8.32. D.F. =2 and (p=0.02) (p< 0.05) significant.

Ulnar loop pattern is the most frequent pattern in any dermatoglyphic studies. This is also true in the present study. Right hand shows (38%) of ulnar loops in CHD as compared to (31%) in control. It is statistically significant as P< 0.05.

Table No. 15 : Showing percentage frequency of ulnar loops in Leftt hand

No. of cases	CHD (%)	Control (%)
93	152 (32.68)	139 (29.89)
465 digits		

Table No. 16 : Showing number of cases with range of Ulnar loops in Left Hand

Range of Arches	CHD	Control
0-1	79	93
2-4	14	--
4+	--	--

Chi sq. = 15.13. D.F. =2 and (P=0.001) (P < 0.05) Highly significant.

From Table No. 16 it is clear that the incidence of ulnar loops in CHDS is increased, especially the number of cases in 2-4 range has increased in CHD than control which is statistically significant ( $P=0.001$ ).

Table No. 17 : Showing percentage frequency of Ulnar loops in Right & Left hand

No. of cases	CHD (%)	Control (%)
93	330 (35.48)	185 (19.89)
465 digits		

The combined study of both hands shows significant increase in ulnar loops in CHD 35.48% than the control group 19.78%.

Table No. 18 : Percentage frequency of whorls in right hand

No. of cases	CHD (%)	Control (%)
93	242 (52.04)	257 (55.26)

Table No. 19 : Showing number of cases with range of whorls in right hand

Range of Arches	CHD	Control
0-1	44	43
2-4	46	49
4+	--	--

Chi sq. = 0.54. D.F. =2 and ( $P=0.50$ ) ( $P > 0.05$ ) Not significant.

The above table shows that the frequency of whorls in right hand in CHD and control is nearly the same, which is statistically not significant.

Table No. 20 : Showing percentage frequency of whorls in Left hand

No. of cases	CHD (%)	Control (%)
93	252 (54.19)	254 (54.62)

Table No. 21 : Showing number of cases with range of whorls in left hand

Range of Arches	CHD	Control
0-1	42	36
2-4	51	57
4+	--	--

Chi sq. = 0.78. D.F. =2 and ( $P=0.50$ ) ( $P > 0.05$ ) Not significant.

Table No. 20 and 21 show the same results as that of right hand. It is statistically not significant.

Table No. 22 : Showing percentage frequency of whorls in right & Left hand

No. of cases	CHD (%)	Control (%)
93 930 digits	494 (53.11)	511 (54.94)

Combined study also shows that the number of whorls in CHD and control do not show any significant variation.

Table No. 23 : Mean value of atd angles in right hand

Cases studied	CHD Mean S.D.	Control Mean S.D.
93 (93 palms)	54 ± 2.91	42 ± 2.99

RD : 0.17, SEM = 0.42 (p=0.4) P>0.05 not significant

The average measurement of atd angle in right hand of CHD is 44° as compared to 42° of control group. The slight increase of atd angle maybe due to shift of axial triradius but it is not significant by statistical analysis,

Table No. 24 : Mean value of atd angles in Left hand

Cases studied	CHD Mean S.D.	Control Mean S.D.
93	53 ± 3.91	41 ± 3.02

RD : 0.39, SEM = 0.43 (p=0.4) P>0.05 not significant

Left hand atd angle showed increase angle in CHD than control. The slight variation in the angle of two groups did not revealed any significance.

Table No. 25 : Showing Mean value of atd angles in right & left hand

Cases studied	CHD Mean ±S.D.	Control Mean ±S.D.
93 (166 palms)	43.5 ± 2.34	41.5 ± 2.91

RD : 1.50, SEM = 0.37 (p=0.41) P<0.05

The mean value of atd angle in two hand when studied statistically does not show any difference in CHD and control groups.

Table No. 26: ab Mean ridge count in right hand

Cases studied	CHD Nos. Mean ±S.D.	Control Nos. Mean ±S.D.
93	3583 38.12± 1.09	2936 31.23 ± 1.41

RD : 1.29, SEM = 0.31 (p=0.29) P>0.05

The mean ab ridge count in right hand is 38.12 CHD and 31.23 in control. The increase of the ab ridge count in CHD group can not be explained by statistical test as  $P < 0.05$ .

Table No. 27 : Showing Mean value of ab ridge count in left hand

Cases studied	CHD		Control	
	Nos.	Mean $\pm$ S.D.	Nos.	Mean $\pm$ S.D.
93	3209	35.12 $\pm$ 1.02	3301	39.45 $\pm$ 2.41

RD : 1.39, SEM = 0.24 ( $p = 0.24$ )  $P > 0.05$

Above table show slight decrease in ab ridge count of CHD in left hand than the control which is not statistically significant as  $P > 0.05$

Table No. 28 : ab Mean ridge count in right hand

Cases studied	CHD		Control	
	Nos.	Mean $\pm$ S.D.	Nos.	Mean $\pm$ S.D.
93	6893	36.67 $\pm$ 2.91	6643	35.35 $\pm$ 1.98

RD : 0.93, SEM = 0.14 ( $p = 0.43$ )  $P < 0.05$

The mean value of ab ridge count in CHD 36.67 and control 35.34 does not show any significant difference. It is also not significant statistically.

### Discussion

Total ninetythree patients of CHD were studied and compared with ninetythree controls. The print of patients with CHD were obtained from the Cardiac Clinic of Bombay Hospital, Bombay. Various type of CHD such as CA, AS, ASD, VSD, PS, Fallot's tetralogy was noted. But the prints have been studied as total CHD cases irrespective of types, as these are governed by genetic and chromosomal factors. The ninetythree control patterns were obtained from people of residential colonies, officers of medical college and post graduate students, ages ranging from 25 to 49 years. Prints have been studied in right, left hands separately.

#### 1) QUALITATIVE ANALYSIS:

##### A) FINGER TIP PATTERNS:

Arches:

In the present study incidence of arches in right hand in CHD is found to be 5.8% as compared to the left hand 8.38%

The more incidence of arches in left hand does not carry any significance. When right and left hands were taken together the percentage frequency of arches was found to be 7.09% in CHD group and 6.23% in the control group. This slight increase in frequency of arches in CHD can not be proved to be significant by statistical test. Sanchez and Cascos (1964) in their studies found that the percentage frequency of arches was 5.3% as compared with 1.51% of control group, this is highly significant Sanchez and Cascos (1964) did not study right and left hands separately.<sup>5</sup>



Table No. 29 : Frequency of arches in right & left hand

Cases studied	Incidence of arches	
	Right	left
CHD (N=93)	5.80%	8.30%
Control (N=93)	4.90%	7.52%

The above table show slightly higher frequency of arches in left hand in both the study groups. It is statistically not significant.

Table No. 30 : Percent frequency of arches (right and left hand)

Workers (years)	CHD	Control
Sanchez and Cascos (1964)	5.30%	1.51%
Present study (1993)	7.09%	6.23%

Above table shows comparison of frequency of arches. Incidence of arches in CHD as compared to control is not significant statistically in present study. The findings of Sanchez and Cascos (1964) do not co relate with this finding.

**Conclusion:** Present study outlines strong correlation of dermatoglyphics pattern and heart diseases.

**References:**

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