

# Study of Palmar Dermatoglyphics in Hypertension

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**Abstract:** *The present study was conducted in the department of Anatomy Government Medical College and hospital Nagpur on hypertensive patients to determine the predominant dermatoglyphic marker for hypertension. One hundred patients and one hundred normal individuals were included in this study and rolled prints were taken from all the digits and palm prints were taken and stored on a proforma. In the present study the cases of hypertension show increased percentage of whorl pattern on first digit, second, third and fourth digits in both sexes. In case of fifth finger the whorl patterns are same in percentage in both sexes of hypertensive patient and control group. The decrease in the percentage of loops there is an increased percentage of arches there are significant differences in the mean values of AFRC and TFRC in hypertensive patient as compared to controls groups. There is an increase in the mean value of Main Line Index. Overall 'atd' angle shows decrease in mean value in hypertensive patient than control but statistically these are not significant.*

**Keywords:** Dermatoglyphics, hypertension

## 1. Introduction

Dermatoglyphics is a scientific study of epidermal ridges and their configuration on volar aspects of hands, fingers, feet and toes. The epidermal ridges are differentiated in their definitive form during 3<sup>rd</sup> and 4<sup>th</sup> month of intrauterine life. Hence they are significant indicators of conditions existing several months prior to the birth of an individual. During 5<sup>th</sup> to 6<sup>th</sup> month of intrauterine life primordium of sweat glands appears, proliferate and reach the surface of epidermis. The dermal ridge configurations and their component ridges enlarge with growth but their essential characteristics remain the same throughout the life. (Penrose, 1969)

It is reported that one of the etiology of hypertension is heredity. But surprisingly very few works has been carried out on dermatoglyphic pattern in hypertension. So the sincere and humble attempt has been made to study the palmar dermatoglyphics pattern in hypertension to see any specific relation between them.

## 2. Aims and Objectives

- 1) To study the finger and palmar dermatoglyphics pattern in hypertension
- 2) To compare dermatoglyphic configurations of hypertension with control
- 3) To compare our findings with other workers.
- 4) To find out whether a specific dermatoglyphic trait exists in hypertensive patients and whether it is significant

## 3. Method of Dermatoglyphic Printing

Dermatoglyphic prints were taken by the 'INK METHOD' as described by CUMMINS (1936) and CUMMINS & MIDLO

## 4. Material Required

- 1) Camel quick drying duplicating ink.
- 2) Rubber roller.
- 3) Inking Slab - Thick glass sheet fixed over wooden support.
- 4) Century board.
- 5) White 'Map Litho' paper with a glazed surface on one side.
- 6) Pressure pad made up of rubber foam.
- 7) Cotton puffs.
- 8) Scale.
- 9) Pencil pen.
- 10) Protractor - To measure 'atd' angle.
- 11) Needle with a sharp point, for ridge counting.

### Dermatoglyphic Data

Qualitative analysis of finger prints.

- a) Whorls
- b) Loops
- c) Arches

Quantitative analysis of finger prints.

- a) Total finger ridge count
- b) Absolute finger ridge count

Main line Index (A+D).

Axial triradii ( $t_0$ ,  $t_1$ ,  $t_2$ ).

atd angle.

### Pattern Configurations

#### I) Fingers:-

1. Fingertip Pattern configurations.
2. Dermatoglyphic landmarks.

#### II) Palms: Palmar pattern configuration

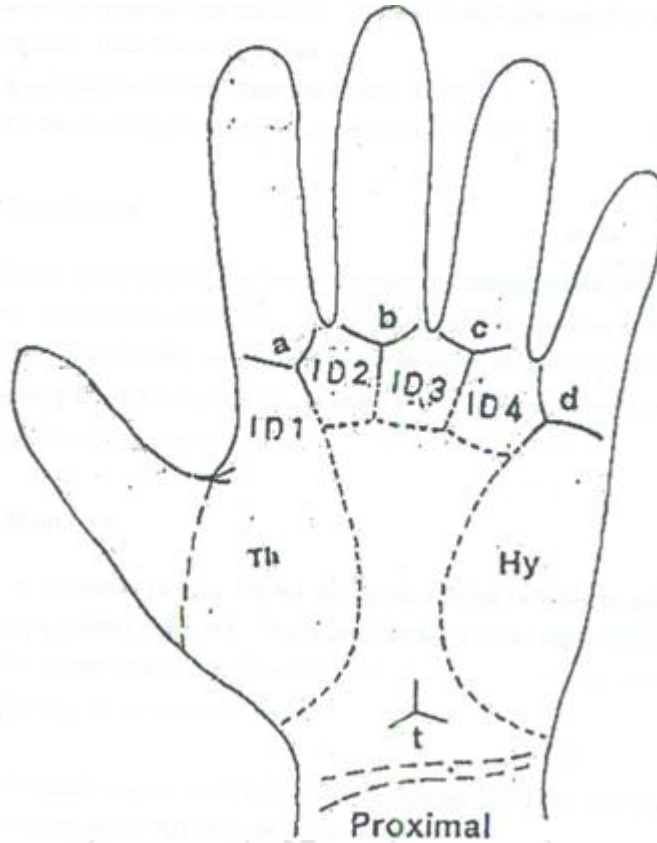


Figure showing palmar pattern configuration

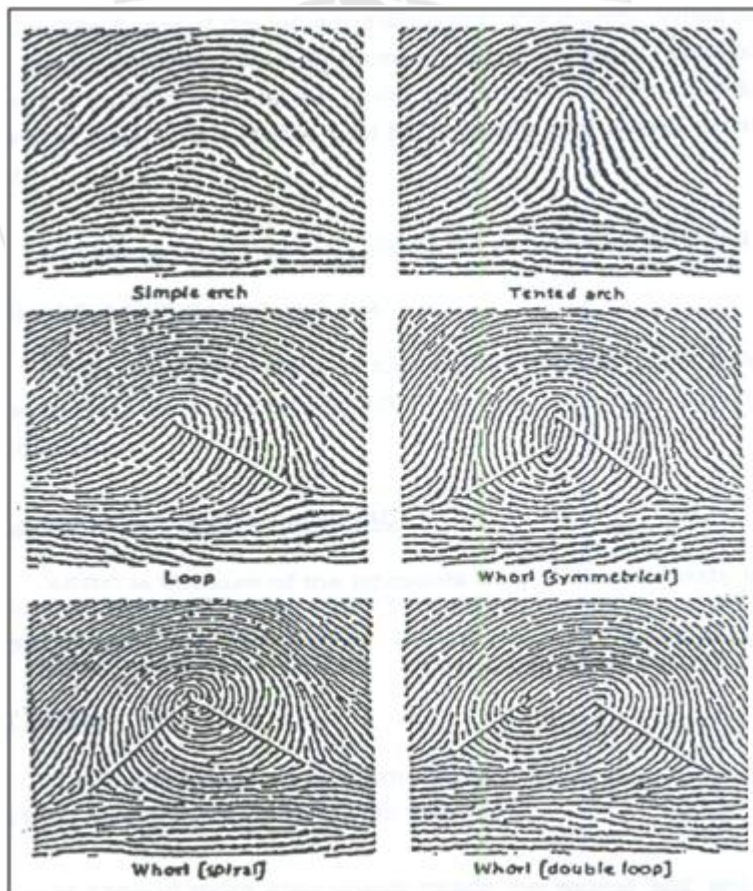


Figure showing ridge counting in various finger tip pattern types

### 5. Statistical Analysis

**Furuhata's Index:** It is defined as the ratio of the whorls to the loops multiplied by hundred.

$$\text{Furuhata's Index} = \frac{\text{Whorls}}{\text{Loops}} \times 100$$

**Dankmeijer's Index:** It is defined as the ratio of the arches to the whorls multiplied by hundred.

$$\text{Dankmeijer's Index} = \frac{\text{Arches}}{\text{Whorls}} \times 100$$

### Observations and Results

In our study out of 100 cases studied, numbers of males were 62 and females were 38.

#### Fingertip Patterns

##### Whorls:

In the present study the cases of hypertension show increased percentage of whorl pattern on first digit in both sexes.

On the second fingertip, whorl patterns are increased in cases of female hypertensive patient.

There is an increase in the percentage of whorl patterns on third digit in both sexes of hypertensive patients,

There is more frequency of whorls in right and left hand of male hypertensive patients as compared to right and left hand of female hypertensive

##### Loops

The table shows decrease in the percentage of loops in male patients

##### Arches

There is an increased percentage of arches

#### Quantitative characteristics of Finger Dermatographics

It is observed that there are significant differences in the mean values of AFRC and TFRC in hypertensive patient as compared to controls groups.

#### Main Line Index

There is an increase in the mean value of Main Line Index in hypertensive patient on the right hand. It is observed that there is significant difference between hypertensive patients and control group on right hand which is statistically significant (t value = 2.444 and p value = 0.015)

#### "atd" Angle

Overall „atd“ angle shows decrease in mean value in hypertensive patient than control but statistically these are not significant.

**Table 1:** Frequency Distribution of Finger Tip Patterns among Patients and Controls (Henry's classification)

Subject	Sex	Side	Total Whorls	Total Loops	Total Arches	Furuhata's Index	Dankmeijer's Index
Patients	M	R	126	161	23	78.261	18.254
		L	116	176	18	65.909	15.517
		R + L	242	337	41	71.810	16.942
	F	R	60	114	16	52.632	26.667
		L	60	107	23	56.075	38.333
		R + L	120	221	39	54.299	32.500
	M + F	R	186	275	39	67.636	20.968
		L	176	283	41	62.191	23.295
		R + L	362	558	80	64.875	22.099
Control	M	R	106	148	16	71.622	15.094
		L	85	170	15	50.000	17.647
		R + L	191	318	31	60.063	16.230
	F	R	54	153	22	35.294	40.741
		L	58	148	24	39.189	41.379
		R + L	112	301	46	37.209	41.071
	M + F	R	160	301	38	53.156	23.750
		L	143	318	39	44.969	27.273
		R + L	303	619	77	48.950	25.413

**Table 2:** Percentage wise Distribution of Finger Tip Patterns among Patients and Controls (Henry's classification)

Subject	Sex	Side	% of Whorls	% of Loops	% of Arches
Patients	M	R	63	80.5	11.5
		L	58	88	9
		R + L	121	168.5	20.5
	F	R	30	57	8
		L	30	53.5	11.5
		R + L	60	110.5	19.5
	M + F	R	93	137.5	19.5
		L	88	141.5	20.5
		R + L	181	279	40
Control	M	R	53	74	8
		L	42.5	85	7.5
		R + L	95.5	159	15.5
	F	R	27	76.5	11
		L	29	74	12
		R + L	56	150.5	23
	M + F	R	80	150.5	19
		L	71.5	159	19.5
		R + L	151.5	309.5	38.5

**Table 3**

Factor	Group	N	Mean	Std. Deviation	Std. Error Mean	T Value	P Value	Result
MLI (Left)	Patients	100	8.4800	1.3594	.1359	1.431	0.154	NS
	Control	100	8.2000	1.4071	.1407			

**Table 4**

Factor	Group	N	Mean	Std. Deviation	Std. Error Mean	T Value	P Value	Result
MLI (Right)	Patients	100	9.2300	1.3622	.1362	2.444	0.015	S
	Control	100	8.7100	1.6348	.1635			

**Table 5**

Factor	Group	N	Mean	Std. Deviation	Std. Error Mean	T Value	P Value	Result
ATD (Left)	Patients	100	41.1500	5.9380	.5938	-1.727	0.086	NS
	Control	100	42.4700	4.8126	.4813			

**Table 6**

Factor	Group	N	Mean	Std. Deviation	Std. Error Mean	T Value	P Value	Result
ATD (Right)	Patients	100	41.46	6.1864	0.6186	-0.934	0.351	NS
	Control	100	42.18	4.5999	0.46			

## 6. Discussion

### 1) Qualitative analysis of finger tip patterns

**Whorls:** In the present study hypertensive patients show increased percentage of whorl pattern on first digit in both sexes.

**Polyzova D, Kuklik M, Berankova M, Shauwmannin 1991** carried out their study on hypertensive patient and they have also observed that in hypertensive patient there was increased frequency of whorls.

**Godfrey KM, Barker DJ, Peace J, Cloke J, Osmond C in 1993** observed increased frequency of whorls in patients with hypertension.

**VarshaMokashi, S. Kantha in 2002** observed highest frequency of whorls in hypertensive patients. Thus, the findings of present study are correlated with findings of above workers.

**Loops:** In the present study decreased percentage of loops was observed in hypertensive patient in first digit.

**Polyzova D, Kuklik M, Berankova M, Shaumann B in 1991** observed lower frequency of fingertip ulnar loops in hypertensive patients.

**VarshaMokashi, S. Kantha in 2002** observed decreased frequency of radial loops

**Arches:** In the present study the increased percentage of the arches observed in female hypertensive patients only as compared to the control group

On the contrary in case of male hypertensive patient there is marginal decrease in the percentage of arches observed. **VarshaMokashi, S.Kantha in 2002** only mentioned decreased percentage of arches in hypertensive patients but they have not specifically mentioned the gender in which the decreased percentage of arches occurred.

In our study only there is partial decrease in percentage of arches observed in male but there is an increased percentage of arches observed in female only. Hence our findings could not match with the findings of **VarshaMokashi and S. Kantha.**

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There is decrease frequency of loops observed as a whole, which can be partially correlated with the above workers.

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### 3) Quantitative analysis of finger prints.

a) **Total finger ridge count: (TFRC)** :In the present study there is significant increase in the mean values of TFRC in hypertensive patients as compared to controls

**Pursnani ML, Elhence GP, Tibrewala L in 1989** observed increased TFRC in hypertensive patients as compared to controls.

**Polyzova D, Kuklik M, Berankova M, Shaumann B in 1991** observed increased total finger ridge count (TFRC) in hypertensive patients.

**Reed T in 1995** observed decrease in total finger ridge count (TFRC) in hypertensive patients as compared to controls.

**VarshaMokashi, S Kantha in 2002** observed increased TFRC in hypertensive patients as compared to controls.

**PriyaRanganath, RoopaRavindranathShubha R in 2003** observed increased ridge count in hypertensive patients than in controls.

**Kulkarni DV, Herekar NG in 2005** observed increased total finger ridge count (TFRC) in hypertensive patients as compared to controls.

Our findings of increased total finger ridge count (TFRC) in hypertensive patients is similar to almost all of the above workers except **Reed T**, who has observed decreased percentage of TFRC in hypertensive patients as compared to controls.

#### **Absolute finger ridge count: (AFRC)**

In the present study mean of absolute finger ridge count was highest in hypertensive patients as compared to controls.

**VarshaMokashi, S Kantha in 2002** observed increased AFRC in hypertensive patients as compared to controls. So our finding of having increase mean value of AFRC in hypertensive patients coincides with the above workers.

#### **Main Line Index (MLI)**

In the present study the mean value of main line index (MLI), in the right hand of hypertensive patients was found to be 9.2300 as compared to controls it was 8.7100.

The previous workers has not done this study hence our findings could not be compared.

#### **“atd” Angle**

In the present study the mean value for “atd” angle is decreased in hypertensive patients as compared to controls.

The following workers notice the decrease in “atd” angle in their extensive work of dermatoglyphics in hypertensive patients. E.g. **Pursnani ML, Elhence GP, Tibrewala L in 1989, Godfry KM, Barker DJ, Peace J, Cloke J, Osmond C, in 1993, Reed T, in 1995, VarshaMokashi, S Kantha in 2002, PriyaRanganath, RoopaRavindranath, Shubha R, in 2003, Kulkarni DU, Herekar NG in 2005,**

Whereas only **Polyzova D, Kuklik M, Berankova M, Shaumann B in 1991** has shown increase in “atd” angle.

Hence, our finding of decrease in “atd” angle in hypertensive patients coincides with the above workers except the findings of **Polyzova et Summary**

#### **Qualitative**

- The whorl pattern was highest in percentage on first, second, third and fourth digits in both sexes in hypertensive patients
- The frequency of whorl was highest in right and left hand of male hypertensive patients .
- The percentage of loops was decreased in male and female hypertensive patients on first, second, third and fourth digits.
- There were an increase percentage of arches on first, third and fifth digit in hypertensive females and male.
- The percentage of Arches was decreased in case of male hypertensive patients on first, fourth and fifth digit as compared with control group.

#### **Quantitative**

- There was an increase in the mean values of TFRC in hypertensive patient
- The present study showed an increase in mean values of AFRC in hypertensive patients .
- The mean value of “atd” angle was decreased in hypertensive .

### 7. Conclusions

From the present study, it was concluded that:

- 1) Whorls were highest in hypertensive patients .
- 2) Loops were decreased in hypertensive patients .
- 3) Arches were highest in hypertensive patients .
- 4) Mean value of TFRC was highest in hypertensive patients.
- 5) AFRC was also highest in hypertensive patients.
- 6) MLI was increased in hypertensive patients in right hand
- 7) “atd” angle was decreased in hypertensive patients.

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