

## A case-control Study on Relationship between Dermatoglyphics and Hypertension

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### Abstract

**Introduction:** Essential hypertension is the type of hypertension that has no identifiable explanation. It is connected with age and congenital acquired issues. Positive family ancestry enhances the danger. Dermatoglyphics, the information on exact plans of epidermal ridge in the recognitions and soles, is a solitary and steady indication of uniqueness, perceived in utero. Extension of those ridge is constrained by acquired and eco-accommodating impacts. As there is improved danger of hypertension in people alongside family ancestry because of acquired issues, the investigation of co-connection among dermatoglyphics and hypertension can help in starting recognizable proof of individuals alongside the acquired propensity to develop basic hypertension

**Materials & Methods:** This is a Prospective, Observational and case-control study conducted in the Department of Anatomy and Medicine, Index Medical College over a period of 2 Years. Clinically diagnosed cases of Hypertension was taken from the age group of 20 to 80 years as Case. The Normal (Non-Hypertensive) individuals are all normotensives. The inclusion criteria are normal blood pressure (i.e. never diagnosed as hypertensive) & absence of family history of hypertension as a control Group. Sampling procedure Informed consent was taken from the subjects in a prescribed format after explaining the whole procedure and its outcome to the patient in his/her own vernacular language and stating that the prints will only be used for research purposes.

**Result:** Development of dermatoglyphic configuration is under hereditary control. Subsequently subjective and quantitative investigation of dermatoglyphic attributes may offer us a hint to the weakness of fundamental hypertension. The Total Finger Ridge Count (TFRC), Absolute Finger Ridge Count (AFRC) and 'atd' Angle. Analysis fingertip examples of Right hand and left hand independently, right hand and left hand joint and anomalous palmar wrinkles Sydney line (Sy line) and simian line (Sm line). dirty on both hands one by one and prints were taken by progressing the hands from wrist creases to finger tips on the roller enclosed with bond paper. On statistical analysis atd angle was not significant in both the hands of male and female study and control group.

**Conclusion:** The current examination demonstrates that there are some hereditary elements which are associated with the causation of fundamental hypertension and it is conceivable to certain degree to foresee from dermatoglyphics person's possibility of obtaining basic hypertension. Like clinical history, assessment and examinations, the dermatoglyphics will assume a significant job uncovering the hereditary powerlessness to fundamental hypertension.

**Keywords:** Dermatoglyphics, Hypertension, Ridge Count

## INTRODUCTION

Essential hypertension is the type of hypertension that has no identifiable explanation. It is connected with age and congenital acquired issues. <sup>[1]</sup> Positive family ancestry enhances the danger. Dermatoglyphics, the information on exact plans of epidermal ridge in the recognitions and soles, is a solitary and steady indication of uniqueness, perceived in utero. <sup>[2]</sup> Extension of those ridge is constrained by acquired and eco-accommodating impacts. As there is improved danger of hypertension in people alongside family ancestry because of acquired issues, the investigation of co-connection among dermatoglyphics and hypertension can help in starting recognizable proof of individuals alongside the acquired propensity to develop basic hypertension. <sup>[3]</sup>

Here are exact plans of epidermal ridge on fingertip – Loop (Ulnar circle has uncovered toward the end of the circle towards ulnar side and Radial circle has open the end in the direction of the circular side), Whorl (Ridge are Rounded), Double Circle Spiral, Curves (Ridge enter from one side make a development in the midpoint and exit from another side). <sup>[4]</sup>

A triradius is the gathering purpose of three edge at a point. Presently since this point, a straight line is drawn to the basic of the specific plan. The ridge that cut this line are determined. This amount is the total ridge check (TRC). <sup>[5]</sup> for that particular finger. Some time ago customary of every one of the 10 TRCs in an impression is determined. Extra restriction of this investigation, the atd approach is normally called as the acclaim approach. Presently for the component of the atd approach a definition is utilized. <sup>[6]</sup> This plan supports to compute the changed atd approach. The procedure of its measurement is as appeared: This atd triangle is planned by connecting 3 triradii in the commendation. The triradii a and d are correspondingly at the base of the directory and slight fingers. "t" is the pivotal triradius found extra underneath. Thus, the atd approach is planned at the "t" triradius. Thus, at beginning all the 3 methodologies are determined, at that point altered atd point is fearless by the plan. <sup>[7]</sup>

$$\tan \left( \frac{\text{corrected atd angle}}{2} \right) = \frac{\sin(\text{measured atd angle})}{2 \times \sin(\text{dat angle}) \times \sin(\text{adt angle})}$$



Fig .1 Procedure of finger and Palm prints

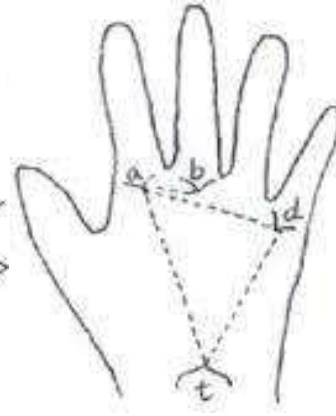


Fig.2: Atd angle measurement

In a study revealed by Palyzova D et al (1991), appeared in young hypertensive patients had a marginally lesser event of fingertip ulnar circles, progressed occurrence of whorl, progressed TFRC and progressed mean atd point. <sup>[8]</sup> Extra investigation (1989) set up similarly sensitive whorl and slight palmar point are connected with hypertension in youthful life. <sup>[9]</sup> Kulkarni DU, Herekar NG (2005) intentional that hypertensive patients required a marginally lesser event of fragile ulnar circles, progressed event of whorl and progressed TFRC and likewise a fairly progressed mean atd point. <sup>[10]</sup> The current study was endorsed out to control relationship of palmar dermatoglyphics with the event of Hypertension, especially the imperative assortment.

## MATERIALS & METHODS

This is a Prospective, Observational and case-control study conducted in the Department of Anatomy and Medicine, Index Medical College over a period of 2 Years. Clinically diagnosed cases of Hypertension was taken from the age group of 20 to 80 years as Case. The Normal (Non-Hypertensive) individuals are all normotensives. The inclusion criteria are normal blood pressure (i.e. never diagnosed as hypertensive) & absence of family history of hypertension as a control Group. Sampling procedure Informed consent was taken from the subjects in a prescribed format after explaining the whole procedure and its outcome to the patient in his/her own vernacular language and stating that the prints will only be used for research purposes.

### Exclusion criteria:

1. Any distortions of fingers and palm and Infected hand
2. Infections influencing subordinate hypertension
3. Chromosomal anomalies like Klinefelter's condition, Turner's disorder.
4. Significant wounds of fingers and palms prompting scars.

**Material used:** Wood table of appropriate height, 'kores' duplicating ink, roller, white crystal bond paper, magnifying lens, soap, needle, scale, water and towel.

**Method:** The changed Purvis Smith technique was applied. Patients has been requested to wash both of their hands with water and cleanser so as to remove any oil or dirt. Black rehashing ink (Kores, Bombay) was filthy on two hands individually and prints were taken by advancing the hands from wrist wrinkles to fingertips on the roller encased with bond paper. [7,8]

**Fingerprints:** The distal groups of individual's right hand were inked on the tile by firm weight on the dorsum, opening from slight finger. The distal groups of left hand were likewise inked. While crystal bond paper, applied unflinching on a wood pad, has been utilized for recording the inked epidermal edge plans. Rolled fingerprints were recorded later applying unvarying load on white bond paper from ulnar to circular side.

**Palm Print:** Palm prints of two hands were found subsequent to inking them with assistance of elastic roller. A white precious stone bond paper was enveloped about a wooden pole situated on the table. The hand was equal set against it and the pole was gradually bowled on the table. Complete palm impression, with the empty or the palm was increased over paper. In this way, one bunch of fingerprints and palm prints was picked up. The prints picked up were quickly examined with hand-focal point and care has been taken to incorporate every single basic detail. Dermatoglyphics of sole and toes were not noted (fig 1). The examination included both subjective and quantitative tests. Subjective investigation contains unique mark designs (whorls, spiral circle, curves, and ulnar circle) and in the palm, contains simian line and Sydney line. Quantitative examination contains Total Finger Ridge Count, Absolute Finger Ridge Count and atd point. To analyze finger design event, the fingertip design plots were named curves (A), circles (L), whorls (W). The curves were extra recorded as basic (A), or rose (At) curves dependent on the presence or nonattendance of a triradius. For factual assurance, both were assembled as curves as it were. Arithmetical controls were finished by number juggling mean and standard deviation, Z test and Chi-square test utilized where required.

## Result

Development of dermatoglyphic configuration is under hereditary control. Subsequently subjective and quantitative investigation of dermatoglyphic attributes may offer us a hint to the weakness of fundamental hypertension.

**The Quantitative Analysis incorporates:** The Total Finger Ridge Count (TFRC), Absolute Finger Ridge Count (AFRC) and 'atd' Angle.

**The Qualitative Analysis incorporates:** Analysis fingertip examples of Right hand and left hand independently, right hand and left hand joint and anomalous palmar wrinkles Sydney line (Sy line) and simian line (Sm line). dirty on both hands one by one and prints were taken by progressing the hands from wrist creases to finger tips on the roller enclosed with bond paper.  
[7,8]

**Table 1: Digit wise frequency of pattern**

	Male				Female			
	Study Group		Control Group		Study Group		Control Group	
	Right hand	Left Hand	Right Hand	Left Hand	Right Hand	Left Hand	Right Hand	Left Hand
Arch	23	17	04	08	18	17	0	4
Loop Radial	24	29	13	19	29	29	22	19
Loop Ulnar	103	104	134	116	94	101	125	117

Whorl	79	75	106	101	93	81	84	105
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Simian Line absent in right and left hands of both male & female hypertensive individuals

**Table 2: Presence of Sydney Line in Right Hand**

		Male	Female	Male	Female
		Study Group	Control	Study Group	Control
Right Hand	Present	16	0	23	0
	Absent	34	50	27	50
Left hand	Present	14	0	16	0
	Absent	36	50	34	50

**Table 3: Total finger ridge count (Mean±SEM)**

	Study Group (hypertensive)	Control (Normal)	Inference
Male	81.4 ± 1.3*	85.9 ± 1.8	Significant
Female	83.6 ± 1.5	83.7 ± 1.3	Not Significant

**Table 4: Absolute finger ridge count (Mean ± S.D)**

	Study Group	Control	T test	P Value	Inference
Male	102.7 ± 11.2	103.7 ± 11.4	1.78	0.074	not significant
Female	111.4 ± 12.3	101.4 ± 13.3	0.84	0.539	not significant

**Table 5: atd Angle (Mean ± S.D)**

		Study Group	Control	T test	p-value	inference
Male	Right Hand	41.64 ± 4.45	38.59 ± 4.73	1.47	0.432	not significant
	Left Hand	41.47 ± 4.38	41.91 ± 4.52	0.34	0.850	not significant
Female	Right Hand	40.43 ± 4.59	42.49 ± 4.40	1.04	0.482	not significant
	Left Hand	38.43 ± 3.48	39.89 ± 3.53	0.09	0.832	not significant

On statistical analysis atd angle was not significant in both the hands of male and female study and control group.

## DISCUSSION

Hypertension "the quiet enemy of masculinity" is a public fitness issue. In the event that untreated, it creates a ton of challenges likely coronary episode, cardiovascular breakdown, stroke and kidney sicknesses. The event of hypertension is 59.9 and 69.9 per 1000 in guys and females circulatory strain in hypertensive's even by 2mm can diminish the total humankind by 3%.<sup>[9]</sup> The noteworthiness of dermatoglyphics isn't to distinguish, yet to dodge by determining an infection; not for significant a momentum sickness, but rather to perceive individuals with acquired propensity to develop certain illnesses.<sup>[10]</sup>

There are various examinations expressed about the dermatoglyphic plan in various diseases like pneumonic tuberculosis, Diabetes Mellitus Type II Essential Hypertension, Eczema, psoriasis and alopecia areata and even in solid Indian youngsters. Current investigation is related with an examination by K M Godfrey.<sup>[11]</sup> In current examination, we attempted to control significant palmar dermatoglyphic restricts if there should arise an occurrence of fundamental hypertensive's

in age bunch among 20-50 years and whether the cutoff points can be utilized for inspect reason i.e., starting finding of hypertension.<sup>[12]</sup>

Current study demonstrated that the ulnar loop pattern was most frequent in both genders among both hypertensive's and diabetics. This was followed in descending order by arch, radial and whorl patterns in both genders. However, Srivastava *et al.* (2019) in their study on eastern Uttar Pradesh population found no association between dermatoglyphic patterns and predictability of disease development.<sup>[13]</sup>

Chakravarthy *et al.* (2018) in their study attempted to analyze the association of dermatoglyphic pattern on palms with hypertension. This study compared two hundred and fifty each subjects (total n = 500) in hypertensive and normotensive individuals. The dermatoglyphic finger print patterns were recorded using digital imaging and the 'atd' angle calculation was done using the 'screen protractor' software. The 'atd' angle was found to be significantly higher in hypertensive subjects when compared to normotensive individuals. Thus, this study stressed upon the need to evaluate dermatoglyphic patterns with risk of development of hypertension.<sup>[14]</sup>

Ramhari Sathawane *et al.* (2019) studied the correlation of lip and finger print patterns in patients with Type II diabetes mellitus. It was found that In diabetic patients whorls are seen as the most common prevalent pattern in both right and left hands. Reticular type of lip print pattern was significantly higher in diabetics than controls.<sup>[15]</sup>

Bala *et al.* (2015) in their study found a significant association between dermatoglyphic patterns with diabetic and diabetic with hypertensive subjects. Advantage of studying lip print and dermatoglyphic print patterns are as follows: (1) It is simple technique; (2) It requires low cost; (3) It consumes less time; (4) There are no additional laboratory facility requirement and (5) These patterns are unique in every individual.<sup>[16]</sup>

## Conclusion

The current examination demonstrates that there are some hereditary elements which are associated with the causation of fundamental hypertension and it is conceivable to certain degree to foresee from dermatoglyphics person's possibility of obtaining basic hypertension. Like clinical history, assessment and examinations, the dermatoglyphics will assume a significant job uncovering the hereditary powerlessness to fundamental hypertension.

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