Section A-Research paper
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ANALYSIS OF DERMATOGLYPHICS AND CHEILOSCOPY PATTERNS IN HYPERTENSIVE AND ISCHEMIC HEART DISEASE PATIENTS: A PILOT STUDY

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Abstract:

Objectives: To analyse dermatoglyphic finger pattern and palm prints in hypertension and ischemic heart disease patients by using stamp pad and scanner. To analyze cheiloscopic pattern in hypertension and ischemic heart disease patients by using dark colour lipstick. To compare cheiloscopic and dermatoglyphic pattern with the hypertension and ischemic heart disease patients. **Material and methodology:** The Patient reporting to the Department of Oral Medicine and Radiology, Vivekanandha Dental College for Women Thiruchengode, Tamilnadu, India were selected for the study. 20 controls (10 males & 10 females) 20 hypertensive patients (10 males & 10 females) and 20 ischemic heart disease patients (10 males & 10 females) were included in the study. Each subject was examined for any pathology. The method of recording lip and finger prints were explained and obtained. **Results:** From the present study it is concluded that no significant difference in left and right hand between ischemic and hypertension. Lip

prints pattern between three groups are statistically significant – 0.004. Branched, reticular followed by straight patterns were observed in decreasing frequency among male subjects while among female patients branched, and reticular followed by straight and intersected patterns in both hypertensive and ischemic heart disease patients. The palm prints of right and left hands showed "atd" angle was higher in cases than in controls. No significant atd angle difference between right and left; left angle is comparatively higher than right. **Conclusion:** From the present study it is concluded that, byanalyzing dermatoglyphics of normal individuals at an early age, we can try to identify particular patterns strongly associated with development of hypertension and thereby modify other risk factors at an earlier stage in susceptible individuals.

Keywords: Finger Print Patterns, Hypertension, Lip Prints, Ischemic Heart Disease

Introduction: The term 'Dermatoglyphics' is derived from Greek words, 'derma' -skin and'glyphics' and was formulated by Professor Harold Cummins. It is a science dealing with epidermal ridge patterns, analysis on soles, toes, fingers and palms. Galton in the year 1892 studied various patterns of finger prints such as plain arch, loops, whorls, plain loops, crestal loop, twined loop. These patterns are genetically determined and numerous studies have shown correlation with many diseases with genetic background[1].

Both genetic and environmental factors are the determinants of systemic hypertension or increased blood pressure. As the fingers grow, new ridges and branches form at the 10^{th} week of gestation. Between 17- and 19- weeks of gestation, a layer of keratin coats the surface of the skin. Smaller, secondary ridges form out of uneven keratin growth. Factors like friction, mutations of genes in the womb can influence a fetus's fingerprint pattern. The pattern of fingerprints established by 19 weeks remains consistent as the child grows. As the development of hypertension is also genetically determined, it can be ascertained by studying dermatoglyphic patterns. Chakravarthy et al in 2018 reported that the ulnar loop pattern was most frequent among male and female subjects in systemic hypertension patients.[1]Edward et al in 2007 have postulated that a close association exists between essential hypertension and whorl type of finger print pattern is probably due to organogenesis of proximities and cardiovascular system which occurs at the same time.

"Cheiloscopy" is the study of lip prints or grooves. The term 'cheiloscopy' has been derived from Greek 'cheilos'means lips; e skopein means to see. The grooves and wrinkles on lips begin to develop at approximately 6 weeks of gestation and these unique patterns persist throughout life with exceptions after a deformity (through injury or disease) or putrefaction. Edmond Locard and Le Moyne Snyderin 2010 has

emphasized upon importance of lip print patterns with pertaining to their stable and permanent nature and ability to resist climatic change.[2]

By analysing dermatoglyphic and cheiloscopic patterns of normal individuals at an early age, we can identify particular patterns strongly associated with development of systemic hypertension. Ischemic Heart Disease (IHD), which develops as a sequela of prolonged systemic hypertension is the most common, serious, chronic, life-threatening illness globally. So, the study of dermatoglyphic and cheiloscopic patterns in an individual may serve as useful predictors of systemic hypertension and IHD. Hence, primary prevention can be done by modifying other risk factors at an earlier stage in susceptible individuals.

With this background, the present study was conducted to determine the association of dermatoglyphics and cheiloscopic patterns in patients with hypertension and ischemic heart diseases

Material and methododolgy: The study was conducted in the Department of Oral Medicine and Radiology, Vivekanandha Dental College for Women Thiruchengode, Tamilnadu. 20 controls (10 males & 10 females) 20 hypertensive patients (10 males & 10 females) and 20 ischemic heart disease patients (10 males &10 females)were selected for study.

Inclusion criteria:

- Those with systolic blood pressure >140 mmHg and diastolic blood pressure >90 mmHg and patients with IHDwho were diagnosed based on ECG abnormality of ST segment deviations and T wave inversionas given by AHA(American heart association) in 2017 wereincluded as cases.
- Controls are normal individuals (10 males and 10 females).

Exclusion criteria:

- Patients with Diabetes mellitus and other systemic diseases were excluded from the study.
- With any deformities of fingers, lips, palms with infected hand or with deep burns of fingers were excluded from our study.
- **Methodology:** Individuals under inclusion criteria were selected for the study. The method of recording lip and finger prints were explained to the participants and an informed consent was obtained from all the individuals participated in the study.

Fig 1: Materials required to take lip prints and finger prints

Method of taking lip print: Lip print were made by using dark coloured lipstick and the sticky side of the cellophane tape was placed over the lips in resting position and then pressed uniformly. Tape was gently removed from the lips without distorting the lip print. Cellophane tape was then stuck to the bond paper and the patterns were classified (According to Vahenwala et alin the year 1970) (fig 2)

Fig 2: Procedure to obtain Lip print pattern

Method of taking finger print: For collection of the data, standard ink method was used. Patients' hands were cleaned and dried before taking imprints. Imprints of five fingertips were recorded in specified boxes on finger print record sheet. The same procedure was repeated with the other hand. (According to henry et alin the year 1894)(fig 3)

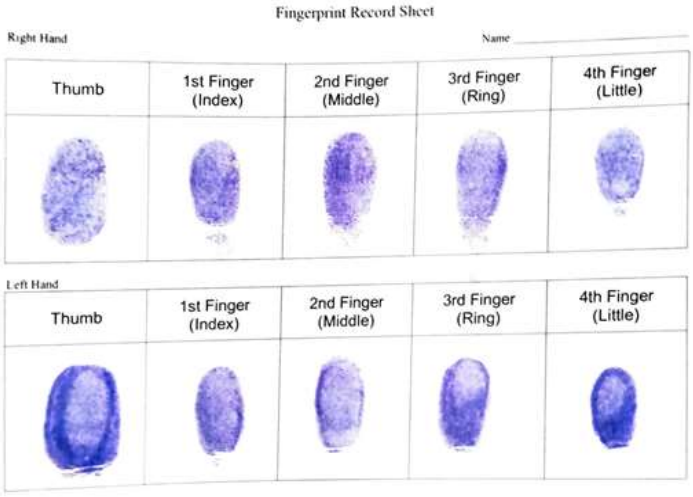


Fig 3: Procedure to obtain finger prints pattern

Method of taking palm prints: The digital data scanner was used for taking palm prints and image of both hands. "atd" triangle also termed as palm triangle is formed by three triradii in palm: a" is at base of the index finger, "d" is at base of little finger and "t" is the axial triradius situated further below. "atd" angle was calculated manually using "protractor" (fig 4)

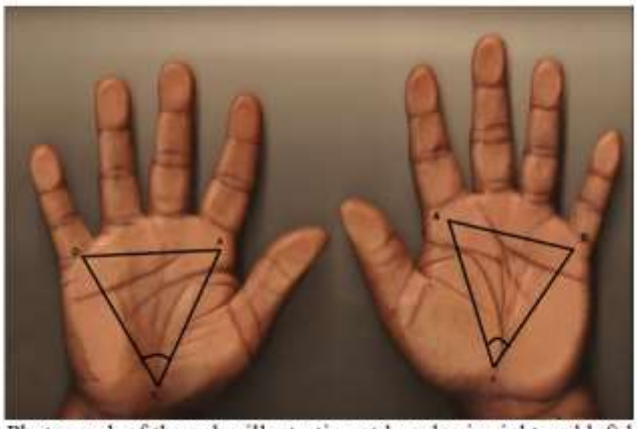


Fig 4: Photograph of the palm illustrating atd angles in right and left hand

Statistical analysis: Study data obtained were entered to Microsoft Excel Software, which was exported to Statistical Package for Social Sciences (SPSS) Version 25, IBM Statistics, USA. Descriptive Statistics [Frequency and percentage] was obtained and presented in tables and graphs. Comparison between the

variables was done using chi- square test. Level of significance was set at 5% ($p < 0.05$ - Statistically Significant).

Results:

Table 1: Analysis of the Cheiloscopy patterns in hypertensive and ischemic heart disease patients

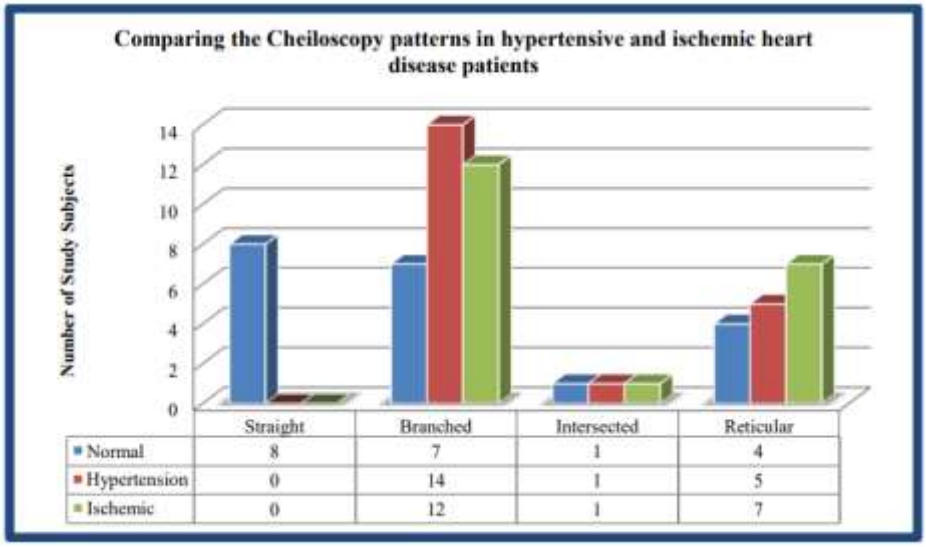
Lip Print	Groups						P Value
	Normal		Hypertension		Ischemic		
	Counts	Percentage	Counts	Percentage	Counts	Percentage	
Straight	8	40%	0	0%	0	0%	0.004*
Branched	7	35%	14	70%	12	60%	
Intersected	1	5%	1	5%	1	5%	
Reticular	4	20%	5	25%	7	35%	

Branched, reticular followed by straight patterns were observed in decreasing frequency among male subjects while among female patients branched, and reticular were observed followed by straight and intersected patterns in both hypertensive and ischemic heart disease patients.

% Percentage within the group; chi square test done for the analysis of the Cheiloscopy patterns in hypertensive and ischemic heart disease patients and found to have a significant p value of 0.004

Interobserver reliability was evaluated and the value is 0.71. Interobserver reliability value is 0.82

Graph 1: Graph showing the comparison the Cheiloscopy patterns in hypertensive and ischemic heart disease patients



Dermatoglyphics patterns of left and right hand

Table 2: Analysis of the Left hand Dermatoglyphics patterns in hypertensive and ischemic heart disease patients

Dermatoglyphics patterns	Groups						P Value
	Normal		Hypertension		Ischemic		
	Counts	Percentage	Counts	Percentage	Counts	Percentage	
Left Thumb							
Loop	16	80	2	10	2	10	0.001**
Whorl	0	0	14	70	14	70	
Arch	1	5	1	5	1	5	
Composite	3	15	3	15	3	15	
Left Index							
Loop	12	60	2	10	5	25	0.001**
Whorl	0	0	12	60	12	60	
Arch	6	30	5	25	2	10	
Composite	2	10	1	5	1	5	
Left Middle							
Loop	9	45	1	5	2	10	0.006*
Whorl	0	0	8	40	8	40	
Arch	5	25	4	20	3	15	
Composite	6	30	7	35	7	35	
Left Ring							
Loop	9	45	3	15	3	15	0.06
Whorl	0	0	7	35	7	35	
Arch	10	50	9	45	9	45	
Composite	1	5	1	5	1	5	
Left Little							
Loop	11	55	3	15	3	15	0.017*
Whorl	0	0	8	40	8	40	
Arch	6	30	6	30	6	30	
Composite	3	15	3	15	3	15	

% Percentage within the group; * Significant ** Highly Significant

Chi square test done for the analysis of the Left hand Dermatoglyphics patterns in hypertensive and ischemic heart disease patients and found to have a significant p value except for Left ring finger

Table 3: Analysis of the Right hand Dermatoglyphics patterns in hypertensive and ischemic heart disease patients

Dermatoglyphics patterns	Groups						P Value
	Normal		Hypertension		Ischemic		
	Counts	Percentage	Counts	Percentage	Counts	Percentage	
Right Thumb							
Loop	16	80	5	25	7	35	0.003*
Whorl	0	0	11	55	11	55	
Arch	3	15	3	15	1	5	
Composite	1	5	1	5	1	5	
Right Index							
Loop	8	40	0	0	5	25	0.006*
Whorl	0	0	8	40	8	40	
Arch	8	40	8	40	3	15	
Composite	4	20	4	20	4	20	
Right Middle							
Loop	13	65	3	15	4	20	0.002*
Whorl	0	0	11	55	11	55	
Arch	1	5	1	5	0	0	
Composite	6	30	5	25	5	25	
Right Ring							
Loop	17	85	1	5	1	5	0.001**
Whorl	0	0	15	75	15	75	
Arch	1	5	2	10	2	10	
Composite	2	10	2	10	2	10	
Right Little							
Loop	14	70	1	5	2	10	0.001**
Whorl	0	0	14	70	14	70	
Arch	4	20	3	15	2	10	
Composite	2	10	2	10	2	10	

% Percentage within the group; * Significant ** Highly Significant

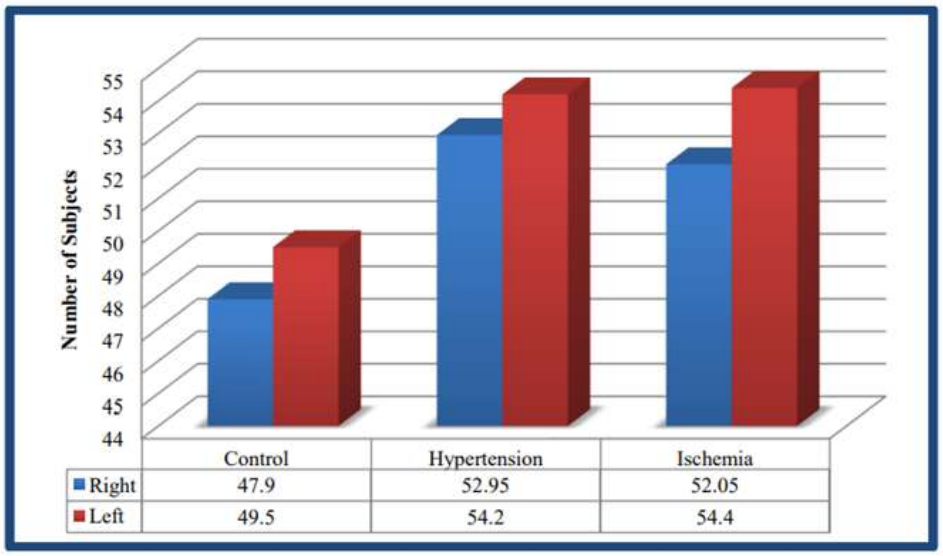
Chi square test done for the analysis of the Right hand Dermatoglyphics patterns in hypertensive and ischemic heart disease patients and found to have a significant p value of 0.001

Palm prints of right and left hand:

Table 4: Comparison of the Mean 'atd' angle in IHD, Hypertension & control groups of Right & Left hand of the individuals of the study population

		Right		Left	
	Counts	**Mean**	**SD**	**Mean**	**SD**
Control	20	47.90	8.188	49.5	6.186
Hypertension	20	52.95	6.855	54.20	4.905
Ischemia	20	52.05	7.602	54.40	4.135
ANOVA [p value]		0.079		0.005**	

Graph 2 representing the Mean 'atd' angle in IHD, Hypertension & control groups of Right & Left hand of the individuals of the study population



"Atd" angle was higher in cases than in controls. Left angle is comparatively higher than right.

Discussion: Lip prints and dermatoglyphics are unique to individuals and has been shown to be an useful genetic marker in some congenital and systemic diseases. Genetic predisposition is one of the known risk factors in many systemic diseases and recent studies have established the relation between dermatoglyphic

pattern and cardiovascular diseases.[6,7]Dermatoglyphics and Cheiloscopy have proven to be a very useful, noninvasive and an economical tool for the preliminary diagnosis of diseases of suspected genetic origin.[13] In our study, left hand dermatoglyphics pattern in hypertensive and ischemic heart disease patients was found to have a significant p value of 0.001 and whorled pattern was found in greater frequency (46.7%) in both hypertensive and ischemic heart disease patients. Bala et al. (2015) [5]found a significant association between dermatoglyphic patterns in diabetic and diabetic with hypertensive subjects. In accordance to our study, Wyethne et al. (2015)[6] in his systematic review found a consistent increase in whorl pattern frequency upon total ridge count in subjects diagnosed with hypertension. Lahiri et al. (2013)[7]in their study on relationship between essential hypertension and dermatoglyphic patterns found that the double-looped whorled pattern was found to be in greater frequency (4.57% compared to 0.44%) among hypertensive subjects when compared to normotensive individuals. Oladipo et al 2010)[9], Polat et al. (1999) [11] and Jain et al. (1984)[12] also found that whorl pattern was predominant in patients with hypertension. Edward et al (2007) have postulated that the close association between essential hypertension and whorl type of finger print pattern is mainly due to organogenesis of proximities and cardiovascular system which occurs at the same time.[8]

In contrary to our study, Srivastava et al. (2019)[4] in their study on eastern Uttar Pradesh population found no association between dermatoglyphic patterns and predictability of disease development. Stevenson et al. (2001)[10]also found no significant association between blood pressure levels and finger print patterns.

In the present study, the palm prints of right and left hands showed “atd” angle was higher in cases than in controls. Left angle is slightly higher than right with the p value of 0.005.

Hemalatha Dhanraj et al[14] observed that the mean value of 'atd' angle is increased in all groups of coronary artery disease in both right and left hand as compared to the controls with significant increase with a p value of ($P<0.01$). Chakravarthy et al (2018)[1] in their study found the ‘atd’ angle to be significantly higher in hypertensive subjects when compared to normotensive individuals.

In our study, lip print pattern between three groups were statistically significant with p value-0.034. Branched, reticular followed by straight patterns were observed in decreasing frequency among male subjects while among female patients branched and reticular followed by straight and intersected patterns were observed in both hypertensive and ischemic heart disease patients. Umana et al. (2014) [13]in their study showed that the branched lip print pattern found to be with significantly high frequency among hypertensives (62.29%) than compared to normotensive subjects(53.57%) which is in accordance with our study.

Conclusion: From the present study it is concluded that

- Comparing left hand and right hand dermatoglyphic patterns shows that whorl pattern was predominantly observed in ischemic heart diseases and systemic hypertension patients
- The palm prints of right and left hand shows that left hand "atd" angle was slightly higher in cases than controls
- Branched cheiloscopic pattern was observed predominantly in decreasing frequency among male and female patients in both hypertension and ischemic heart disease patients.

Presence of above dermatoglyphic and cheiloscopic features may help us to identify individuals susceptible for systemic hypertension and ischemic heart disease. By developing advanced techniques using specialized software to study the digitized images of these patterns may enable us to analyze them more efficiently. Analyzing dermatoglyphics and cheiloscopic patterns at an early age enables susceptible individuals to identify and modify the risk factors of systemic hypertension and ischemic heart diseases by employing life style modifications and prevent the associated morbidity and mortality.

References:

1) Chakravarthy GP, Shirali A, Chowta KN, Ramapuram JT, Madi D, Chouhan RRS. A "handy" tool for hypertension prediction: Dermatoglyphics. Ind Heart J 2018;70: S116-7
2) Shende PD, Jangam DK. Study of lip print patterns among patients visiting dental college: A descriptive study. Int J Recent Sci Res 2019; 10:36322-34
3) Ganesh Chakravathy P, Arun Shirali, K. NithyanandaChowta, John T. Ramapuram, Deepak Madi, Ravi Raj Singh Chouhan (2018). A "Handy" tool for hypertension prediction: Dermatoglyphics. Indian Heart Journal 2018; 70: S116eS119
4) Srivastava A, Bihari A, Upadhyay M, Ghaffar A, Gautam P. Palmar dermatoglyphic: A forecast of hereditary diseases by the cumulative and comparative data in eastern Uttar Pradesh. Ind J Comm Health 2019; 31:464-9.
5) Bala A, Desmal A, Sarmah PC, Khandalwal B, Tamang BK. Palmar dermatoglyphic patterns in diabetes mellitus and diabetes with hypertension patients in Gangtok region. Int J Adv Res 2015; 3:1117-25.
6) Wyerathne BT, Meier RJ, Agampodi TC, Agampodi SB. Dermatoglyphics in hypertension: A review. J PhysiolAnthropol2015; 34:29-41.

7) Lahiri A, Bandhopadhyay S, Adhya S, Ghosh S, Goswani S, Bhattacharya P. A study on relationship between dermatoglyphics and hypertensives. IOSR J Dent Med Sci 2013; 7:62-5
8) Edward DC. Fingerprint and palmar dermatoglyphics. Available from: https://007.www.pdc.co.ildiakses. [1 April 2].
9) Oladipo GS, Osogba IG, Bobmanuel I, Ugboma HA, Sapira MK, Ekeke ON. Palmar dermatoglyphics in essential hypertension amongst Rivers Indigenes. Austr J Appl Sci 2010; 4:6300-5.
10) Stevenson CJ, West CR, Pharaoh PO. Dermatoglyphic patterns, very low birth weight and blood pressure in adolescents. Arch Dis Child Fetal Neonatal Ed 2001;84: F18-21.
11) Polat MH. Juvenil HipertansujonlaOlgulardaDermatoglificOzellikler. SDU Tip Fakultesi Derg1999; 6:7-10.
12) Jain PK, Sharma BK, Marthur BD. Dermatoglyphics in essential hypertension. J Assoc Physicians India 1984; 32:335-7.
13) Umana UE, Netete BV, Timbuak JA, Ibegu JA, Musa AO, Hammam WO. Dermatoglyphics and cheiloscopy patterns in hypertensive patients: A study in Ahmadu Bello Univ Teaching Hospital, Zaria, Nigeria and Environs. Int J Sci Res 2014; 4:15.
14) Hemalatha Dhanraj, Ksheersagar A Study of Palmar Dermatoglyphics in Coronary Artery Disease. Maharashtra University of Health Sciences. Nashik 2010
15) Suzuki K, Tsuchihashi Y (1970) New attempt of personal identification by means of lip print. J Indian Dent Assoc 42: 8-9