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Original Research Article

DERMATOGLYPHIC C-LINE PATTERN OF PALM IN CORONARY ARTERY DISEASE

H.V. Ambade *[1], D. D. Ksheersagar [2], A.P. Kasote [3].

*[1] Assistant Professor, Department of Anatomy, Government Medical College, Nagpur, Maharashtra State, India.

[2] Professor and Head, Department of Anatomy, N.K.P Salve Institute of Medical Sciences and Research, Nagpur, Maharashtra State, India.

[3] Professor, Department of Anatomy, Government Medical College, Nagpur, Maharashtra State, India.

ABSTRACT

Dermatoglyphics as a diagnostic aid is now well established in number of diseases, which have strong hereditary basis. Few literatures are available in relation to dermatoglyphic finger ridge patterns in myocardial infarction, but none of the studies has focused on dermatoglyphic C-line pattern of the palm. The C-line is one of the four Main Line of the palm which shows true polymorphism. The present study is attempted to find out correlation between dermatoglyphic C-line pattern of palm and coronary artery disease which is also influenced by genetic predisposition. Depending on the termination of C-line of the palm, it is classified in to four types namely radial, ulnar, proximal and absent. In the present study, bilateral inked palmar impressions of 150 patients of angiographically proven Coronary Artery Disease (CAD) were compared with equal number of controls for dermatoglyphic C-line pattern of palm. The C-line terminates frequently on radial side of palm followed by ulnar side in both sexes and both sides. The frequency of radial type of C-line is decreased in both sexes and right hand ($P<0.05$) in CAD, while frequency of absent type is increased in both sexes ($P<0.001$ in male) and both hands ($P<0.01$ in right hand and $P<0.05$ in left hand) in CAD as compared to controls. The frequency of ulnar type is increased in females and right hand in CAD. Thus, it appears that there exists a variation in dermatoglyphic pattern of C-line of palm in coronary artery disease.

KEY WORDS: Palmar dermatoglyphics, C-line pattern of palm, coronary artery disease, correlation.

Address for Correspondence: Dr. Hemlata Ambade, Plot No 3, Narkesri Apartment, RPTS Road, Laxmi Nagar, Nagpur (Pin Code- 440022), Maharashtra State, India.
E-Mail: hemachimne@gmail.com

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INTRODUCTION

Dermatoglyphics is the scientific study of patterns of epidermal ridges and their configuration on fingers, palm, toes and soles. Abnormalities in the epidermal ridges may result from genetic alterations occurring in the first trimester [1]. The dermatoglyphic pattern is unique and based on the genetic characteristics of each individual [2]. High heritability, high degree of individual variations and unchanging morphology throughout postnatal life makes the dermatoglyphic pattern as an excellent prognostic and genetic marker [3] and is employed as a method of screening abnormal anomalies [4].

Among the dermatoglyphic pattern of the palm, C-Line is the only main line which shows true polymorphism in terms of direction as well as degree of transversality [5]. Hence, it is used by physical anthropologists and geneticists as an important tool for population genetics studies [5-7]. The etiology of coronary artery disease is multifactorial with genetics playing an important role. Taking into consideration of its genetic predisposition, the study was undertaken to find out the correlation between the dermatoglyphic C-line patterns of palm as an indicator of genetic susceptibility in coronary artery disease.

MATERIALS AND METHODS

The data analysed in the present study consists of bilateral inked palmar impressions of 150 patients of angiographically proven Coronary Artery Disease (CAD) from private Heart Institute and Research Centre, Nagpur and 150 healthy individuals (Controls). There are 120 males and 30 females in each group. Even the patients of Ischaemic Heart Disease with normal coronary angiography were excluded from the study. Similarly the individual with history/ family history of hypertension, diabetes or any cardiac or genetic problem were excluded from the controls. The dermatoglyphic palmar prints were taken by Ink Method as described by Cummins and Mildo (1961) [8] on the Map Litho White Paper. (Fig 1). After taking dermatoglyphic palmar print, digital triradii are traced in the distal portion of the palm at the base of digits 2, 3, 4 and 5. They are labelled as a, b, c and d respectively from radial to ulnar direction. There are four Main Line each emanating from one of the digital triradii and labelled as A, B, C, D corresponding to the digital triradius a, b, c, d respectively. (Fig 2,3). The terminations of C-Line of the palm were classified into four modal types according to the direction of their path [5]. These are (1) Ulnar type with 3, 4, 5', 5'', 6 or 7 terminations; (2) Radial type with terminations in the palmar areas 9, 10, 11, 12, or 13; (3) Proximal type representing the terminations X, x, or 8; and (4) Absent type where no 'c' triradius is present. The dermatoglyphic findings were analysed by comparing C-line types between patients (CAD) and controls in both sexes and in both hands.

RESULTS

As shown in table 1, radial type is the most common termination of C-line followed by ulnar type and proximal type in both CAD and control except CAD females and in left hand, where ulnar type predominates. Absent type is least frequent in both CAD and controls in both sexes and in both hands. The termination of C-line shows a high frequency of radial (41.7%) followed by ulnar (34.2%) type in CAD males. Whereas in CAD females, the termination of C-line shows a high frequency of ulnar (48.3%) followed by radial type (28.3%). Similarly, radial type is more frequent than ulnar type in both sexes and right hand in controls. But in left hand, ulnar type predominate the radial type. Small proportion of C-line terminated either proximally or absent in both sexes and both hands. However, increase number of absent type is seen in CAD males (9.2%) and CAD females (6.7%) as compared to control males (1.3%) and control females (5%).

As per table 2, there is decrease frequency of radial type of C-line in both sexes and right hand ($P<0.05$) in CAD; and increase frequency of absent type in both sexes ($P<0.001$ in males) and both hands ($P<0.01$ in right hand and $P<0.05$ in left hand) in CAD as compared to controls. There is also high frequency of ulnar type in females and right hand in CAD whereas the frequency of proximal type is increased in males and both hands in CAD.

Fig. 1: Showing palmar print of left hand of male CAD patient.

Fig. 2: Showing different palmar areas with digital triradii (a,b,c,d) at the base of digit II to V.

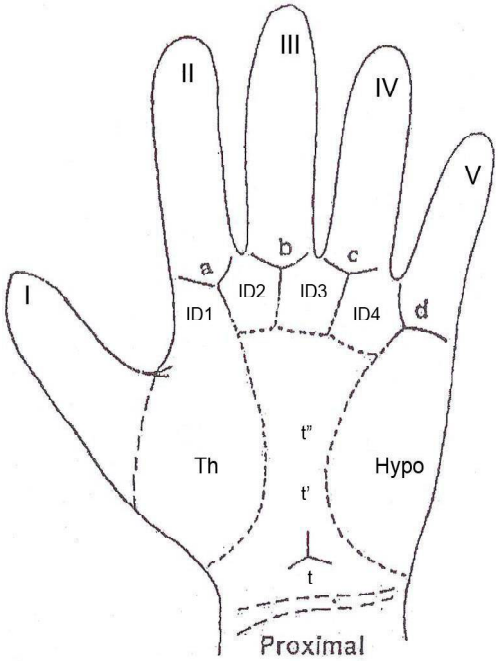

Fig. 3: Showing palmar main lines (A,B,C,D) with terminals (assigned numbers) along the periphery of the palm.

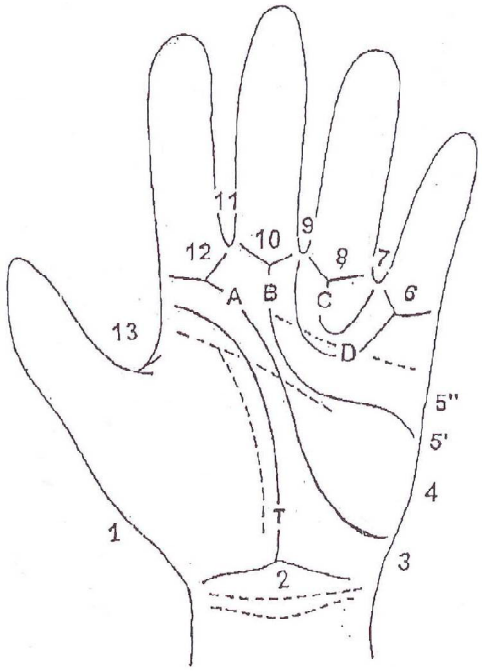

Table 1: Frequency distribution of different types of C-Line in CAD and Controls.

(Types of C-Line: R= Radial, U= Ulnar, P= Proximal, A= Absent)

Subject	SEX	Side	Types of C-Line							
			R	%	U	%	P	%	A	%
CAD	MALE	Right	65	54.2	33	27.5	11	9.2	11	9.2
		Left	35	29.2	49	40.8	25	20.8	11	9.2
		R+L	100	41.7	82	34.2	36	15	22	9.2
	FEMALE	Right	10	33.3	15	50	3	10	2	6.7
		Left	7	23.3	14	46.7	7	23.3	2	6.7
		R+L	17	28.3	29	48.3	10	16.7	4	6.7
	TOTAL (M+F)	Right	75	50	48	32	14	9.3	13	8.7
		Left	42	28	63	42	32	21.3	13	8.7
		R+L	117	39	111	37	46	15.3	26	8.7
Control	MALE	Right	76	63.3	33	27.5	10	8.3	1	0.8
		Left	44	36.7	53	44.2	21	17.5	2	1.7
		R+L	120	50	86	35.8	31	12.9	3	1.3
	FEMALE	Right	20	66.7	6	20	3	10	1	3.3
		Left	6	20	13	43.3	9	30	2	6.7
		R+L	26	43.3	19	31.7	12	20	3	5
	TOTAL (M+F)	Right	96	64	39	26	13	8.7	2	1.3
		Left	50	33.3	66	44	30	20	4	2.7
		R+L	146	48.7	105	35	43	14.3	6	2

Table 2(a): Statistical Comparison of C-Line types between CAD and Controls in Males and Females.

SEX	Subject	TYPES OF C-LINE			
		R	U	P	A
MALE (240)	CAD	100	82	36	22
	CONTROL	120	86	31	3
	Chi Sq	3.03	0.08	0.28	13.67
	P-Value	0.0817697	0.7740475	0.5983136	**0.0002177**
FEMALE (60)	CAD	17	29	10	4
	CONTROL	26	19	12	3
	Chi Sq	2.32	2.81	0.06	0
	P-Value	0.1277577	0.0935325	0.8134941	1
COMBINED (M+F) (300)	CAD	117	111	46	26
	CONTROL	146	105	43	6
	Chi Sq	5.31	0.18	0.05	11.92
	P-Value	**0.021235**	0.6706481	0.8183088	**0.0005563**

Table 2(b): Statistical Comparison of C-Line types between CAD and Controls in Right and Left hand.

SIDE	Subject	TYPES OF C-LINE			
		R	U	P	A
RIGHT HAND (150)	CAD	75	48	14	13
	CONTROL	96	39	13	2
	Chi Sq	5.44	1.04	0	7.02
	P-Value	**0.0196812**	0.3087299	1	**0.0080715**
LEFT HAND (150)	CAD	42	63	32	13
	CONTROL	50	66	30	4
	Chi Sq	0.77	0.05	0.02	3.99
	P-Value	0.3807789	0.8155773	0.8866173	**0.0457479**

DISCUSSION

Coronary artery disease is the most important cause of morbidity and mortality in the world. The knowledge of major risk factors and its relation with genetic susceptibility serves as a screening tool in prevention of myocardial infarction.[9] Genetic predisposition is one of the known risk factors for coronary artery disease. Dermatoglyphic patterns form in utero during early gestation and may be influenced by genetic or environmental factors operating at that time [10]. Since cardiac embryogenesis also occurs during early gestation, an analysis of dermatoglyphics in heart diseases might reveal some types which are associated with aberrant dermatoglyphics [10]. Some studies also report the relation between dermatoglyphic finger ridge patterns as an indicator of genetic susceptibility in the incidence of myocardial infarction [11-15], but none of the studies focussed on dermatoglyphic C-line pattern of the palm.

Among the four main lines (A,B,C,D) of the dermatoglyphic pattern of the palm, it has been noticed that the C-Line is the only main line which shows true polymorphism in terms of direction as well as degree of transversality [5]. The present study deals with the bilateral and bisexual differences exhibited by C-Line termination among CAD. Radial type is the most common termination of C-line followed by ulnar type and proximal type in both CAD and control except CAD females and in left hand. Dermatoglyphic C-lines of the palm show a peculiar pattern in different medical disorders [16]. But, no literature is available showing pattern of C-line in CAD for comparison. However, few studies regarding C-line patterns in different diseases are available. Stein and Rott (1980) [17] reported no difference between the patients of cystic fibrosis and general population except for the higher tendency of reduction of proximal and absent types of C-line. Bagga A (1987) [18] reported considerable increase of radial and proximal types on the left palm of the paranoid and catatonic patients of schizophrenia with bilateral decrease of ulnar type among all the sub-categories. Absent types showed a steep increase in all the sub-categories of schizophrenic. Eswaraiah (1978) [19] also observed high frequency of absence of C-line among the Schizophrenic as compared to normal populations.

Eswaraiah and Bali (1977) [20] have reported decrease frequency of ulnar type in male diabetic and increase frequency of ulnar type in female diabetics. They have further reported increase frequency of proximal type in both sexes of diabetics as compared to control. Sant et al (1983) [21] also reported significant reduced frequency of ulnar type in both sexes of diabetics and increase frequency of radial type in diabetic females. They also reported significant increase of absent type in male diabetics. Proximal types have same frequency in diabetics and controls. Ojha and Gupta (2014) [22] found predominance of radial type in diabetic patient in contrast to predominance of absence of C-line in control. Nand Lal and Sureka (2012) [1] found significant increase in radial type of C-line pattern in epileptic patients. But, absent types is seen in 29% control as compared to 8% in cases of epilepsy. However, in the present study, there is significant decrease frequency of radial type and increase frequency of absent type of C-line in CAD in both sexes and right hand. But in left hand, there is significant increase frequency of radial type and absent type of C-line in CAD. There is increase frequency of ulnar type in females and right hand in CAD.

From the above findings, it appears that there exist a variation in dermatoglyphic pattern of C-line of palm in coronary artery disease and suggests that antenatal factors may contribute to the etiology of CAD. Thus, it can be useful in screening the population for early detection and thereby prevention of disease. However, further extensive studies are necessary to explore the effective correlation between dermatoglyphic C-line pattern of palm and CAD to confirm these findings.

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Conflicts of Interests: None

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