Ind. J. Phys. Anthrop. & Hum. Genet. Vol. 35. No. 1, (2016) : 77-82

PALMAR C-LINE PATTERN IN ANGIOGRAPHICALLY PROVEN CORONARY ARTERY DISEASE

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ABSTRACT

Dermatoglyphics as a diagnostic aid is now well established in number of diseases, which have strong hereditary basis. Available literature on palmar dermatoglyphics in coronary artery disease is scanty and little is known about co-relation of C-Line types in various disorders. Depending on the termination of C-line, it is classified into four modal types namely radial, ulnar, proximal and absent. In the present study, bilateral inked impressions of 150 patients of angiographically proven Coronary Artery Disease (CAD) were compared with equal number of controls for palmar C-line pattern. The C-line terminates frequently on radial side 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.

Keywords: C-line polymorphism; palmar dermatoglyphics; coronary artery disease; correlation.

INTRODUCTION

C-Line is the only main line of the palm which is truly polymorphic, since it demonstrates qualitative (directional) as well as quantitative variation manifested in the degree of transversality and size reduction culminating in complete suppression. Hence, it is used by physical anthropologists and geneticists as an important tool for population genetics studies (Plato, 1970; Sengupta and Sharma, 1983; Garg, 1985). However, few studies were available which shows the co-relation of C-line types and medical disorder. Against this background, present study is conducted with a view to find out the pattern of palmar C-line types in coronary artery disease.

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MATERIAL AND METHODS

The data analysed in the present study consists of bilateral inked 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) on the Map Litho White Paper. The terminations of C-Line of the palm were classified into four modal types according to the direction of their path (Plato, 1970). 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 predominates 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 decreased frequency of radial type of C-line in both sexes and right hand ($p<0.05$) in CAD; and increased 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.

DISCUSSION

Among the four main lines (D,C,B, A), it has been noticed that the C-Line is the only main line of the palm which shows true polymorphism in terms of direction as well as degree of transversality (Plato, 1970). The pattern of C-line in the general population varies from one region to other. In the present study, 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. Garg (1985), Balgir and Sharma (1986), Narahari *et al.* (2008), Nand Lal and Sureka (2012) and Sharma *et al.* (2012) reported high frequency of C-line terminated towards radial side followed by ulnar side among the Gaur Brahmins of Punjab, male Gujjars of North-western India, Khond population of Andhra Pradesh, people of Churu district of Rajasthan, and Jaipur district of Rajasthan respectively, which is very much in consistence with the present study. However, Kusuma *et al.* (1994) and Deva *et al.* (2010) revealed that C-line terminates more frequently towards ulnar side followed by radial side among majority of the Andhra populations of India. But, Ojha and Gupta (2014) had reported predominance of absent pattern of C-line in the control population of Udaypur district of Rajasthan. In relation to termination pattern in individual outside India, C-line terminated most frequently on the ulnar side followed by proximal side in Nigerian populations (Jajd and Igbigbi, 2010) and ulnar side followed by radial side among Caucasian of south Iran (Kamali Sharif, 1984). In most of the tribes of Nigerian population had a complete absence of radial type of C-line (Jajd and Igbigbi, 2010). But, Sternberg *et al.* (1975) has reported 21-43% incidence of radial termination in black American population.

In spite of such variations in the general population in different regions, C-lines show a peculiar pattern in different medical disorders (Schaumman and Alter, 1976). The present study deals with the bilateral and bisexual differences exhibited by C-Line termination among CAD. 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) 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 (1987) 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) also observed high frequency of absence of C-line among the Schizophrenic as compared to normal populations.

Eswaraiah and Bali (1977) have reported decrease frequency of ulnar type in male diabetic and increased frequency of ulnar type in female diabetics. They have further reported increased frequency of proximal type in both sexes of diabetics as compared to control. Sant *et al.* (1983) 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) found predominance of radial type in diabetic patients in contrast to predominance of absence of C-line in controls. Nand Lal and Sureka (2012) 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 decreased frequency of radial type and

increased frequency of absent type of C-line in CAD in both sexes and right hand. But in left hand, there is significant increase in frequency of radial type and absent type of C-line in CAD. There is increased frequency of ulnar type in females and right hand in CAD. Thus, it appears that there is correlation between palmar C-line and CAD. However, further extensive studies are necessary to explore the effective correlation between palmar C-line and CAD to confirm these findings. But it can be useful in screening the population for selecting the individual for further investigation to confirm or to rule out CAD.

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

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	15.0	22	9.2
	FEMALE	Right	10	33.3	15	50.0	3	10.0	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	Right	75	50.0	48	32.0	14	9.3	13	8.7
	(M+F)	Left	42	28.0	63	42.0	32	21.3	13	8.7
		R+L	117	39.0	111	37.0	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	50.0	86	35.8	31	12.9	3	1.3
	FEMALE	Right	20	66.7	6	20.0	3	10.0	1	3.3
		Left	6	20.0	13	43.3	9	30.0	2	6.7
		R+L	26	43.3	19	31.7	12	20.0	3	5.0
	TOTAL	Right	96	64.0	39	26.0	13	8.7	2	1.3
	(M+F)	Left	50	33.3	66	44.0	30	20.0	4	2.7
		R+L	146	48.7	105	35.0	43	14.3	6	2.0

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

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	1.0000000
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*

(*p<0.05)

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	0.00	7.02
	p-value	0.0196812*	0.3087299	1.0000000	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*

(*$p<0.05$)

ACKNOWLEDGEMENTS

The authors gratefully thank to Dr. Jaspal Singh Arneja, Director Arneja Heart Institute; Dr. Uday B. Mahorkar, Director Awanti Heart Institute; and Dr. Harshawardhan Mardikar, I/c Spandan Heart Institute and Research Centre, Nagpur for permitting to take palmar prints of the patients in their hospitals/ institute. The authors also wish to thank all person concerned in palmar prints and Mr. Dashrath Basannar, Statistician, Armed Forces Medical College, Pune for his contribution in this study.

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