Research Article

Digital and palmar dermatoglyphics patterns in myocardial infarction

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Abstract

Introduction: Dermatoglyhics is the scientific study of skin creases and lines and has formed an important part of surface anatomy. The development of dermatoglyphics occurs at much earlier embryonic stage. This is the same period when most of the organs and systems develop including the cardiovascular system. Hence in this study we evaluated the dermatoglyphics in patients of Myocardial Infarction as compared to normal counterparts. **Materials and Methods:** Study was carried out in Department of Anatomy, in D. Y. Patil medical college during January 2011 to June 2012. Finger prints and palm prints of 150 diagnosed cases of Myocardial Infarction 120 males (M) and 30 females (F) and 150 Control group120 males and 50 females were obtained. Materials required for standard ink method was collected and used for data collection of both the hands. Written consent of the patients was obtained. **Results:** It was observed in our present study that there was significant increase in whorls and decrease in percentage loops and arches in Myocardial Infarction as compared to controls. The frequency of total palmar pattern in Myocardial Infarction Group is decreased in both sexes and both sides as compared to the controls. There was increase in frequency of position of axial triradii at t' and t'' in both hands of myocardial Infarction group in both sexes. **Conclusion:** Dermatoglyphics in Myocardial Infarction showed significant variation as compare to normal. Presence of above dermatoglyphic features will help us to predict that these individuals may be susceptible for myocardial infarction. It warrants further research in the same direction.

Keywords: Arches, Dermatoglyphics, Loops, Myocardial infarction, whorls.

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INTRODUCTION

In India, since ancient times till today, the ridges on the palms and fingers have been studied for prophecy and fortune telling. With the emergence of civilization, this interest was replaced by a methodical and a scientific study on these patterns. Skin is composed of epidermal and dermal layers. The junction of dermis and epidermis is irregular and projections of the dermis are called papillae that interdigitate with evaginations of the epidermis known as epidermal ridges.[1] The study of the epidermal ridge patterns of the skin of the fingers, palms, toes and soles is known as 'Dermatoglyphics'. Harold Cummins coined the term 'Dermatoglyphics' in 1926.[2] Greek derma-skin, Greek Glyphein- to carve.[3] The dermatoglyphic science is based upon 2 major facts; firstly, the ridges are unique for each individual, they are not same even uniovular twins and secondly, the ridges are permanent throughout life.[4] The dermal ridge differentiation takes place early in the foetal development. The ridges develop between the tenth and nineteenth intrauterine weeks, forming different patterns. The resulting ridge patterns are genetically determined and are influenced by environmental factors.[5] Finger ridge counts and frequencies of all palm patterns follow the genetic modes of major genes. The distribution of interdigital patterns has been proven to follow a multi-allelic major gene mode of inheritance.[6] Dermatoglyphics has been studied in certain clinical disorders which are

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associated with chromosomal and developmental defects like Mongolism, Turner's syndrome, Cardiovascular disease, Diabetes mellitus, Bronchial asthma[7] and Schizophrenia.[8] In this modern world of competition, fast life and deteriorating environment, stress and strain is a major contributing factor for health hazard. This is bound to increase the incidence of Myocardial Infarction. Myocardial Infarction is one of the leading cause of death in the Indian sub continent. The mortality rate with acute infarction is approximately 30%, more than half of these deaths occur before the attacked individual reaches the hospital.[9] The aetiology of Coronary Heart diseases is believed to be multi-factorial with genetics playing an important role**.** Hence a study has been done to find dermatoglyphics in Myocardial Infarction which may be a possible preventive measure to be taken in such susceptible case.

MATERIALS AND METHODS

The present study was carried out in the Department of Anatomy D. Y. Patil medical college, Kolhapur. It includes 150 diagnosed patients 120 males (M) and 30 females (F) of Myocardial infarction, age ranging from 33yrs to 85yrs. These cases were confirmed by clinical findings, electrocardiographic changes and serum enzyme levels. Similarly equal numbers of normal healthy individual were included as controls. The individuals with history/family history of hypertension, diabetes or any cardiac problem were excluded from controls.

The materials used to take the dermatoglyphic patterns of the palms were

Porcelain tile, "Camlin" duplicating ink, a rubber roller, white executive bond paper of 15 x 20 cms**,** sponge of 30 cms x 20 cms**,** spirit, soap, towel, water**,** cotton and magnifying lens.

Method

For collecting the data, standard ink method was used.[10] Patients and controls were made to wash both the hands, with soap and water and dried by towel. A small amount of camlin's duplicating ink was spread over the porcelain tile by means of rubber roller to obtain a thin uniform film of ink on the tile.

Prints of the finger tips

The distal phalanges of person's right hand were inked over the tile by a firm pressure starting from the thumb. Executive bond paper kept over the wooden pad was used for recording the finger print patterns. Rolled finger prints were obtained from thumb to little finger. The prints were numbered as Digit number I, II, III, IV and V from thumb to the little finger. The same procedure was done for recording the finger prints of the left hand.

Prints of the palms

The palm of the person's right hand was inked over the tile by applying firm even pressure over the dorsum of hand and if necessary it is again inked with the help of rubber roller. An executive bond paper of size 15 x 20 cm was kept on the wooden pad and the right hand of the person was pressed firmly on the paper using even pressure on the dorsum of the hand and a palm print was obtained. The above procedure was repeated to print left Palm. Prints were examined by using magnifying lens and details were noted

1. Fingers: Fingertip Pattern configuration
2. Palms: Palmar pattern configuration.
    1. Hypothenar (Hyp)
    2. Thenar (Th/I_1)
    3. Interdigital area - (I_2, I_3 and I_4)
3. Axial triradii: Triradius is the point of confluence of ridges. Triradii close to palmar axis found in the proximal region of palm, near the wrist crease are termed as Axial triradius (t).

t''- triradius situated near the center of palm.
t'- intermediate triradius situated between t'' and t.

RESULTS

In present study all the data obtained from both Myocardial infarction group and controls were analysed qualitatively using chi square test.

Table 1: Frequency distribution of fingertip patterns

Sex	Subject	Finger tip patterns (%)			Inference
		Loops	Arches	Whorls	
Males(M)	MI cases	51.4	5.9	42.8	X2-16.9; P-0.0002 SA
	Control	57.6	7.7	34.8	
Females(F)	MI cases	59.0	8.3	32.7	X2-2.33; P-0.312 NS
	Control	64.4	8.6	27.0	
M+F	MI cases	52.9	6.4	41.1	X2-19.9; P-0.001 SA
	Control	59.0	7.9	33.2	
Right (RT) Hand	MI cases	52.3	6.4	42.1	X2-9.23; P-0.0099 SA
	Control	57.1	8.4	34.5	
Left (LT) hand	MI cases	53.4	6.4	40.1	X2-11.1; P-0.0038 SA
	Control	60.8	7.3	31.8	

There was decrease in the percentage of loops and arches in both sexes (M+F) in both hands with corresponding significant increase in the percentage of whorls patterns in Myocardial infarction Group as compared to the controls

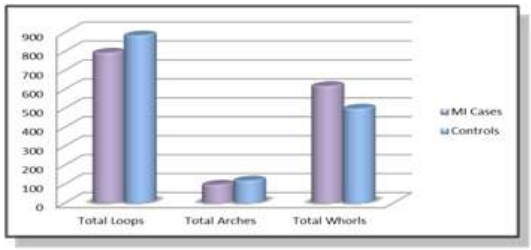

Figure 1: Showing frequency distribution of fingertip pattern

There was increase frequency of ulnar loop patterns as compared to radial loop pattern in both sexes in Myocardial Infarction as well as in the controls. There was increase in the percentage of tented arches as compared to the plain arches in both sexes of Myocardial Infarction. Simple whorls were seen in increased frequency as compared to double loop whorls and other composite whorls in both sexes in cases as well as controls.

Table 2: Frequency distribution in percentage of true palmar patterns in cases and controls

Sex	Subject	Hypo	Thenar/I_1	I_2	I_3	I_4	Inference
M	MI Group	87.9	43.4	12.5	43.4	49.2	X^2-5.83;
	Control	88.4	44.6	7.1	51.7	58.8	P-0.32 NS
F	MI Group	86.7	10	3.3	25	58.4	X^2-12.6;
	Control	83.3	38.4	6.7	41.7	45	P-0.027 SA
M + F	MI Group	87.7	36.7	10.3	39.7	57	X^2-7.13;
	Control	87.4	43.4	6.3	49.7	56	P-0.211 NS

In Myocardial infarction group, the percentage of palmar patterns is 87.7%, 57%, 39.7% and 36.7% in hypothenar, I_4, I_3, and thenar areas respectively as compared to 87.4%, 56%, 49.7% and 43.3% respectively in controls.

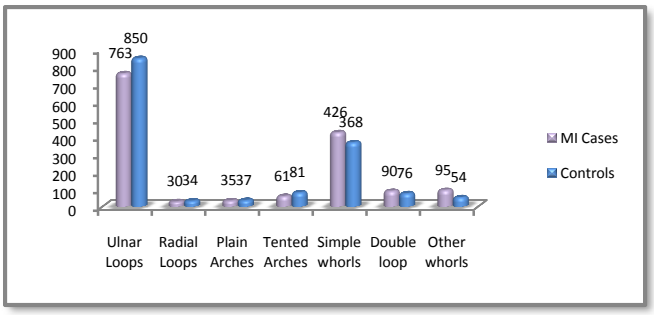

Figure 2: Frequency distribution of different Fingertip patterns

Table 3: Frequency distribution of position of axial triradii

Position of axial Triradii					Inference
Side	Subject	T	t'	t"	
M	MI group	177	32	3	X2-21.9;
	Control	190	23	1	P-0.0002 SA
F	MI group	39	20	0	X2-5.73;
	Control	44	12	0	P-0.057 NS
M + F	MI group	216	52	3	X2-6.92;
	Control	234	35	1	P-0.07 NS

There was decrease in the frequency of axial triradii near wrist (t) with increase in the frequency of t' and t" position in myocardial infarction group in both hands of both sexes. There was statistically significant increase in the frequency of position of axial triradii at t'and t" in Myocardial infarction group males.

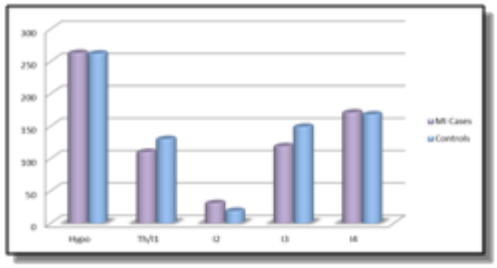

Figure 3: Frequency Distribution of True Palmar Pattern

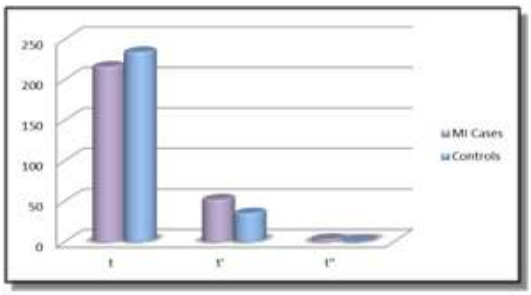

Figure 4: Showing frequency distribution of position of axial triradii

DISCUSSION

The scientific study of papillary ridges of the hands and feet is credited as the beginning with the work of Purkinje in 1823. Since then scientists are searching to find its relation to identity of an individual and relation of susceptibility to killer diseases.[11] Dermatoglyphics as a diagnostic tool is now well established in number of diseases which have strong hereditary basis. Myocardial infarction is multifactorial in origin reflecting a complex interaction between multitude of genetic factors and environmental factors, so certain dermatoglyphic variation is to be expected in it. In the present study there was decrease in the percentage of loops (51.4%) and arches (5.9%) while increase in the percentage of whorls (42.8%) in myocardial infarction group. Differences in frequencies were statistically significant (P-0.0002) in males. In Right and Left hand, there was significant decrease in the percentage of loops and arch pattern and increase in the percentage of whorl pattern in myocardial infarction group as compared to the controls (P-0.003). The frequency of arches was decreased in all digits of myocardial infarction group in both sexes, expect Digit I in males; Dight IV and Dight V in females. This was statistically significant in males (P-0.024) and in females (P-0.032). These findings were found to be similar with following workers. Dhall *et al*. (2000)[12] observed that the loop pattern (54.71%) was significantly lower and whorl pattern(35.87%) was significantly higher in myocardial infarction patients as compared to the control Group. There was decrease in the frequency of arches (9.42%) but not statistically significant. He observed significant lower percentage of loops in Digit I (50.1%) and Digit IV (33.3%). He noticed higher percentage of whorls in all the digits of the patients with statistically significance in Digit I (38%), Digit V (29.6%) and Digit IV (57.1%). Anderson MW *et al*. (1981)[13] found decrease in the loop pattern and increase in whorl pattern in myocardial infarction with no statistical significance. Rashad *et al*. (1978)[14] had observed less frequency of loops, arches and reported significantly higher frequency of whorls in myocardial infarction patients. Jalali *et al*. (2002)[15] There was significant decrease in the percentage of loops (46.8%) in myocardial infarction. He found significant increase arches (7.2%). He noticed that the percentage of arches was increased in all digits of myocardial infarction patients with significant increase in Digit I, Digit II and Digit IV (P<0.0001). He revealed slight increase in the percentage of whorls (46%) in myocardial infarction. The frequency of total palmar pattern in myocardial infarction group is decreased in both sexes and both sides except in hypothenar, I_2 and I_4 area. I_2 area in myocardial infarction males; hypothenar area and I_4 in myocardial infarction group females showed increase frequency of palmar pattern. There is decrease in the frequency of axial triradii near wrist (t) with increase in the frequency of t' and t" position in myocardial infarction group in both hands in both sexes.

CONCLUSION

The knowledge of dermatoglyphic pattern in patients with Myocardial infarction is an interesting matter and little information is available about this relation. From the present study it is concluded that there is variation in

dermatoglyphic patterns in myocardial infarction patients when compared to controls. These variations were:

- Decreased frequency of loops and arches and significant increase in whorls in both hands of myocardial infarction group.
- Significant decrease in frequency of arches in all digits of myocardial infarction group in both sexes, except digit I in males, digit IV and V in females.
- In males frequency of palmar pattern is seen decreased in all areas except I_2. In females there is significant decrease in frequency of palmar pattern except hypothenar area and I_2.
- There is increase in frequency of position of axial triradii at t' and t'' in both hands of myocardial infarction group in males and females. It is statistically significant only in males.

The diagnosis of myocardial infarction is often difficult due to scarcity of physical signs, especially in rural areas of developing countries where diagnostic facilities are lacking. Presence of above dermatoglyphic features will help us to predict that these individuals may be susceptible for myocardial infarction.

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