A COMPARATIVE STUDY OF DERMATOGLYPHIC PATTERNS IN PATIENTS WITH MYOCARDIAL INFARCTION AND CONTROL GROUP

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Abstract- ***Coronary artery disease (CAD) is the most important cause of mortality and morbidity in the world. The knowledge of major risk factors can be useful in prevention of CAD. There is no known major risk factor in many patients with myocardial infarction (MI). The dermatoglyphic pattern in patients with myocardial infarction is an interesting matter and little information is available about this relationship. The objective of this study is to investigate the relation between the dermatoglyphic pattern as indication of genetic susceptibility in the incidence of myocardial infarction.***

We conducted a multi-centre cross-sectional study of 900 patients with diagnosis of myocardial infarction admitted or referred to six hospitals in three large cities in the north of Iran. The control group consisted of 900 subjects who were selected from those who were referred to police information system at the time when cases had been diagnosed. The dermatoglyphic pattern of finger lines was determined using classic categorization by supervision of experts in Identification Diagnosis Administration Office. For each subject 10 fingerprints had been derived. Overall, 9000 fingerprints for cases and 9000 fingerprints for control group were obtained for analysis. The findings show that 55.3% of cases were male and 44.7% were female and 70.6% of patients had, Q-wave and 29.6% had non-Q wave MI. In patients group, the distribution of dermatoglyphic pattern was 7.2 % arch type, 46.8 % loop type, and 46% whorl type of fingerprints. In contrast, in the control group, there were 3.7%, 50.7% and 45.5% respectively. The odds ratio(OR) of arch type vs whorl type was 1. 89 (P < 0. 0001) and odds ratio of loop type vs whorl type was 1. 23 (P < 0. 0001). This result shows a statistical significant increase in the rate of arch type fingerprints in patients with MI roughly two times. Also, in subgroup analysis, the percentage of arch type was significantly increased in left thumb, left forefinger and left ring finger among cases (P < 0. 0001)

Our findings indicated that there is a significant relation between the arch types of fingerprint and the risk of MI. Thus, dermatoglyphic analysis of subjects can help in early detection of persons with susceptibility to myocardial infarction, particularly among those without major risk factors, especially, among subjects with arch type pattern of fingerprint on the left thumb, left forefinger and left ring finger.

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INTRODUCTION

The types of fingerprint is unique based on the genetical characteristics of each individual. The analysis of the shape of lines on the fingers of hand and foot is called dermatoglyphic. In the recent decades, a considerable improvement has been achieved in the concept of relation between the types of pattern of lines on the fingers and some individual disorders (1-4). The pattern of lines on the finger of hand as a method of diagnosis has been documented in medicine (2-4). Cummins and Tompson (1939) presented dermatoglyphic pattern in patients with Downs' syndrome when its cause was unknown. Based on the dermatoglyphic pattern of cases, they found that the genetic factors are the main cause of this disease. This study was the first step of conception of type of line of skin and its relation to genetical disorders (1). Basically, the pattern of the skin lines on the finger is formed in the second trimester of the foetus and it dose not change for each individual during the life and this pattern is transferred genetically from one generation to others. Generally, the pattern of fingerprint is divided to three types, namely arch, loop and whorl (Fig. 1). The arch type is divided to two subgroups: simple and tented and the loop type is divided to two subgroups: radial and ulnar. The whorl type is divided to five subgroups as simple, central packed loop, twinned loop, lateral packed loop, and accidental. In general population, the line pattern is consisted of 4%, 55 % and 41% from arch type, loop type and whorl type respectively (1). An extensive report has been published with regard to the relation of skin lines and various diseases (1-11), for example, Down's syndrome, schizophrenia, constipation, congenital hypodentia and bile ducts atresia. Bolgir et al. (1993) investigated the fingerprints in patient with schizophrenia (5) and they found that there is a significant difference on the

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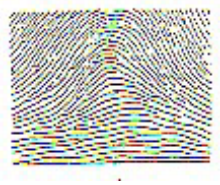
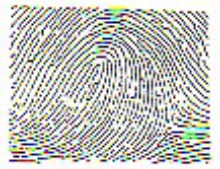
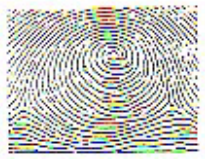
dermathoglyphic pattern between patients with and without family history of schizophrenia, which indicated the role of genetic factors in the etiology of schizophrenia.



a: arch type



b: loop type



c: whorl type

Fig. 1. The three major patterns of finger print

Coronary artery disease (CAD) is the most important cause of mortality and morbidity in the world. For example, in the United States, 1.5 million people are suffering from myocardial infarction annually out of which 45% of them are under 65 years (12). Thus, the cost of lost years and the cost of therapeutic management are the major problems. The knowledge of major risk factors can be useful in prevention of CAD. Also, the risk of CAD is related to genetic susceptibility; sometimes, the risk factors such as high levels of cholesterol, and triglycerid, hypertension, overweight and diabetes mellitus might have genetic susceptibility that can provide early detection of CAD. The role of HLA and its relation to immunological type in patient with CAD had been documented, but the knowledge of genetic susceptibility and determining HLA is not cost efficient and problematic in the developing countries (13). The knowledge of dermatoglyphic pattern in patients with myocardial infarction is an interesting matter and little information is available about this relation. Thus, with regard to the high incidence of myocardial infarction (MI) in the world, the existence of such relation might be important in the screening program for prevention of MI. If an individual with special pattern of dermatoglyphic is susceptible to MI, he or she can be screened for prevention by controlling other risk factors in early detection program. This study was conducted to investigate the relation between the dermatoglyphic pattern as indication of genetic susceptibility in patients with myocardial infarction.

MATERIALS AND METHODS

We conducted a multi-centre cross-sectional study of 900 patients with diagnosis of myocardial infarction who had been admitted to out-patient services or coronary care unite (CCU) of the educational and therapeutic hospitals in four large cities (Babol, Sari, Gorgan and Gonbad) and 900 control subjects in the north of Iran (2000). In this cross-sectional design, the status of subjects and the types of fingerprints were assessed at the same time but with two independent samples from cases and controls. In selection of cases, the inclusion criteria for MI, was based on the clinical observation, typical electrocardiographic changes for MI and an increase in the biomedical markers such as LDH and CPK Isoenzymes. Based on this data, the case had been diagnosed by direct supervision of a cardiologist. For cases, diastolic hypertension >85 mmHg, cholesterol >220 mg/dl and triglycerid >250 mg/dl were considered as greater than normal level. The control group was selected from those referred to police information system for employment and various tests at the time cases had been diagnosed. The control group had not any clinical or paraclinical evidences for MI. In selection of control, we constrained subjects with age >30 and within normal range of electrocardiogram. We excluded subjects with hypertension, hypercholesterolemia, diabetes, overweight, smokers and any family history of CAD in control group. The identification of dermatoglyphic pattern of finger lines was determined with the same procedure for cases and controls using classic categorization of dermatoglyphic pattern by supervision of an expert who was blind with respect to the case and control status in Identification Diagnosis Administration Office. For each subject, 10 fingerprints had been derived. Overall, 9000 fingerprints for cases and 9000 fingerprints for control group were obtained for analysis. The data consisted of age, sex, type of MI, the location of MI and the pattern of fingerprints and case status. Thus the type of fingerprints of 10 fingers for each subject was the main independent variable under study. In statistical analysis, we used SPSS software and the Chi-square and Z tests to decide the relation between the dermatoglyphic type and the incidence of MI. We also estimated the odds ratio (OR) to quantify the magnitude of association. The P-value< 0.05 was considered as statistically significant.

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RESULTS

The results show that 498 patients (55.3 %) were male and 402 (44.7%) were female; The mean age of cases was 58.6 (±8.8) years and 45% of patients were under 60 years. The mean age of control group was 58.7 (±8.9) years and 490 subjects (54%) were male and 410 (46%) female. The distribution of age and gender of two groups were quite similar (P >0.05). Based on the data of electrocardiogram, 70.6 % of MI were Q-wave and 29.6% were non-Q-wave. The distribution of major risk factors such as hypertension, hypercholesterolemia, diabetes mellitus, and smoking were 30.1%, 27.4%, 27.7% and 16.2 % respectively in patients with MI. With respect to the location of MI, there were 50.7% anteroseptal, 35.6% inferior, 4% extensive anterior, 8.7% lateral and 1% posterior. Table 1 shows the distribution of the types of fingerprints for each finger. With Chi-square test and its P-value, it shows that the pattern of fingerprints are similar between cases and controls. These results show that the distributions of dermatoglyphic pattern were 7.2% arch type, 46.8% loop type, and 4.6% whorl type. While in the control group there were 3.7%, 50.7% and 45.5% respectively. The difference of the distribution of arch type between case and control was statistically significant (P< 0.0001). Also, in subgroup analysis, the percentage of arch type was significantly increased among cases as compared with control group, particulary, in left thumb, left forefinger and left ring finger (P< 0.0001). In Table 2, the distribution of finger prints among cases with Q-wave MI and non-Q-wave MI were compared with control subjects and it showed that the percentage of arch type was significantly increased both in Q-wave and non-Q-wave MI in compared with control group (P<0.0001). The percentage of arch type tended to be greater in Non-Q-wave MI in contrast to Q-wave. Overall, the odds ratio of arch type vs whorl type was 1. 89 (P< 0.0001) and the odds ratio of loop type vs whorl type was 1. 23 (P < 0.0001). Also, we found that the rate of arch type was significantly increased among MI patients those who had not any major risk factors (Table 3). In this subgroup analysis, the odds ratio of arch type vs whorl type was 1.95 (p<0.001) while the odds ratio of loop type vs whorl type tended to decrease (OR= 0.94, P< 0.001). In addition, with respect to the location of MI, the rates of arch type were 5.9%, 6.4% and 8.9% for Ant. septal MI, Inf. MI, and Ext. Anterior MI respectively.

Table 1. The frequency and percentage of type of fingerprints in case and control groups

Type of finger	Type of fingerprints: arch		loop		whorl		Chi-square* P-value
	case No (%)	control No (%)	case No (%)	control No(%)	case No(%)	control No(%)	
R. thumb	29 (3.2)	8 (0.9)	278 (30.9)	375 (41.7)	593 (65.9)	517 (57.4)	31.5, P<0.0001
R. forefinger	98 (10.8)	71 (7.9)	350 (38.9)	346 (38.4)	452 (50.2)	483 (53.7)	5.4, P>0.05
R. middle	66 (7.3)	53 (5.9)	531 (59.0)	521 (57.8)	303 (33.7)	326 (36.2)	2.4, P>0.05
R. ring	28 (3.1) -	15 (1 .7)	295 (32.8)	347 (38.5)	577 (64.1)	538 (59.8)	9.5, P<0.01
R. small	19 (2.1)	9 (1.0)	571 (63.4)	607 (67.4)	310 (34.4)	284 (31.5)	5.8, P>0.05
L. thumb	56 (6.2)	19 (2.1)	3 61 (39.0)	472 (52.4)	493 (54.8)	409 (45.4)	35.1, P<0.0001
L. forefinger	157 (17.4)	59 (6.5)	352 (39.1)	348 (38.7)	391 (43.4)	493 (54.8)	56.3, P<0.0001
L. middle	114 (12.7)	74 (8.2)	489 (54.3)	515 (57.2)	297 (33.0)	311 (34.5)	9.5, P<0.01-
L. ring	57 (6.3)	.21 (2.3)	352 (39.1)	351 (39.0)	491 (54.5)	528 (58.7)	17.9, P<0.001
L. small	23 (2.5)	8 (0.9)	643 (71.4)	683 (75.8)	234 (26.0)	209 (23.2)	10.1, P<0.01
Total	647 (7.2)	337 (3.7)	4212 (46.8)	4566 (50.7)	4141 (46.0)	4097 (45.5)	

*DF=2 R: right L: left

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Table 2. The frequency and percentage of type of fingerprints among Q-wave and Non-Q-wave MI and its comparison with control and odds ratio and P-value

Type of fingerprints	Case Q-wave MI No (%)	Non-Q-wave MI No (%)	Control No (%)	Odds Ratio	P-value case vs control	P-value Q-wave vs Non-Q-wave
Arch	341 (5.2)	184 (6.7)	337 (3.7)	1.89	P<O. 0001	P<O. 01
Loop	3166 (48.9)	1223 (44.6)	4567 (50.7)	1.23	P<O. 0001	P<O. 0001
Whorl	3083 (46.8)	1223 (48.6)	4196 (46.6)	1.0	-	-
total	6590 (100)	2740 (100)	9000 (100)	-	-	1

33 cases had both Q-wave and non-Q-wave MI

Table 3. The frequency and percentage of type of fingerprints among 329 MI patients without major risk factors and its comparison with control and odds Ratio and P-value

Type of Fingerprints	MI No (%)	control No (%)	Odd ratio	p-value
arch	240(7.2)	337 (3.7)	1.95	P< 0.001
loop	1561(47.5)	4562 (50.7)	0.94	P< 0.001
whorl	1489(45.3)	4096 (45.5)	1.0	-
Total	3290(100)	9000 (100)	-	-

DISCUSSION

Our findings show that the arch type fingerprint is significantly increased roughly 2 times in patients with MI in contrast to the control group (7.2% vs 3.7%). Also, we found a significant difference in increasing the rate of arch type fingerprint on left thumb finger, left ring finger, and left fore finger. In addition, the arch type fingerprint was significantly increased among non-Q-wave type of MI and on the location of MI at Ant-septal and Ext-Ant in contrast to control group. This evidence is a new clue of information that had been revealed in this investigation and it has not been documented previously in the literature. This finding provide the first systematic information which was not documented in the literature. In comparison to other studies, in a dermatoglyphic study (7, 14), among patients with congenital hypodontia and biliary atresia, the increasing rate of arch type fingerprint was reported. In particular, in our subgroup analysis, when we compared the dermatoglyphic pattern between controls and cases those without indication of major risk factors, we found that an increasing arch type fingerprint significantly persisted among cases in comparison with controls. Our results show the independent effect of dermatoglyphic pattern as indication of genetical susceptibility on the incidence of MI since the two groups under comparison were quite similar with respect to age, gender and major risk factors of coronary artery disease. Thus, our univariate analyses was quite fair. In contrast to a similar study, in an investigation of 100 patients with MI and 100 controls from Kerman University of Medical Science University in Iran, Shamsoddini and et al. (1997) reported that the pattern of loop lines increased significantly as compared to control group (1). In their study, the number of Q-wave patients was more than ours but the number of non-Q-wave MI less than our study. Also, they did not investigate the pattern of dermatoglyphic with respect to type of MI. However, our study included a large number of cases and controls in six different centres; thus, we considered it as an advantage. In an other situation of dermatoglyphic study, Drongowski and Coran (1995) investigated 77 children with chronic constipation (4). They found that the rate of arch type pattern increased among cases but it was not statistically significant. Our results indicated that there is a significant relation between the dermatoglyphic pattern and the risk of MI. Thus, in the absence of major risk factors such as hypertension, increasing of cholesterol level,

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overweight, diabetes mellitus, and smoking, dermatoglyphic analysis of subjects can help in early detection of patients with susceptablity to myocardial infarction. Particularly, among subjects with arch type pattern of fingerprint in the left thumb, left forefinger and left ring finger, one might suspected to MI, unless its opposite was confirmed by decisive diagnostic methods. However, for the purpose of the consistency of results, we recommend more comparative studies in different geographical areas to identify the dermatoglyphic patterns in patients with coronary artery disease in various conditions.

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