Original Article

# Study of 'atd' angle in myocardial infarction patients

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## Abstract

**Background:** Myocardial infarction is the most important cause of mortality and morbidity in the world. 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 at which 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. Standard ink method was used for data collection of both the hands. Written consent of the patients were obtained. **Results:** Significant increase in the mean value of 'atd' angle in both sexes in myocardial infarction patients was observed as compared to controls. **Conclusion:** From the present study, it appears that there exists a specific relation in the 'atd angle' and Myocardial infarction patients, as compared to normal subjects. It warrants further research in the same direction.

**Key Words:** Dermatoglyphics, Myocardial infarction, Control group, atd angle.

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## INTRODUCTION

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 in uniovular twins and secondly, the ridges are permanent throughout life.[4] The dermal ridges 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] The fundamental assumption is that since many genes take part in the formation of dermatoglyphic characters, it is possible that genes which predispose to familial disease may, by pleiotropy, also influence the ridge patterns so that particular constellations of dermatoglyphic features may be characteristic of a particular disease.[7] Dermatoglyphics has been studied in certain clinical disorders which are associated with chromosomal and developmental defects like Mongolism, Turner's syndrome, Cardiovascular disease, Diabetes mellitus, Bronchial asthma[8] and Schizophrenia.[9] 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

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deaths occur before the individual reaches the hospital.[10] 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 collection of the data, standard ink method was used.[11] 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.

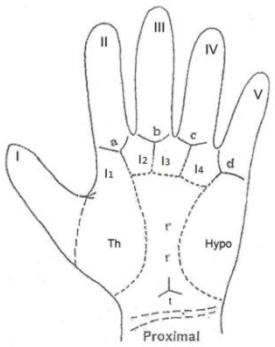


**Figure 1:** Showing Palmar Pattern Configuration and Palmar Areas with Palmar Triradii

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.

There are four digital triradii at the base of each finger from index finger to little finger (a, b, c, and, d). The Axial triradius "t" is between the thenar and hypothenar area in line of fourth metacarpal. 'atd' Angle: is constructed by joining the three triradius–a, t, and d. the atd angle is decided genetically and determined in fetal life itself (Sadler 2006).[12] When more than one axial triradii are present the most distal one is used for measurement of 'atd' angle (Fig. 1).

## RESULTS

In present study all the data obtained from both Myocardial infarction group and controls were analysed quantitatively using student's t-test to determine any significant difference in 'atd' angle.

**Table 1:** Frequency distribution of 'atd' angle in Myocardial infarction and Control groups in males

| 'atd' angle Class Interval | MALE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Myocardial Infarction(MI) Group | | | | Control group | | | |
| | Right | Left | Total | % | Right | Left | Total | % |
| 26-30 | 0 | 1 | 1 | 0.4 | 1 | 1 | 2 | 0.8 |
| 31-35 | 12 | 10 | 22 | 9.2 | 18 | 17 | 35 | 14.3 |
| 36-40 | 54 | 49 | 103 | 42.9 | 61 | 62 | 123 | 51.3 |
| 41-45 | 36 | 42 | 78 | 32.5 | 31 | 34 | 65 | 27.1 |
| 46-50 | 13 | 11 | 24 | 10 | 7 | 4 | 11 | 4.6 |
| 51-55 | 4 | 10 | 14 | 4.2 | 2 | 1 | 3 | 1.3 |
| 56-60 | 1 | 2 | 3 | 0.8 | 0 | 1 | 1 | 0.4 |

Maximum percentage of 'atd' angle is seen between 36-40 in both the groups. In males of Myocardial infarction group it is 42.9% and in control males 51.3%. Percentage of 'atd' angle is more in myocardial infarction group in class interval of 41-45 (32.5%) as compared to controls (27.1%).

**Table 2:** Frequency distribution of 'atd' angle in group and Controls in females

| 'atd' angle Class Interval | FEMALE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Myocardial Infarction(MI) Group | | | | Control Group | | | |
| | Right | Left | Total | % | Right | Left | Total | % |
| 26-30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31-35 | 6 | 3 | 9 | 15 | 6 | 4 | 10 | 16.7 |
| 36-40 | 10 | 8 | 18 | 30 | 12 | 11 | 23 | 38.3 |
| 41-45 | 9 | 12 | 21 | 35 | 9 | 8 | 17 | 28.3 |
| 46-50 | 5 | 5 | 10 | 16.7 | 2 | 6 | 8 | 13.3 |
| 51-55 | 0 | 2 | 2 | 3.3 | 1 | 1 | 2 | 3.3 |
| 56-60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

In females of Myocardial infarction, maximum percentage of 'atd' angle is seen between 41-45 (35%) as compared to control females where it is seen between 36-40 (38.3%).

**Table 3:** Test of Significance for 'atd' angle for comparison in Total Myocardial infarction group and Controls

| Sex | Sub | Mean | SD | SE-M | Inference |
|---|---|---|---|---|---|
| M | MI Group | 40.76 | 5.24 | 0.48 | Z-3.879; P-0.0001 SA |
| | Controls | 39.04 | 4.44 | 0.4 | |
| F | MI Group | 40.7 | 5.34 | 0.97 | Z-0.414; P-0.679 NS |
| | Controls | 40.3 | 5.24 | 0.96 | |
| M+F | MI Group | 40.75 | 5.25 | 0.43 | Z-3.65; P-0.0003 SA |
| | Controls | 39.29 | 4.63 | 0.38 | |

Table 3 shows statistical calculations and Z-value for 'atd' angle for comparison between total Myocardial infarction group and controls. Statistically significant difference is found in the mean value of 'atd' angle in males of Myocardial infarction group (P-0.0001) and total group (P-0.0003) when compared with the control group. There is no statistically significant difference in 'atd' angle in female of Myocardial infarction and control group.

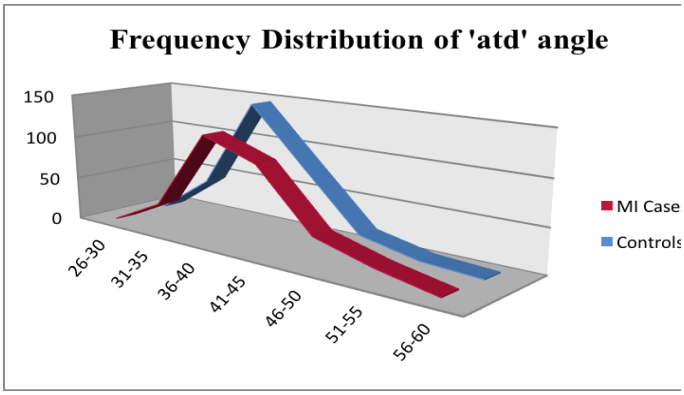


**Figure 1:** Frequency Distribution of 'atd' angle in Total (M+F) in both the groups.

## DISCUSSION

Dermatoglyphics as a diagnostic tool is now well established in number of diseases which have strong hereditary basis. Myocardial infarction being the hereditary background, certain dermatoglyphic variation is to be expected in it. The observed values in the current study were first subjected to the test of statistical significance and the findings were then compared with the available literature of previous workers In the present study, the mean value of 'atd' angle in myocardial infarction group is increased in both right and left hand as compared to the controls. There is also increase in the mean value of 'atd' angle in both sexes with significant increase in myocardial infarction group males, myocardial infarction total group (M+F). These findings were found to be similar with following workers. Rathva Ashish *et al*[13] obeserved that there is increase in the mean value of 'atd' angle in both sexes and in both hands with significant increase in Coronary Artery Diseases males (P<0.01) and (M+F) (P<0.01). Manara A *et al*[14] found the mean 'atd' angle was wider in the patients than in the controls.

## 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 significant variation in 'atd' angle in myocardial infarction patients when compared to controls. 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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