

Study of Total Finger Ridge Count (TFRC) and 'ATD' Angle in Patients of Coronary Artery Disease in Bidar

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Abstract

Introduction: Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the palmar region of hands and fingers. As a diagnostic aid, it is now well established in a number of diseases which have a strong hereditary basis. The etiology of coronary heart diseases is believed to be multi-factorial with genetics playing an important role. **Objectives:** (1) To study the finger and palmar dermatoglyphics pattern in Coronary Artery Disease (CAD). (2) To compare dermatoglyphic configurations of CAD with the controls. (3) To find out whether a specific dermatoglyphic trait/features exists in CAD patients and whether it is significant. **Methodology:** Inking method was used for taking finger and palm prints. The present study includes the dermatoglyphic patterns of CAD and that of Controls. It constitutes 100 CAD patients (60 males, 40 females) and 100 Controls (60 males, 40 females). Quantitative analysis for TFRC and "ATD" angle was done. **Results:** There was low frequency in TFRC ($p > 0.05$) in CAD group compared control group. The atd angle ($p < 0.05$) was more in CAD compared to Controls. **Conclusion:** 1. There was high percentage in total finger ridge count in CAD group when compared to controls. 2. There was high 'atd' angle in CAD group when compared to controls.

Keywords: Coronary Artery Disease; Dermatoglyphics.

Introduction

Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the palmar region of hands and fingers. The term dermatoglyphics was coined by Cummins and Midlo in 1926 and was derived from Greek words 'derma' means skin and 'glyphics' means carvings [1].

The ridge pattern depends upon the cornified layer of epidermis and dermal papillae. The typical patterns of epidermal ridges are determined since their formation in foetus. There is proliferation of cells in the lower zone of epidermis which projects into the dermis as a regularly spaced thickenings and the dermis subsequently projects upward in the

epidermal hollows. This is followed by the appearance of elevations formed by them on the skin surface which gives rise to epidermal ridges [2].

Dermatoglyphics has long been recognized as a scientific and valuable method for medicolegal, anthropological and genetic studies. The research findings put forth by some scientists suggest that muzzle prints of animals similar to fingerprints in human being could be used as permanent method of identification of such animal fraud particularly in insurance matter [3].

The etiology of Coronary Artery Disease (CAD) is multifactorial with genetics playing an important role. Taking into consideration of genetic predisposition of dermatoglyphics and coronary artery disease, the study was undertaken to find out correlation between them. So that dermatoglyphics may be helpful in the diagnosis of predisposition towards this disease at an earlier age.

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Dermatoglyphics in Coronary Artery Disease

Takashina T et al (1966) studied palmer dermatoglyphic patterns on 44 patients with

congenital heart disease and compared with patterns on 362 patients with acquired heart disease. Distal displacement (t" or multiple axial triradii) of the palmar axial triradii occurred significantly greater frequency in the patients with congenital heart disease (64%) as compared to acquired heart disease (17%) [4].

Rashad MN and Mi MP (1975) carried out dermatoglyphic studies on 800 Japanese subjects. Individuals with MI had a significantly higher finger Total and absolute ridge counts [5].

Rashad et al (1978) observed that individuals who had had MI were significantly higher in total and absolute ridge counts than other control [6].

Manara et al (2011) studied 30 patients of MI and 30 controls. The mean TFRC of MI patients was lesser than controls which was not significant ($p > 0.05$) [5].

After reviewing the above references, Dermatoglyphics is multifactorial in inheritance. CAD has various etiological causes. Various studies have been done correlating dermatoglyphics with CAD. The present study was undertaken at Bidar Institute of Medical Sciences, Bidar with the following objective: To study the finger and palmar dermatoglyphics pattern in Coronary Artery Disease (CAD) and its different groups.

Materials and Methods

The data was collected from Cardiac Care Unit, Government Teaching Hospital, Bidar. After taking oral consent of 100 or more patients of myocardial infarction, angina and IHD of the age group 30-65 years, confirmed by clinical findings and ECG report, bilateral rolled finger and palm prints were taken. While the control group data was collected from normal healthy individuals.

The study group includes 100 patients, of which 60 patients were males and 40 patients were females. The control group includes 100 controls, of which 60 were male and 40 were females.

Materials

Kore's printers ink
Ink dropper.
Rubber roller
Glass inking slab.
Cotton puff
Executive bond paper

Procedure

The persons were asked to wash their hands with soap and water and to dry them in order to remove sweat, dirt and clean the hands. Small amount of ink was placed on the inking slab with the help of ink dropper and spread with the rubber roller into a thin, even film. The palm and the film will be pressed against the slab, taking care that the whole area to be printed is covered with the ink. The inked hand was placed on paper that was kept on smooth and even surface in such a way that, at first the palmar aspect of the wrist rested firmly over the paper and then gently the palmar aspect of the hand was placed on the paper with all fingers in abducted position. Each fingertip was gently rolled side to side to get complete print of the pattern. By holding the paper in place, the hand was gently taken off the paper.

The data collected was tabulated separately for male and female in CAD and controls and it was also tabulated for combined male and female in CAD and controls.

The statistical analysis was done as follows:

2. Quantitative analysis of finger prints: (t- test is applied)
 - i) Total finger ridge count (TFRC)
 - ii) 'ATD' angle

t-Test

Two-sample t-test: $DF = (s_1^2/n_1 + s_2^2/n_2) / \{ [(s_1^2 / n_1) / (n_1 - 1)] + [(s_2^2 / n_2) / (n_2 - 1)] \}$
Where, s_1 is the standard deviation of sample 1 (CAD), s_2 is the standard deviation of sample 2 (Control), n_1 is the size of sample 1 (CAD) and n_2 is the size of sample 2 (Control).

Total Finger Ridge Count (TFRC)

TFRC represents the sum of ridge counts of all ten digits, where only the larger count is used on those digits with more than one ridge count. It expresses the size of pattern.

'ATD' Angle

It is formed by lines drawn from digital triradius 'a' to the axial triradius 't' and from axial triradius 't' to the digital triradius 'd'. The more distal the position of t, the larger the 'ATD' angle. 'ATD' angle is the most widely used method in interpreting the position of triradius 't'.

Results

The present study includes the dermatoglyphic patterns of CAD and that of Controls. It constitutes 100 CAD patients (60 males, 40 females) and 100 Controls (60 males, 40 females). Quantitative analysis for TFRC and "ATD" angle was done.

Table 1 shows mean of total finger ridge count in CAD male is 6368 and mean±SD is 106.1±26.14, while in control male TFRC is 6004, mean±SD 100.06±31.95 (p>0.05). There is increase in TRFC in CAD male compared to control male, though the difference was statistically not significant.

Table 2 shows mean of total finger ridge count in CAD female is 3988 and mean±SD is 99.7±27.67, while in control female TFRC is 3630, mean±SD is 90.75±17.33 (p>0.05). There is increase in TRFC in CAD female compared to control female, though the difference was statistically not significant.

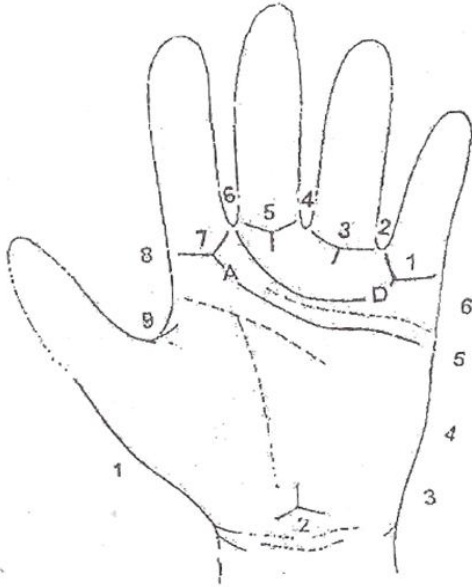
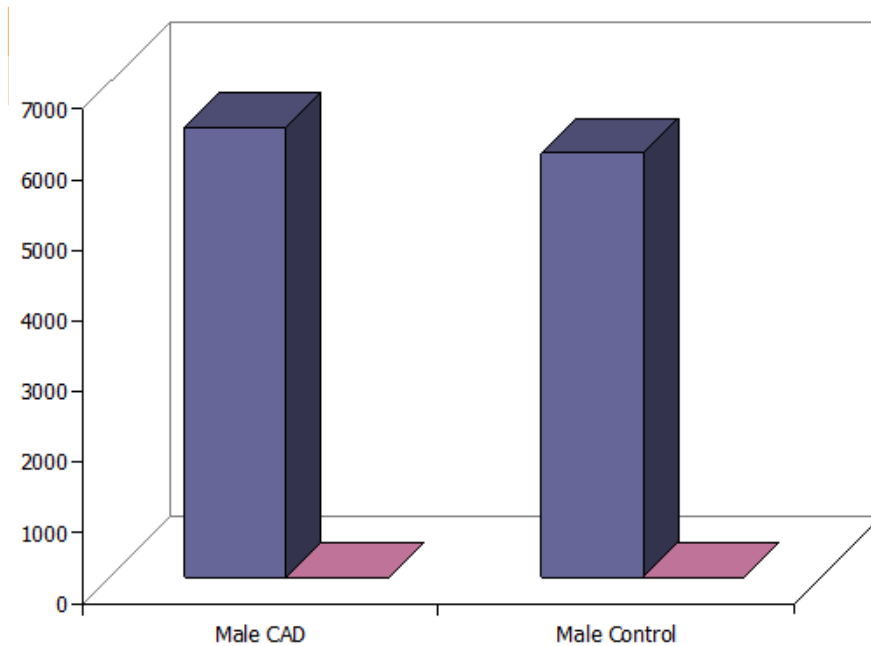


Fig. 1: Showing 'atd' angle

Table 1: Distribution of total finger ridge count patterns in male between patients (CAD) and Control group

| Sex | Type of finger print | CAD Case | Mean ± SD | Control | Mean ± SD | p-value | Significance |
|------|----------------------|----------|-------------|---------|--------------|---------|-----------------|
| Male | TFRC | 6368 | 106.1±26.14 | 6004 | 100.06±31.95 | >0.05 | Not significant |

TFRC

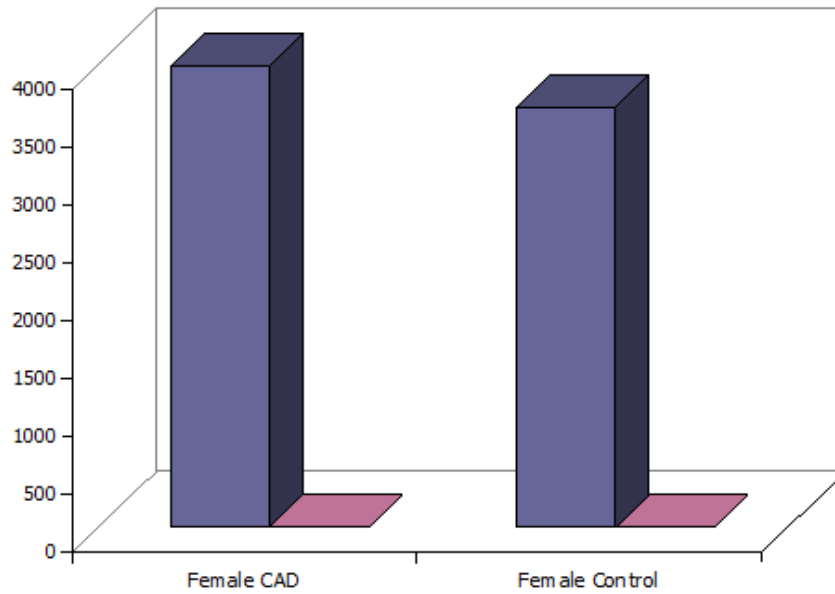


Graph 1: Distribution of Total Finger Ridge Count in Male

Table 2: Distribution of total finger ridge count in female between patients (CAD) and Control group

| Sex | Type of finger print | CAD Case | Mean ± SD | Control | Mean ± SD | p-value | Significance |
|--------|----------------------|----------|------------|---------|-------------|---------|-----------------|
| Female | TFRC | 3988 | 99.7±27.67 | 3630 | 90.75±17.33 | >0.05 | Not significant |

TFRC



Graph 2: Distribution of Total Finger Ridge Count in Female

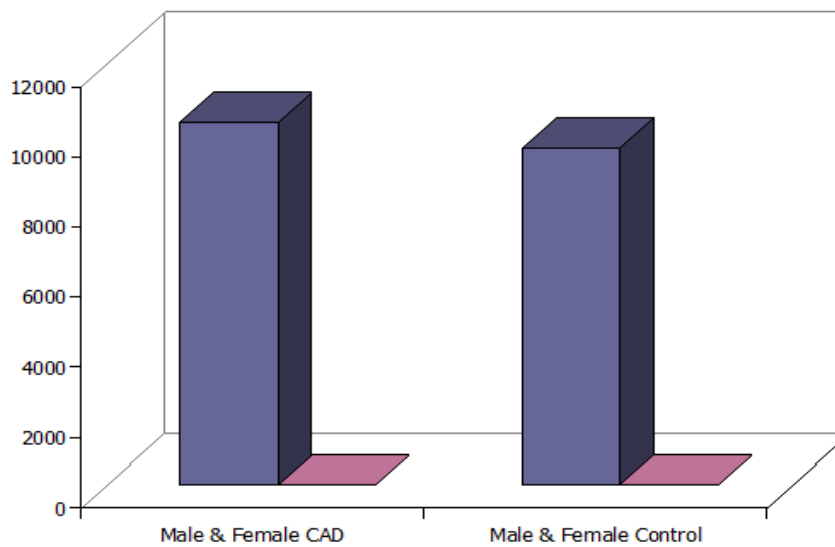
Table 3: Distribution of total finger ridge count in male & female between patients (CAD) and Control group

| Sex | Type of finger print | CAD Case | Mean ± SD | Control | Mean ± SD | p-value | Significance |
|---------------|----------------------|----------|--------------|---------|-------------|---------|-----------------|
| Male & Female | TFRC | 10356 | 103.56±27.85 | 9634 | 96.34±29.26 | >0.05 | Not significant |

Table 3 shows mean of total finger ridge count in CAD male and female is 10356 and mean±SD is 103.56±27.85, while in control male and female TFRC is 9634 and mean±SD is 96.34±29.26 (p>0.05). There

is increase in TRFC in CAD male & female compared to control male & female, though the difference was statistically not significant.

TFRC



Graph 3: Distribution of Total Finger Ridge Count in Male & Female

Table 4: 'atd' angle in CAD and Controls

| Subject | CAD | Control | Statistical P-value | Significance |
|-------------|----------|-----------|---------------------|--------------|
| 'ATD angle' | 43.7±3.1 | 42.46±2.8 | <0.05 | Significance |

Table 11 shows 'ATD' angle of CAD (43.7±3.1) is more compared to control (42.46±2.8) (p<0.05), the difference is statistically significant.

Discussion

Medical interest in dermatoglyphics developed only in last few decades and knowledge of deviations associated with various medical disorders can add appreciably to the diagnostic armamentarium of the

clinician [6].

Coronary Artery Disease (CAD) in its various forms is one of the leading cause of death for both males and females in leading industrialized countries [6].

The present study is carried out to study the correlation between the dermatoglyphic pattern of CAD and that of Controls. It constitutes 100 CAD patients (60 males, 40 females) and 100 Controls (60 males, 40 females). Quantitative analysis for TFRC and "ATD" angle was done.

Table 5: Distribution of Total finger ridge count in Cases and Controls

| Author | Cases | Controls | p-value | Significance |
|---|--------------|-------------|---------|-----------------|
| Manara et al ⁷ (2011) (n=30) | 161.37±29.05 | 162.7±48.62 | >0.05 | Not significant |
| Present study | 103.56±27.85 | 96.34±29.26 | >0.05 | Not significant |

1. TFRC

The findings of present study correlate with

Rashad MN and Mi MP [5] (1975), Rashad et al [6] (1978), Anderson MW et al [8] (1981).

Table 6: 'ATD' angle in Cases and Controls

| Author | Variables | Cases | Controls | p-value | Significance |
|---|----------------------------|-----------|------------|---------|-----------------|
| Manara et al ⁷ (2011) (n=30) | Right hand 'atd' angle (°) | 39.6±4.9 | 38.56±5.6 | >0.05 | Not significant |
| | Left hand 'atd' angle (°) | 41.15±7.1 | 38.32±6.02 | >0.05 | Not significant |
| | 'atd angle' | 43.7±3.1 | 42.46±2.8 | <0.05 | Significance |

2. 'ATD' angle

Manara et al (2011) showed high mean 'ATD' angle in CAD compared to controls, though the difference was statistically not significant. It also showed higher mean of 'atd' angle in left hand compared to right hand [7].

The present study shows that the mean 'ATD' angle in CAD (43.7±3.1) is more compared to control (42.46±2.8) (p<0.05), the difference was statistically significant.

as tool in diagnostic help for at risk individuals and eventually aid in taking preventive measures. Although we understand to some extent my study and also few studies have been done on this aspect, further research is needed to study the palmar dermatoglyphics in CAD and controls that would be of great help in future.

Conclusion

The following conclusions can be drawn from results of this study:

- There was high frequency of TFRC in CAD group compared control group.
- There was high 'atd' angle in CAD group when compared to controls, the difference was statistically significant.

Though our study is by no means exhaustive, it does provide a glimpse into dermatoglyphic patterns in patients of Coronary artery disease which can serve

References

1. Penros LS. Finger prints, palms and chromosomes. Nature, 1963; 197:933- 938.
2. Cummins H and Midlo. Palmar and plantar epidermal configurations (dermatoglyphics) in European Americans. Am.J. Phys Anthropol., 1926; 9:471-502.
3. Tarasiuk SI, Glazko VI, Trofimenko AL. The muzzle prints and biochemical genetic markers as supplementary breed characteristics in cattle. Article in Russian. 1997; 31(4):89.
4. Takashina T, Yorifuji S. Palmar dermatoglyphics in heart disease. Differential studies in Japanese and American populations with congenital and acquired heart diseases. JAMA. 1966; 197(9):689-92.
5. Rashad MN, Mi MP. Dermatoglyphic traits in patients

- with cardiovascular disorders. Amer J Physl Anthropol, 1975; 42(2):281-83.
6. Rashad MN, Mi MP, Rhoads G. Dermatoglyphic studies of myocardial infarction patients. Hum Hered 1978; 28:1-6.
 7. Manara A, Habib MA, Rahman AA, Ayub M, Begum N, Hossain S. Digital and Palmar Dermatoglyphics in Myocardial infarction. JAFMC, Bangladesh. 2011 Dec; 7(2).
 8. Anderson MW, Haug PJ, Critchfield G. Dermatoglyphic features of Myocardial Infarction patients. Amer J Physl Anthropol, 1981; 55(4): 523-27.
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