

Evaluation of Palmar Angles in Carcinoma Breast Patients and in Normal Healthy Females

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ABSTRACT

Introduction: The term dermatoglyphics was coined by Cummins and Midlo in 1926. It applies to a unique division of anatomy which includes study of palm and toe prints. Palm prints include much more information than finger print. Palmar studies are much easier to study and interpret as compared to fingerprints.

Aim: To study the palmar angles in carcinoma breast patients and in normal healthy individuals.

Materials and Methods: A cross-sectional study was conducted in which palm prints of 100 breast cancer patients were taken as cases and were compared with those of healthy females without breast cancer, taken as controls. The parameters in this study were palmar angles ('atd', 'dat', 'tda'). The means of 'atd', 'tda' and 'dat' angles were compared

between right and left hands of cases and controls to establish the symmetry.

Results: Mean 'atd' angles in cancer cases were (44.9±6.04) as compared to controls (43.2±5.74). The mean 'atd' angle was significantly higher in cancer cases as compared to controls ($p < 0.05$). The 'tda' angle in carcinoma of breast patients was 76.4±6.80 and in control it was 77.7±5.27 and 'dat' angle in carcinoma breast patients was 58.9±6.83 and in control it was 59.2±5.58. The angles 'tda' and 'dat' did not vary significantly between cancer patients and controls.

Conclusion: These angles play a significant role in assessing the dermatoglyphic difference between the cancer breast patients and normal healthy females. It can be used as a screening tool in assessing the carcinoma breast cases.

Keywords: 'atd' angles, 'tda' angles, 'dat' angles, Malignancy of breast

INTRODUCTION

Palm prints give more information than finger print [1]. Dermatoglyphic characteristics have been helpful in identifying some diseases of genetic origin, such as diabetes mellitus [2,3], hypertension [3], congenital heart disease [4], cystic fibrosis [5], and cleft lip and palate [6]. Dermatoglyphic studies were also studied in different dental malocclusion [7].

atd angle indicates degree and speed of co-ordination between the nervous and muscular systems, reflecting one's efficiency [8]. Each individual has its characteristic ridge configuration which is unique and remains unchanged from womb to tomb.

In humans, the mammary buds appear during 6th week as solid downgrowth of the epidermis into the underlying mesenchyme. The dermal ridges start developing by 6th week of gestation and reaches its maximum by 12th-13th week [9-11]. The genetic message contained in the genome is deciphered during this period.

Breast cancer is the most frequent cancer among women, affecting 2.1 million women each year. It is one of the biggest causes of cancer-related deaths among women. In 2018, it was estimated that 627,000 women died from breast cancer that is approximately 15% of all cancer deaths among women [12]. The mortality and morbidity rate due to breast cancer in India is quite high; therefore the present study was conducted with an aim to study the palmar angles in carcinoma breast patients and in normal healthy individuals.

This study was a part of the research conducted previously in 2011 and published in 2013 and same sample size was used to conduct the study, but the parameters in this study conducted were palmar angles [13].

MATERIALS AND METHODS

A cross-sectional study was conducted in the Department of Anatomy, Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan, India from July 2011 till December 2011. Hundred

cases of breast cancer were taken up for dermatoglyphic studies from the day care centre of the Bhagwan Mahaveer Cancer Hospital and Research Centre, Jaipur, Acharya Tulsi Regional Cancer Centre, Bikaner and Ravindranath Tagore Medical College and Hospital, Udaipur, India. This work was done as a part of thesis and at the time when study was conducted IEC approval was not deemed necessary. Histopathologically, proven cases of carcinoma breast who presented to the hospital for neo-adjuvant and adjuvant chemotherapy were included. Individuals who had deformities in their hands like burns or injury and genetic disorders other than breast malignancy were excluded. Inclusion criteria for controls were normal healthy volunteers between the age group of 20-75 years and exclusion criteria were same as that for cases.

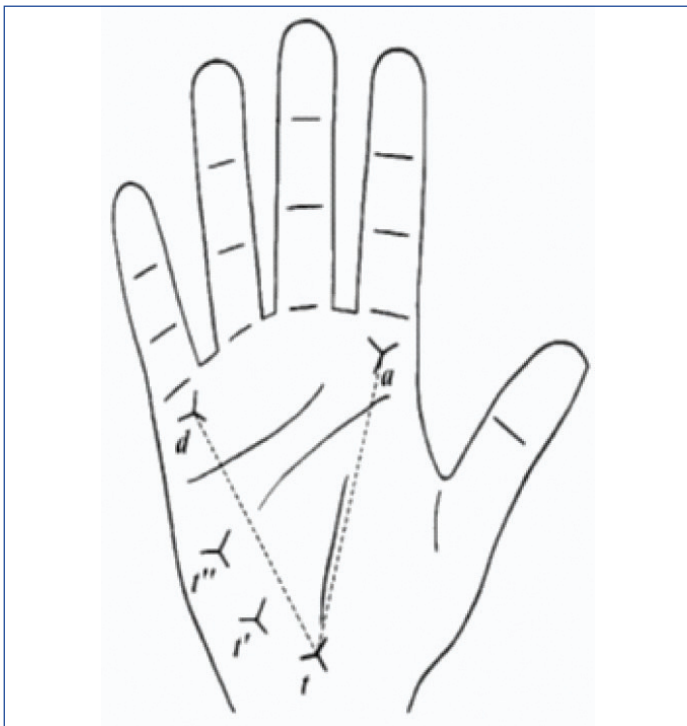
The materials required for the procedure were camel quick drying duplicating ink, rubber roller, inking slab-thick glass sheet fixed over wooden support, A4 size white sheet, pressure pad made up of rubber foam, cotton puffs, scale, pencil, pen, protractor- to measure 'atd' angle, paint software in Microsoft and scanner.

Procedure

The hands were washed with soap and water and the greasy material was cleared off with the help of ether. This method was described by Cummins H et al., [1]. It is known as Cummins and Midlo method (rolling palm technique). A small dab of printer's ink is squeezed out on the inking slab and is spread into thin even film with the help of a roller for direct inking of the fingers. Palm is smeared uniformly with the inked roller to cover the whole area of the palm to be printed for examination.

In the next step, paper is set over the round bottle and the palm and moderately open fingers are successively rolled over with some pressure on it, permitting the bottle and paper to move forward, so that whole of the palm and plain finger prints are obtained.

This method enables us to record the complete impressions of palms and soles including palmar and plantar surfaces of all digits in one attempt. These imprints are scanned and then palmar angles were studied in paint software. The axial tri-radius is present in the proximal part of the palm in the same backing as fourth metacarpal bone. This angle is formed by the lines drawn from the digital tri-radius "a" to the axial tri-radius "t" and from this tri-radius to the digital tri-radius d. The more distal the position of t, the larger is the 'atd' angle [Table/Fig-1]. The 'atd' angle is an indicator of the degree of distal displacement of axial tri-radius. The angle increases as the radius is more distally located. The 'atd' angle is even more sensitive to environmental factors than a-b ridge count. The 'tda' and 'dat' angles are measured once we join all three tri-radii, similar to the angles measured in a triangle.



[Table/Fig-1]: Palmar angles (in this case "atd" angle).

This figure is taken from finger prints, palms and soles: an introduction to palmar dermatoglyphics by Cummins H et al., [1].

STATISTICAL ANALYSIS

Statistical processing and various calculations were performed with SPSS software (14th version).

The mean level of 'atd', 'tda' and 'dat' were compared between hands of cancer cases and controls to establish the difference in their pattern by means of paired t-test.

RESULTS

The mean age for cancer patients was 45.2±11 years while for controls it was 33.3±15 years.

The mean "atd" angle in cancer patients (44.9±6.04) was significantly higher as compared to controls (43.2±5.74) ($p < 0.05$) [Table/Fig-2].

Status	Number	Mean	SD	t-value	p-value
Cases	100	44.9	6.04	2.04	<0.05
Controls	100	43.2	5.74		

[Table/Fig-2]: Mean values of 'atd' angles in cases and controls. Paired t-test was used

The 'atd' angle for right and left hand did not vary significantly for both cancer patients as well as controls. No fluctuation asymmetry was noted [Table/Fig-3].

The 'tda' angle does not vary significantly between cases (76.4±6.80) and controls (77.7±5.27) [Table/Fig-4].

Status	Hand	Number	Mean	SD	t-value	p-value
Cases	Left	100	44.6	5.56	0.99	NS
	Right	100	45.2	6.49		
Controls	Left	100	42.7	5.34	1.79	NS
	Right	100	43.7	6.11		

[Table/Fig-3]: Mean values of 'atd' angle of right and left hand of cases and controls. Paired t-test was used

Status	Number	Mean	SD	t-value	p-value
Cases	100	76.4	6.80	1.51	NS
Controls	100	77.7	5.27		

[Table/Fig-4]: Mean values of 'tda' angle in cases and controls. Paired t-test was used

The 'tda' angle of right hand ($p < 0.05$) of both cases and controls was significantly higher as compared to left hand ($p < 0.05$) [Table/Fig-5].

The 'dat' angle did not vary between cases (58.9±6.83) and controls (59.2±5.58). The difference was not significant [Table/Fig-6].

The 'dat' angle of right hand ($p < 0.01$) of cancer patients as well as of controls was less as compared to left hand ($p < 0.01$) [Table/Fig-7].

Status	Hand	Number	Mean	SD	t-value	p-value
Cases	Left	100	75.5	7.09	2.34	$p < 0.05$
	Right	100	77.2	6.49		
Controls	Left	100	76.9	5.72	2.24	$p < 0.05$
	Right	100	78.4	4.77		

[Table/Fig-5]: Mean values of 'tda' angle of right and left hands of cases and controls. Paired t-test was used

Status	Number	Mean	SD	t-value	p-value
Cases	100	58.9	6.83	1.51	NS
Controls	100	59.2	5.58		

[Table/Fig-6]: Mean values of 'dat' angle in cases and controls. Paired t-test was used

Status	Hand	Number	Mean	SD	t-value	p-value
Cases	Left	100	60.1	6.82	3.27	0.01
	Right	100	57.7	6.83		
Controls	Left	100	60.4	5.79	3.12	0.01
	Right	100	58.0	5.37		

[Table/Fig-7]: Mean values of 'dat' angle of right and left hands of cases and controls. Paired t-test was used

DISCUSSION

Family history is an important well established risk factor for breast cancer. It has its importance in breast cancer screening and prevention of malignancy extends beyond mammography [14].

Palm prints are polygenetically determined properties; their appearance and number are determined by a specific gene. They represent the skin ridges that are created by epidermis on the fingers or toes, palms and soles [15].

"atd" angles

Metovic A et al., reported that for right palm the atd angle was higher in (breast cancer patients) ($p = 0.015$, $p < 0.05$). Similar results were obtained for the left palm. It was observed that atd angle was also higher in patients with breast cancer and the results were statistically significant ($p = 0.020$, $p < 0.05$) [16]. Similarly, in the present study the "atd" angles were significantly higher in cases (44.9±6.04) as compared to controls (43.2±5.74). But it did not vary for right and left hand. Lavanya J et al., reported that a significant difference was observed for the atd angle between the experimental and the control group ($p < 0.05$), pointing out that the atd angle was

smaller in the experimental group, with the mean value of 41.5 than in the control 44.43 [17]. In present study 'atd' angles were higher in cases as compared to controls [17].

The results of Lavanya J et al., were similar to that obtained from Madhavi D et al., [17, 18]. The study of Lavanya J et al., and Madhavi D et al., were not in concordance with the present study [17,18]. Oladipo GS et al., reported low "atd" angle (38.78±2.08) of both hands of cancer patient as compared to controls (42.44±2.18) [19]. Sridevi NS et al., reported that difference between "atd" angles in cancer patients (43.51±5.07) as compared to controls (43.29±6.07) was not significant [20].

'dat' angle

In present study the 'dat' angle of cancer patients and controls were compared. It is 58.9±6.83 in cancer patients and 59.2±5.58 in controls. The result was non-significant. The left hand 'dat' angle of cancer patients (60.1±6.82) is more than right 'dat' angle of cancer patients (57.7±6.83). The p-value between the two groups was 0.01.

Oladipo GS et al., reported mean 'dat' angle of right hand of cancer patients is greater than that of controls. The mean 'dat' angle of left hand of cancer patients (61.65±2.56) was more than that of controls (58.67±2.21) [19]. Sridevi NS et al., reported that mean 'dat' angles are not significant in both hands of carcinoma breast patients and controls [19]. Our study coincides with Oladipo et al., Sridevi et al., in which dat angle was more in cancer patients but results were non-significant [19,20].

'tda' angle

In present study the 'tda' angle in cancer patients (76.4±6.80) and that of controls is (77.7±5.27). The results are non-significant. 'tda' angles of right hands in cancer patients and controls is more.

Sridevi NS et al., reported 'tda' angles of both hands are less in cancer patients as compared to controls [20]. Our results are not in conformity with study of Sridevi NS et al., [20].

LIMITATION

The limitation of the study is that sample size taken was small.

CONCLUSION

Dermatoglyphics can be a non-invasive technique in assessing the carcinoma breast in developing countries. It can be employed in a better way if we use digital computerised screens so as to assess these angles, so that before a person gets diagnosed clinically,

radiologically and histopathologically, we can take certain measure and diagnose the persons under risk category.

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