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A Dermatoglyphics Study on Fingerprint Patterns in the Patients of Carcinoma of Breast

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KEYWORDS

Indian women, Dermatoglyphics, Breast cancer.

ABSTRACT:

Background: Dermatoglyphics refers to a branch of science in the study of the patterns of skin ridges (dermal ridges) present on the fingers, palm, toes, and soles of the human. Breast cancer is the most common cancer among women in India. Findings indicate that women diagnosed with breast cancer often exhibit a higher prevalence of ulnar loops or possess more than six loops in their fingerprints. It appears that having more than six whorls may actually confer a protective advantage against the disease. This connection highlights the potential of using fingerprint patterns as a novel avenue for breast cancer risk assessment and prevention.

Material and Methods: This was a case control study, conducted at the SRM medical college, Trichy, India. It consists of 60 histopathologically confirmed breast cancer females in the age group of 20–80 years and a 60-healthy female control group of the same age range, who had no signs and symptoms of breast cancer and no family history. The fingertips were inked and pressed onto plain A4 white paper using the ink method; then, different types of fingerprint patterns were studied and their significance analyzed in the control and case groups.

Results: Statistical analysis shows that the right-hand control group has a greater number of ulnar loops and fewer arches, both of which are statistically significant. The same result is shown for the left-hand control group, but ulnar loops do not show statistically significant differences. The right-hand control group shows a greater number of ulnar loops and fewer arches, which are statistically significant.

Conclusion: In our study, the ulnar loop pattern was more common and the arch pattern was less common in both hands of the control group compared with those of breast cancer patients. This study can help with early diagnosis and treatment in breast cancer patients.

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Introduction

Dermatoglyphics refers to a branch of science in the study of the patterns of skin ridges (dermal ridges) present on the fingers, palm, toes, and soles of a human.[1] Dermal ridges develop in relation to the volar pads, which are formed by the 6th week of gestation and reach maximum size between 12th and 13th weeks.[2] The importance of fingerprints in the modern world is not restricted to forensic and criminal applications; nowadays, dermatoglyphics serve in biology, anthropology, genetics, and medicine as a tool to describe, compare, and contrast, and at times to predict the occurrence and risk of biomedical events.[3] Breast cancer is a malignant tumor that often manifests with fibrosis, causing retraction of the nipple, necrosis, and ulceration of the overlying skin.[4] Breast cancer is the most common cancer among women in India, followed by cervical cancer. It is a significant threat to women today, with nearly half a million deaths attributed mainly to the lack of early diagnosis. Breast cancer constitutes a significant public health issue globally, with over 1.7 million new cases diagnosed in women in 2012, and 6.3 million women are alive with breast cancer in the past 5 years annually.[5] As per the WHO cancer country profiles 2014, in India, out of 100 cancer deaths in females, 21 females were dying because of breast cancer (6). The genetic component in breast cancer is well established, and various genes like BRCA1 and BRCA2, p-53, etc, have been extensively studied and identified as genetic links.[7-9]

Recent research has uncovered a significant correlation between specific fingerprint patterns and breast cancer. Since there is a knowledge gap in this area of research in India, we wanted to conduct further research regarding the same.

MATERIALS and METHODS:

The was a case control study, conducted in the Departments of Anatomy and Surgery of SRM Medical College Hospital & Research Centre, Trichy, Tamil Nadu, India. In our study, 60 histopathologically confirmed breast cancer females in the age group of 20–80 years were included, and 60 healthy female controls of the same age group who had no signs and symptoms of breast cancer and no family history were selected from female students and staff members of SRM Medical College, Trichy. The Institutional Ethics Committee approved this study, all participants were informed of its nature, and written consent was obtained.

Inclusion criteria:

- Female breast cancer patients were pathologically and clinically confirmed.
- Treated, untreated and operated breast cancer patients were used for this study.
- Female control group individuals with no history of cancer or any other genetic disorders.

Exclusion criteria:

- Individuals who had deformities in their hands and fingertip like burns or injury were excluded.
- Genetic disorders other than breast cancer were also excluded.
- The patients with the hypertension, diabetes, schizophrenia or mental retardation were excluded.
- Male breast cancer was excluded.

The following materials were used 1) Kores quick drying duplicating ink, 2) White paper 4) Thin glass sheet, 5) Cotton puffs, 6) Magnifying hand lens.

Procedure for obtaining the finger prints from case and control groups.

Before starting the procedure, the subjects were instructed to wash both their hands and all their finger tips properly with soap and water to remove oil, dirt, and sweat from the skin. A plain A4 white paper was placed over a plain glass plate on a table. The fingertips were inked and pressed over the plain paper. After obtaining the fingerprints (Figure 1), the analysis was performed with a magnifying hand lens, and each fingerprint was classified according to Galton's classification. Galton classified the fingerprints into three major classes (arch, loop, and whorl) and further divided each category into subcategories (Figure 2).[10]

Classification of fingertip patterns is as follows:

Loops: The series of epidermal ridges enters the pattern area on one side of the fingertip and exits on the same side. If the epidermal ridges enter and exit on the ulnar

Journal of Chemical Health Risks

www.jchr.org

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side of the fingertip, it is an ulnar loop (UL), and those from the radial side of the fingertip are radial loops (RL). Loop has one triradius (i.e, meeting point of three epidermal ridge lines (Fig. 1 Radial loop, ulnar loop)

Arches: The series of epidermal ridges enters the pattern on one side of the fingertip and exits on the opposite side. At the centre of the pattern, the ridges are slightly arched. Such a pattern is called a simple arch; a simple arch has no triradius. (Fig. 1- Arch)

Whorls: The epidermal ridges are arranged in a series of concentric rings. Whorl patterns have two or more triradii. (Fig. 1-whorl). The fingerprint patterns were analyzed qualitatively from the collected case and control group samples.

Figure-1: a) Arch, b) Ulnar loop, c) Radial loop, d) Simple whorl.

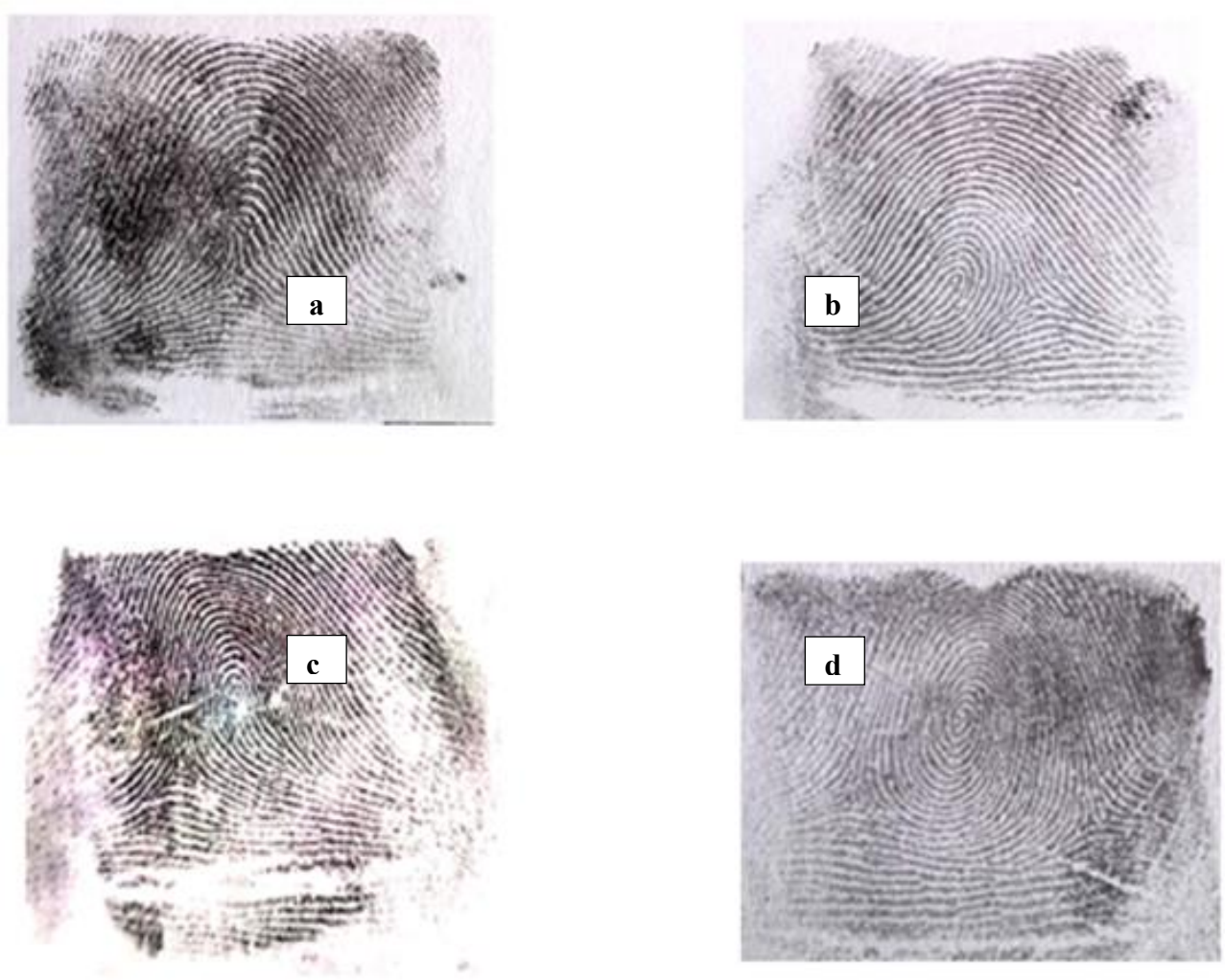

Figure-2: a) Arch b) Ulnar loop, c) Radial loop, d) Transitional loop, e) simple whorl, f) Central pocket ulnar whorl, g) Central pocket radial whorl, h) Spiral whorl clockwise, i) Spiral anticlockwise, j) Lateral pocket ulnar whorl, k) Double loop whorl.

Journal of Chemical Health Risks

www.jchr.org

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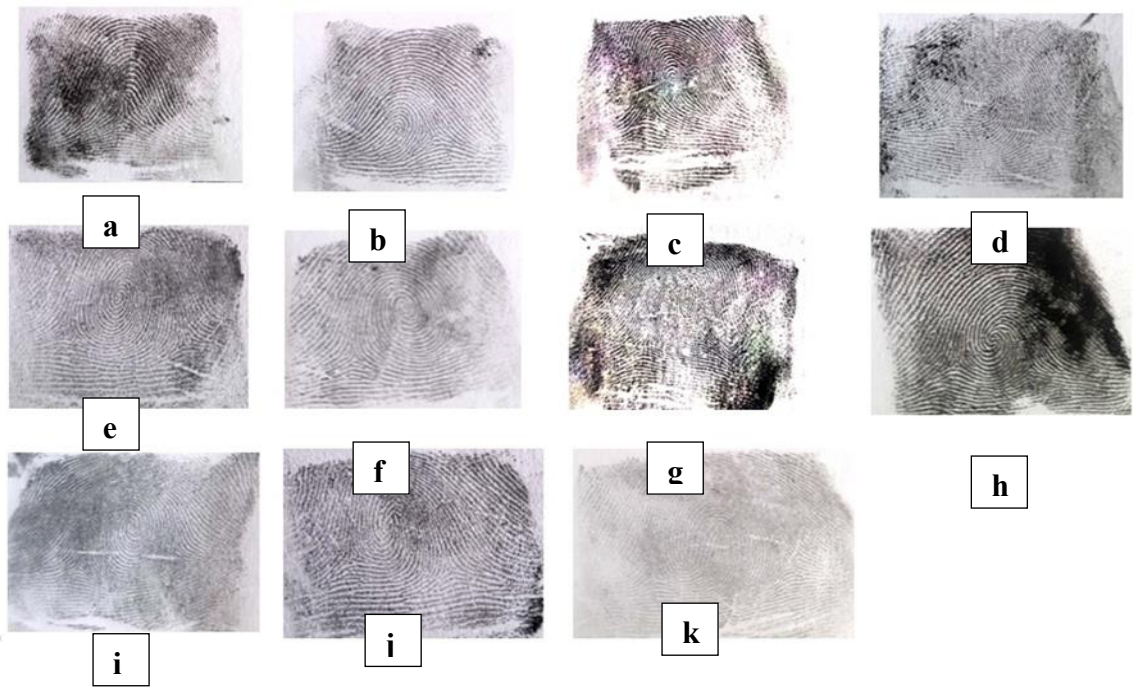

RESULTS:

Table.1

TABLE.1 Fingertip pattern of the right hand between control and case groups			
Fingertip pattern	Control group (No& %)	Case group (No& %)	p-value
Whorls	81 (27)	85 (28.33)	0.715
Arches	08 (2.66)	29 (9.66)	0.001
Ulnar loops	211(70)	186 (62)	0.031
Radial loops	0 (0)	0 (0)	0

Table 1 shows the following results in the fingertip patter of right hand of control group whorl 81 (27%),Arch 08 (2.66%),Ulnar loop 211 (70%),Radial loop 0(0%) and case group whorl 85 (28.33%), Arch 29 (9.66%),Ulnar loop 186 (62%),Radial loop 0(0%) in this ulnar loops was more in all the fingers of control group 211 (70%) compared with case group this shows statistically significant (P=0.031; p<0.05), Arch was less in all the fingers of control group 08 (2.66%) compared with the case group this shows statically significant (P=0.001; p<0.05).

Table-2

TABLE.3 Fingertip pattern of the right and left hands between control and case groups			
Fingertip pattern	Control group (No & %) (600 fingers)	Case group (No & %) (600 fingers)	p-value
Whorls	172 (28.66)	184 (30.66)	0.448
Arches	18 (3)	54 (9)	0.001
Ulnar loops	405 (67.5)	361 (60.16)	0.008
Radial loops	5 (0.83)	1 (0.16)	0.101

Table 2 shows the following results in the fingertip patter of left hand of control group whorl 91 (30.33%),Arch 10 (3.33%),Ulnar loop 194(64%),Radial

Journal of Chemical Health Risks

www.jchr.org

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loop 5(1.66%) and case group whorl 99(33%), Arch 25(8.33%),Ulnar loop 175(58.33%),Radial loop 1(0.33%) in this ulnar loops was more in all the fingers of control group 194 (64%) compared with case group this shows statistically insignificant (P=0.110; p>0.05), Arch was less in all the fingers of control group 10(3.33%) compared with the case group this shows statically significant (P=0.009; p<0.05).

Table-3

TABLE.2 Fingertip pattern of the left hand between control and case groups			
Fingertip pattern	Control group (No & %)	Case group (No & %)	p-value
Whorls	91 (30.33)	99 (33)	0.482
Arches	10 (3.33)	25 (8.33)	0.009
Ulnar loops	194 (64.66)	175 (58.33)	0.11
Radial loops	5 (1.66)	1 (0.33)	0.1

Table 3 shows the following results in the fingertip patter of right and left hand of control group whorl 172 (28.66%),Arch 18(3%),Ulnar loop 405(67.5%),Radial loop 5(0.83%) and case group whorl 184(30.66%), Arch 54 (9%),Ulnar loop 361(60.16%),Radial loop 1(0.16%) in this ulnar loops was more in all the fingers of control group 405(67.5%) compared with case group this shows statistically significance (P=0.008; p<0.05), Arch was less in all the fingers of control group 18(3.%) compared with the case group this shows statically significant (P=0.001; p<0.05).

Discussion

Singh et al. (2019) found that among patients with breast carcinoma, the distribution of fingerprint patterns was as follows: ulnar loops were present in 67.93% of cases, whorls in 24.68%, arches in 4.13%, and radial loops in 3.24%. In contrast, the control group showed different frequencies of these patterns, with 15.31% ulnar loops, 50.82% whorls, 17.58% arches, and 16.27% radial loops. Notably, the ulnar loop pattern was more prevalent in female breast cancer patients. [11]

In our study, we found that the mean percentages of fingerprint patterns in both hands of the control group were as follows: ulnar loops (67.5%), whorls (28.66%), arches (3%), and radial loops (0.83%). In contrast, the case group showed mean percentages of ulnar loops (60.16%), whorls (30.66%), arches (9%), and radial loops (0.16%). Notably, the control group exhibited a higher prevalence of ulnar loops across all fingers, with a percentage of 67.5%, compared to the case group. This is statistically significant (P=0.008; p<0.05), Arch was less in all the fingers of control group (3.%) compared to the case group, this difference is statically significant (P=0.001; p<0.05).

A study by Raizada et al. (2013) found that breast cancer patients exhibited a statistically significant increase in the arch pattern compared to the control group. Specifically, 39.8% of the right-hand cases showed this pattern, while only 16.2% of the control group did. For the left-hand cases, 36.0% of patients displayed the arch pattern, in contrast to 11.4% of the controls. The difference was deemed statistically significant with a p-value of less than 0.001.[12] In our study, we found that the arch pattern was present in 9% of breast cancer cases compared to 3% in the control group. This difference is statistically significant (p = 0.001), indicating an increase in the arch pattern among those with breast cancer compared to controls.

The present study of the fingertip pattern of the right and left hands of the control group showed whorl 172 (28.66%) and the case group showed whorl 184(30.66%), there was an increase in the number and mean percentage in whorl pattern of case group in comparison with healthy women but this increase didn't reach to statistically significant level (P=0.448; p>0.05). In contrast to the findings of the present studies, Seltzer et al. in 1982 and 1990 [13], Chintamani et al. in 2007 [14], Lavanya et al. in 2012)[]15], Abhilasha in 2013 [16], and Sakineh Abbasi et et al. in 2006 [17] showed that whorls were found in more than six fingers of breast cancer patients. Singh V et al. (2019) found that radial loops are less frequently associated with cancer patients (3.24% cases and 16.27% controls). Our results also found a less association of radial loops with breast cancer compared with controls.[11]

Journal of Chemical Health Risks

www.jchr.org

JCHR (2026) 16(1), 404-409 | ISSN:2251-6727

Conclusion:

On the basis of study of fingerprint patterns, it was concluded first that the ulnar loop pattern was found more in number in control group as compared to the breast cancer patients. Secondly, the arch pattern found more in number in the breast cancer patients compared with control group. The present study concludes that the dermatoglyphic pattern is cost-effective , an easy and non-invasive procedure and would serve as a tool for early screening of breast carcinoma patients with predisposing factor in the age group of 20–80 years. This study can be helpful in early diagnosis and treatment; preventive measure can be taken early to avoid the risk and complications of breast cancer.

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