Original Article

Role of Fingerprint Patterns in the Histopathologically Diagnosed Breast Cancer Females

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Abstract

Introduction: Breast cancer is the most common cancer among women in India followed by cervical cancer. It is a major threat to women today with nearly half a million deaths attributed mainly to the lack of early diagnosis. A fingerprint pattern determination is genetic, but it has been reported to be affected by the environmental factors in the first trimester of pregnancy. The importance of fingerprints in the modern world is not restricted to the field of forensic and criminal applications only. The purpose of this study is to examine the fingertip patterns among women with histopathologically diagnosed breast cancer and controls. **Material and Methods:** The study was conducted 145 histopathologically diagnosed breast cancer women and their fingerprint patterns compared with 145 normal healthy women with no family history of breast cancer. **Results:** The fingerprint patterns were analyzed between breast cancer and control group of individuals, which showed statistically difference. The most common pattern found in breast cancer females was ulnar loop (67.93%) followed by whorl (24.68%) arches (4.13%) and radial loop (3.24%)while in the normal females, the most common pattern was whorl (50.82) follow by arches (17.58%) radial loop (16.27%) and ulnar loop (15.31%). **Discussion and Conclusion:** According to our study, we conclude that dermatoglyphics may help in identifying women with risk of breast cancer. The dermatoglyphics can serve as an inexpensive, noninvasive anatomical and effective tool to determine the individuals with breast cancer in their future.

Keywords: *Arches, breast cancer, fingerprint patterns, radial loops, ulnar loops, whorls*

Introduction

Breast cancer is the most common cancer among women in India followed by cervical cancer.

It is a major threat to women today with nearly half a million deaths attributed mainly to the lack of early diagnosis.

Breast cancer constitutes a major 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.[1]

According to the Indian Council of Medical Research, the estimated number of breast cancer cases would be approximately 90,659, 106,124, and 123,634 in the years 2010, 2015, and 2020, respectively.

Dermatoglyphics is the scientific study of the details of finger ridge structure. The term dermatoglyphics has its origin from Greek words "derma" means skin and "glyphic" means curved. Cummins in 1926 introduced the term dermatoglyphics that refers to the study of the naturally occurring patterns of the surface of the hands and feet.[2]

The dermal ridges develop in relation to the volar pads, which are also formed by the 6th week of gestation, and they reach their maximum size between the 12th and 13th weeks. This means that the genetic message normal or abnormal is deciphered during this period and it is reflected by dermatoglyphics. A fingerprint determination is genetic, but it has been reported to be affected by the environmental factors in the first trimester of pregnancy. Fingerprint patterns are unique to the individual, but they vary from person to person in their number, shape, position, and types.

The search of literature has shown that a family history of breast cancer might be associated with a specific fingerprint pattern. The study of the fingerprints

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represents a noninvasive anatomical proxy marker of breast cancer risk.[3,4]

Galton, who divided the fingerprints into three major classes (arch, loop, and whorl) and further divided each category into subcategories [Figure 1] during this period, the dermatoglyphics was used in anthropology comparative zoology, criminology, and human genetics.[5]

Because the BRCA1 and BRCA2 are human genes that produced tumor suppressor proteins. These proteins help in repairing the damaged DNA and ensuring the stability of the cell's genetic material. Sometimes, specific inherited mutations in BRCA1 and BRCA2 will develop breast cancer.[6-8]

A recent study has shown that 55%–65% of females inheriting BRCA1 mutation and 45% of women inheriting BRCA2 mutation will develop breast cancer by age 70 years.[9,10]

Although harmful mutations in *BRCA1* and *BRCA2* are responsible for the disease in nearly half of families with multiple cases of breast cancer and 90% of families with both breast and ovarian cancers, mutations in a number of other genes have been associated with increased risks of breast and/or ovarian cancers[11-16] [Figure 1].

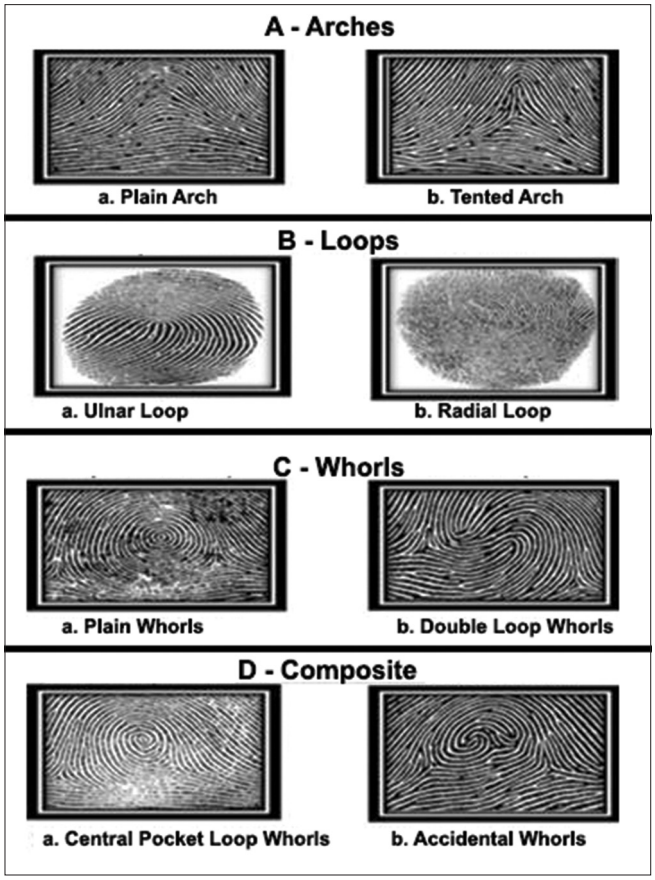

Figure 1: Types of fingerprints: (A) Arch – (a – Plain arch; b – Tented arch, (B) Loop – (a – Ulnar loop; b – Radial loop), (C) Whorl – (a – Plain whorl; b – Double-loop whorl), (D) Composite – (a – Central pocket loop whorl; b – Accidental whorl)

Aims and Objectives

The purpose of this study was to examine the relationship of fingertip patterns among women with histopathologically diagnosed breast cancer and controls.

Material and Methods

In this study, 145 histopathologically diagnosed breast cancer females in the age group of 25–70 years were taken from the Department of Oncology and Radiotherapy, B.R.D. Medical College, Gorakhpur, Uttar Pradesh, India.

One hundred and forty-five female controls of the same age group were selected those who had no signs and symptoms of breast cancer and no family history.

Procedure for obtaining prints

Before starting the procedure, it is necessary to remove oil, dirt, and sweat from the skin. The plain white paper sets over the Plain glass plate on the table. The inked fingertips pressed over the plain paper. After obtaining the fingerprints [Figure 2], the analysis was done with a magnifying lens.

Results

The fingerprint patterns calculated from 145 histopathologically diagnosed breast cancer patients and 145 controls were studied for differences. The patterns were analyzed qualitatively.

In the present study, ulnar loops were found to be significantly higher in breast cancer patients. as compared to controls.

In the cancer patient we observed six or more ulnar loop in the finger print pattern of both hands which were statistically significant It was found to be significantly associated (X^2=817, df=3, P=<0.001).

Thus we found that the CA breast patients had ulnar loops 67.93%, whorls 24.68%, arches 4.13% and 3.24 % radial loops.

Whereas the control group had 15.31% ulnar loops, 50.82%whorls, 17.58% arches and 16, 27% radial loops. The ulnar loop pattern was more common in the cancer breast females.

The ulnar loops in the left little finger were seen in a significantly higher percentage of the C A breast as compared to those in the control.

Figure 2: Fingerprints obtained from breast cancer female. UL – Ulnar loop, W – Whorl

Table 1: Correlation of fingerprint pattern of the right hand between case and control groups

Fingertip patterns	Number of fingers (%)		*P*
	Case group	Control group	
Arches	35 (4.82)	129 (17.79)	<0.001
Whorls	176 (24.27)	380 (52.41)	<0.001
Ulnar loop	490 (67.58)	114 (15.72)	<0.001
Radial loop	24 (3.31)	102 (14.06)	<0.001

Table 2: Correlation of fingerprint pattern of left hand between case and control groups

Fingertip patterns	Number of fingers (%)		*P*
	Case group	Control group	
Arches	25 (3.44)	126 (17.37)	<0.001
Whorls	182 (25.10)	357 (49.24)	<0.001
Ulnar loop	495 (68.27)	108 (14.89)	<0.001
Radial loop	23 (3.17)	134 (18.48)	<0.001

Table 3: Frequency of fingertip patterns in cases and controls

Pattern type	Number of fingers (%)	
	Cases (1450 fingers)	Control group (1450 fingers)
Arches	60 (4.13)	255 (17.58)
Whorls	358 (24.68)	737 (50.82)
Ulnar loop	985 (67.93)	222 (15.31)
Radial loop	47 (3.24)	236 (16.27)

A significant (P<0.001) increased percentage of the ulnar loop pattern (67.58%, right and 68.27% left) was seen in cancer patients as compared to that in the controls (15.72% right and 14.80% left) [Tables 1-3].

Discussion

A statistical significance was found between breast cancer patients and controls in ulnar loop patterns of both the right and left hands ($P \leq 0.001$).

In the present study, we identified that a significant association with ulnar loop had the highest mean percentage frequency followed by whorls, arches, and radial loop.

According to Nateker (2006) PE, out of 1000 fingerprints, breast cancer women had 66.6% loops, 33% whorls, and 0.4% arches, whereas the control group had 63.8% whorls, 35.5% loops, and 0.75% arches. There was presence of more than six loops in breast cancer patients, but they did not mention types of loop, whether ulnar or radial.

Our study also goes in according to Nateker study of 1450 fingerprints; breast cancer patients had 66.20% ulnar loops, 26% whorls, 4.13% arches, and 3.24% radial loops, whereas the control group had 50.75% whorls, 17.58% arches, 15.37% ulnar loops, and 16.27% radial loops.

Oladipo has observed a significant association with ulnar loop in 8 of 10 digits in Nigerians and he has concluded that their dermatoglyphic findings will serve as a baseline in the identification of patients at increased risk of developing breast cancer.

In the present study, we have observed that the ulnar loops are frequently found in breast carcinoma females in comparison to the control group; this is an important finding.

Aparajita Raizada *et al*. (2013)[17] found that radial loops are less frequently associated with cancer cases (3.24% cases and 16.27% controls). We also found less association of radial loops with cancer breast.

In contrast to the findings of the above studies, Seltzer *et al*. in 1982 and 1990[18], Chintamaniet *et al*. in 2007[19], Lavanyaet *et al* (2012).[20], Abhilasha (2013)[21], and Sakinehabbasiet *et al*. in 2006[22] quoted that whorls were found in more than six finger severy cancer patient.

Conclusion

On the basis of fingerprint patterns, it was concluded that the ulnar loop pattern was frequently found in breast cancer patients as compared to the control group.

The present study concludes that the dermatoglyphic pattern is an easy, cost-effective, and noninvasive procedure and would serve as a tool for early screening of breast carcinoma patients with predisposing factor in the age group of 25–70 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, which could occur in advancing age.

Clinical significance of dermatoglyphics in breast cancer

Based on the dermatoglyphic patterns patients can be identified. These patients may then be referred to gene therapy for identification of muted genes by karyotyping. This helps in analysis of transmission of these genes and also can be helpful in counseling of patients.

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Conflicts of interest

There are no conflicts of interest.

References

1. Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, *et al*. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 11. Lyon, France: International Agency for Research on Cancer;2013.
2. Cummins H, Midlo C. Palmar and plantar epidermal configurations (Dermatoglyphics) in European Americans. Am J PhysAnthropol1926;9:471-502.
3. Moore KL, PersaudTVN ,Torchol M.G,The Developing Human. Clinically oriented embryology. Philadelphia U.S. 7th ed.Elsevier Publications; 2004;492-3.

4. Natekar PE, Desouza FM. Fluctuating asymmetry in dermatoglyphics of carcinoma breast. Indian J Hum genet 2006;12:76-85.
5. Sir FrancisGalton – "Finger Prints". London, McmillanCo- 1892.
6. Ayub SG, Rasool S, AyubT, Khan SN, WaniKA, Andrabi KI. Mutational analysis of the BRCA2 gene in breast carcinoma patients of Kashmiri descent. Mol Med Rep2014;9:749-53.
7. Davies AA, Masson JY, McIlwraith MJ, Stasiak AZ, Stasiak A, Venkitaraman AR, *et al*. Role of BRCA2 in control of the RAD51 recombination and DNA repair protein. Mol Cell 2001;7:273-82.
8. Pellegrini L, YuDS, Lo T, Anand S, Lee M, Blundell TL, *et al*. Insights into DNA recombination from the structure of a RAD51-BRCA2 complex. Nature2002;420:287-93.
9. Antoniou A, Pharoah PD, Narod S, Risch HA, Eyfjord JE, Hopper JL, *et al*. Average risks of breast and ovarian cancer associated with BRCA1 or BRCA2 mutations detected in case Series unselected for family history: A combined analysis of 22 studies. Am J Hum Genet2003;72:1117-30.
10. Chen S, Parmigiani G. Meta-analysis of BRCA1 and BRCA2 penetrance. J ClinOncol2007;25:1329-33.
11. Calderón-Garcidueñas AL, Ruiz-Flores P, Cerda-Flores RM, Barrera-Saldaña HA. Clinical follow up of mexican women with early onset of breast cancer and mutations in the BRCA1 and BRCA2 genes. SaludPublica Mex2005;47:110-5.
12. Chen W, Pan K, Ouyang T, Li J, Wang T, Fan Z, et al. BRCA1 germline mutations and tumor characteristics in Chinese women with familial or early-onset breast cancer. Breast Cancer Res Treat2009;117:55-60.
13. Malone KE, Daling JR, Doody DR, Hsu L, Bernstein L, Coates RJ, *et al*. Prevalence and predictors of BRCA1 and BRCA2 mutations in a population-based study of breast cancer in white and black American women ages 35 to 64 years. Cancer Res2006;66:8297-308.
14. Antoniou AC,Pharoah PD,McMullan G,DayNE,Stratton MR, PetoJ,etal.Acomprehensivemodelforfamilialbreastcancer incorporating BRCA1, BRCA2 and other genes. Br JCancer 2002;86:76-83.
15. NandaR,SchummLP,CummingsS,FackenthalJD,SveenL, Ademuyiwa F, *et al*. Genetic testing in an ethnically diverse cohort of high-risk women: A comparative analysisofBRCA1 and BRCA2 mutations in American families of European and African ancestry.JAMA2005;294:1925-33.
16. OladipoGS, Paul CW, Bob-Manuel IF, FawehinmiHB, Edibamode EI. Study of digital andpalmar dermatoglyphic patterns of Nigerian women with malignant mammaryneoplasm. J.Appl.Biosci.2009;15:829-34.
17. Aprajita Raizada, Vishwas Johri, T Ramnath, D S Chowdhary, R P Garg. A Cross-Sectional Study on the Palmar Dermatoglyphics in Relation to Carcinoma Breast Patients.Journal of Clinical and Diagnostic Research. 2013 April, 7(4): 609-612.
18. Murray H Seltzer,PEEngler,Chris C Plato(1982): Digital Dermatoglyphics And Breast Cancer,Breast Cancer Research And Treatment. 1):15-27.
19. Chintamani , Rohan Khandelwal, Aliza Mittal, Sai Saijanani. Amita Tuteja, Anju Bansal, Dinesh Bhatnagar and Sunita Saxena. Qualitative and quantitative dermatoglyphic traits in patients with breast cancer: a prospective clinical study. BMC Cancer 2007; 7:44.
20. J Lavannya, P Saraswathi, J Vijayakumar, S Prathap. Analysis of dermatoglyphc traits in patients with breast cancer.Journal of Pharmaceutical and Biomedical Sciences. 2012; 23(24): 1-5.
21. Abilasha S, Harisudha R, Janaki CS. Dermatoglyphics: a predictor tool to analyze the occurrence of breast cancer. Int J Med Res Health Sci. 2014;3(1):28-13.
22. Sakineh Abbasi, Nahid Einollahi, Nasrin Dashti, F. Vaez-Zadeh. Study of dermatoglyphic patterns of hands in women with breast cancer. Pak J Med Sci 2006;(22)1:19-22.