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Research article

## DERMATOGLYPHICS: A PREDICTOR TOOL TO ANALYZE THE OCCURRENCE OF BREAST CANCER

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### ABSTRACT

**Background:** Dermatoglyphics is the branch of science that deals with the study of ridge patterns on finger tips, palm, sole and toes and when once formed, they remain unchanged throughout the except after severe injuries. These patterns can serve as a non-invasive, cost-effective tool which can be used for the prediction of cancer. This can also serve as a baseline guide to identify women with breast cancer. **Objective:** To study the digital dermatoglyphic patterns among women with breast cancer in comparison with normal individuals. **Materials and methods:** 50 female patients with breast cancer of age group between 30-70 years were compared with 50 control group of individuals with no history of cancer. The breast cancer patients and the control group were of the same age and sex. Digital dermatoglyphic patterns were taken among these individuals with the aid of a dermatoglyphic kit. Procedure involved was modified purvis smith method. **Results:** digital dermatoglyphic patterns were analyzed between the patients and control group of individuals which showed statistical difference. **Conclusion:** we conclude that there is a genetic influence on the dermatoglyphic patterns. With the aid of this, the occurrence of breast cancer can be predicted and this dermatoglyphics can serve as a non-invasive, anatomical marker and a predictor tool to determine the individuals with breast cancer.

**Keywords:** Breast cancer, Dermatoglyphics, Ridge patterns, Genetic marker

### INTRODUCTION

Dermatoglyphics is a branch of science that deals with the study of ridge patterns on finger tips, palm, sole and toes. Dermatoglyphics traits are epidermal ridges formed under genetic control early in development but may be affected by environmental factors during the first trimester of pregnancy. They however do not change significantly thereafter, thus maintaining stability not greatly affected by age. These epidermal ridges are closely related to volar pads and these ridge

patterns form at the site of these pads. Harold and Cummins<sup>1</sup> coined the term dermatoglyphics in 1926, which they first used in a paper, the American journal of physical anthropology. A detailed description on ridge patterns was described in 17<sup>th</sup> century<sup>2</sup>. Widespread medical interest towards epidermal ridges developed only in the last few decades when it became an apparent factor that many patients with chromosomal aberrations had unusual ridge patterns.

Inspection of these ridges therefore seems to provide a simple and cost effective means of information to determine whether the patients could have any underlying changes in genotype.<sup>3</sup>

## MATERIALS AND METHODS

The material for this present study consisted of fingerprints of patients selected from those attending outpatient and inpatient clinics in the department of Meenakshi Hospital, Kanchipuram and Jeevodhaya Cancer Hospital –Retteri, Chennai.

### Sample size:

The study consisted of 100 subjects categorized into two groups including 50 patients with breast cancer and 50 control groups of individuals.

**Inclusion criteria:** 1. 50 histopathologically conformed female breast cancer patients age between 30-65 years.

2. Age matched 50 female control group individuals with no history of cancer or any other genetic disorders.

3. Treated, untreated and operated patients were used for this study.

**Exclusion criteria:** 1. Individuals who had deformities in their hands like burns or injury were excluded.

2. Genetic disorders other than breast cancer were also excluded. 3. Females under 30 years of age.

## MATERIAL & METHODS

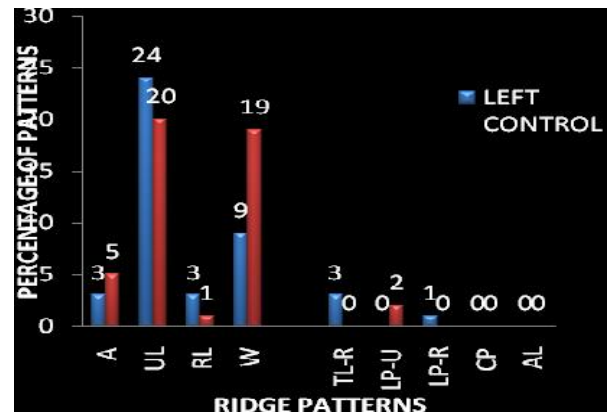
**Data collection:** After obtaining permission from the Institutional Ethics Committee also inform consent form was taken from the patient. Total 100 patients (50 histopathologically conformed breast cancer and 50 normal age match control) were informed about the procedure in detail and data comprising of age, sex and address were taken.

**Method :** In our study with the help of the modified Purvis smith method<sup>4</sup> we have studied the fingerprint patterns of controls and breast cancer individuals by the arrangements of loop-ulnar loop, radial loop, whorl- plain whorl, central pocket loop whorl, arches-plain arch, tented arch, radial twinned loop, ulnar twinned loop, accidental loop. The prints were analyzed with the help of the finger print analyst.

## RESULTS

In left hand thumb, ulnar loop, twinned loop ulnar and twinned radial loop was maximum in control group of

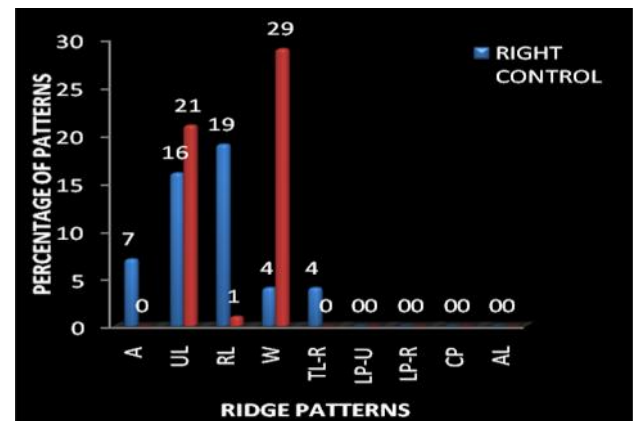
individuals and whorl was maximum in breast cancer patients which showed statistical significance.( $p \geq 0.05$ )



**Fig 1: Comparison of dermatoglyphics pattern between control and breast cancer (left hand)** (A=Arch, UL= Ulnar Loop,RL= Radial Loop, W= Whorl, TL-R= Twinned Loop Radial, Lp-U= Lateral Pocket Ulnar, Lp-R= Lateral Pocket Radial, Cp= Central Pocket Loop, Al= Accidental Loop.)

In left hand ring finger, arch and ulnar loop were maximum in control group of individuals and whorls were maximum in breast cancer patients when compared to normal group.

In left hand little finger ulnar loop was maximum in control group and arch, whorl was maximum in breast cancer patients which showed statistical significance.



**Fig 2: Comparison of dermatoglyphics pattern between control and breast cancer (right hand)** (A=Arch, UL= Ulnar Loop,RL= Radial Loop, W= Whorl, TL-R= Twinned Loop Radial, Lp-U= Lateral Pocket Ulnar, Lp-R= Lateral Pocket Radial, Cp= Central Pocket Loop, Al= Accidental Loop.)

In right hand ring finger arch and whorl were maximum in breast cancer patients and arch was maximum in control group of individuals which showed statistical significance. ( $p \geq 0.05$ )

## DISCUSSION

Chintamani<sup>5</sup>, Bierman<sup>6</sup>, RJ Meier<sup>7</sup>, has identified a pattern of 6 or more digital whorls has been used to identify women with breast cancer and whorls were commonly observed in right ring finger and right little finger in breast cancer patients. Hence, the determination of dermatoglyphic pattern of the finger and palm is genetic, so it could serve as a suitable parameter for differentiating individuals. Our study also goes in accordance with the previous study that we identified a pattern of whorls in 6 out of 10 digits in 62% of the breast cancer patients whereas in a control group of individuals it was the ulnar loop pattern present in 6 out of 10 digits. So this was a major difference observed in our study, and in our study too whorls were commonly seen in right ring finger and little finger among the breast cancer patients. Oladipo<sup>8</sup> has observed a significant association with ulnar loop in 8 out of 10 digits in Nigerians and he has also concluded that these dermatoglyphic findings will serve as a baseline in the identification of women who are at increased risk of developing breast cancer and perhaps aid early treatment of the disease. He has also observed that ulnar loop had highest mean percentage frequency of the digital dermatoglyphic pattern followed by whorl, arch and radial loop i.e., ulnar loop and whorl was higher in right hand and radial loop and arch in left hand of breast cancer -patients. In our study, we identified a significant association with whorls and we have also observed that ulnar loop had highest mean percentage frequency followed by whorl, arch and radial loop. According to Natekar PE<sup>9</sup>, out of 1000 fingerprints, cancer patients had 33% whorls, 66.6% loops, 0.4% arches whereas the control group had 63.8% whorls, 35.5% loops and 0.7% arches. There was the presence of more than 6 loops in breast cancer patients. In our study, out of 2000 fingerprints, breast cancer patients had 47% loops, 44% whorls, 4% arches, 2% ulnar twinned loop, 0.8% radial twinned loop whereas the control group had 56% loops, 25% whorls, 8% arches, 7% ulnar twinned loop, 3% radial twinned loop. We have also observed there was the presence of 0.4% tented arch and 0.4% accidental loop among the breast cancer patients which was absent in a control group of individuals. There was presence of whorls in 6 out of 10 digits in 62% of the breast cancer patients. Sakineh Abbasi<sup>10</sup>, with an ever increasing population it is important that methods be developed to identify individuals who are either at risk or already

having illness in the most cost – efficient manner without sacrificing quality of care. The use of dermatoglyphics is a unique approach and cost effective for identification in such individuals. In his study of dermatoglyphic patterns, he has observed the significant difference in right hand middle finger, ring finger, left hand index finger, middle finger, ring finger, little finger where there was an increase in loop in all these digits and also observed whorls in 6 out of 10 digits in 48.7% of the breast cancer cases. In our study, we have observed the significant difference in the left hand thumb, ring finger, little finger, right hand ring finger. We have also observed that the whorls in <6 out of 10 digits in 62% of the breast cancer patients.

## CONCLUSION

The present study concludes that as there is a genetic influence on the digital ridge patterns, these do not change throughout the life. Hence with the aid of this digital and dermatoglyphic pattern we can predict the occurrence of breast cancer and this dermatoglyphics can serve as a non-invasive, anatomical marker and a predictor tool to determine the individuals with breast cancer. We also conclude that with the help of this ability to predict the earliest changes associated with breast cancer it may allow to the introduction of more effective preventive strategies.

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