DERMATOGLYPHICS IN CARCINOMA BREAST

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ABSTRACT

BACKGROUND

Dermatoglyphics has been used to study the patterns of various diseases and is also used as a screening tool. Carcinoma breast is one of the common cancers affecting the females and since the development of milk ridges and mammary buds coincide with the development of dermal ridges in the volar pads, the pattern of dermal ridges may be linked with Carcinoma breast.

MATERIALS AND METHODS

The fingertip patterns and impressions of the palm were taken by the Roller & Ink method in an executive bond paper. Digital patterns, pattern intensity, total finger ridge count (TFRC), absolute finger ridge count (AFRC), a-b ridge count, atd angle were studied and their significance analysed in 100 histopathologically proven carcinoma breast cases and in 100 age matched controls.

RESULTS

Predominance in arch pattern, a pattern intensity of less than 10 in both hands, TFRC less than 70, AFRC less than 80, a-b ridge count of less than 30 in the left hand and an atd angle of less than 45 were significantly associated with carcinoma breast.

CONCLUSION

The present study showed a significant association between the various dermatoglyphic features and carcinoma breast. So it may be used as a screening tool in early detection of carcinoma breast in high risk population.

KEYWORDS

Dermatoglyphics, Digital Patterns, TFRC, AFRC, a-b Ridge Count, atd Angle, Carcinoma, Screening.

needle, fingertip patterns were counted and dermatoglyphic landmarks marked.

Fingertip patterns are arches, loops whorls and accidentals and dermatoglyphic landmarks include triradius and core.³

Qualitative Analysis
Include fingertip patterns and pattern intensity.

Fingertip Patterns- The type of patterns in the fingertip was counted in the order from the little finger to thumb in the left hand and from the thumb to little finger in the right hand.

Pattern Intensity- Triradius refers to the confluence of 3 ridge systems and pattern intensity denotes the number of triradii present.

Quantitative Analysis
Core is the approximate center of the pattern and in ridge counting the distal tip of the straight line forming the core is used. Ridge counting is done along a straight line connecting the triradii point to the core. Ridges containing the point of core and triradii point are both excluded. Ridges are counted from the little finger to thumb in the left hand and from the thumb to little finger in the right hand.

Method of ridge counting in various patterns are given in Figure 1.

Figure 1. Ridge Counting in Various Fingertip Patterns A-loops B, C & D- Whorls

Total Finger Ridge Count/TFRC- TFRC is the sum of the ridge counts in all the ten fingers.

Absolute Finger Ridge Count- AFRC is the sum of ridge counts from the separate triradii of all the fingers.

a-b Ridge Count- is the ridge count between 2 adjacent digital triradius a & b. Counting is done along the straight line connecting them (Fig 2).

Atd Angle- is the angle subtended by lines drawn from digital triradius ‘a’ to axial triradius’ t’ and digital triradius’ d’ (Figure 2). This is measured using a protractor. This determines the axial triradii point.

Figure 2. Method of Measuring a-b Ridge Count (left) and atd Angle (right)

All the findings were entered in the master chart which also had the serial number and age of both cases and controls. The significance of these values was determined using the chi-square test and p value determined.

RESULTS
Fingertip Patterns
38% of cases and 24% of controls had a predominance of arch patterns. An equal proportion of both cases and controls showed loops and so was the case of whorls. 98% of cases and 94% of controls had loops. 81% of cases and 80% of controls had loops (Table I).

<table>
<thead>
<tr>
<th>Pattern Type</th>
<th>Cases</th>
<th>Controls</th>
<th>P value</th>
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<tbody>
<tr>
<td>Arches</td>
<td>38</td>
<td>24</td>
<td>0.032</td>
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<tr>
<td>Loops</td>
<td>98</td>
<td>94</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Whorls</td>
<td>81</td>
<td>80</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Accidentals</td>
<td>02</td>
<td>03</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

Table I. Frequency of Fingertip Patterns in Cases and Controls

There was a significant association between the presence of arches and cases with a p value of 0.032. No significant association between the presence of whorls or loops and cases were seen in the present study.

Pattern Intensity
Less than 10 was observed in 47% of cases and 27% of controls in the right hand. In the left hand, a pattern intensity of less than 10 was found in 43% of cases and 24% of controls (Table II).

<table>
<thead>
<tr>
<th>Pattern Intensity</th>
<th>Right Hand</th>
<th>Left hand</th>
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<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Controls</td>
</tr>
<tr>
<td>Less than 10</td>
<td>47</td>
<td>27</td>
</tr>
<tr>
<td>More than 10</td>
<td>53</td>
<td>73</td>
</tr>
</tbody>
</table>

Table II. Frequency of Pattern Intensity and Carcinoma Breast

There was a significant association with pattern intensity of less than 10 and cases in right hand (p value-0.005) as well as in the left hand (p value-0.007).
The number of cases and controls with a pattern intensity in a range between 6 to 10 (<10) and between 11 to 15 (>10) in the right and left hands is depicted in the line diagram (Figure 3). From the above figure, it is clear that pattern intensity of less than 10 is observed more in cases than controls in both hands.

**Quantitative Analysis**

**Total Finger Ridge Count**

Among the study population, TFRC less than 70 was found in 71 cases and 15 controls whereas TFRC of more than 70 was seen in 29 cases and 85 controls (Table III).

A significant association between TFRC less than 70 and carcinoma breast (p=0.017) was observed in this study.

**Absolute Finger Ridge Count**

AFRC of less than 80 was seen in 32 cases and 18 controls whereas more than 80 was seen in 68 cases and 82 controls (Table III).

A significant association between AFRC less than 80 and carcinoma breast was present (p= 0.033).

<table>
<thead>
<tr>
<th>Finger Ridge Count</th>
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<th>Controls</th>
<th>P value</th>
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</thead>
<tbody>
<tr>
<td>TFRC</td>
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<td>AFRC</td>
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<tr>
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<td>68</td>
<td>82</td>
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</table>

*Table III. Frequency of Finger Ridge Count in Cases and Controls*

AFRC was categorised into 4 groups depending on the number of ridges and the results plotted in a histogram (Figure 4).

**DISCUSSION**

**Fingertip Patterns**

The present study showed an increased arch pattern in the fingertips in both hands in carcinoma breast cases and was statistically significant in conformity with Oladipo, Shivaji, Devgan, and Aprajitha. There was no significant association between the presence of whorl patterns and carcinoma in this study as against Devgan and Lavanya.

**Pattern Intensity**

Pattern intensity refers to the complexity of ridge configurations. Pattern intensity and carcinoma breast showed a significant relation to each with a value of less than 10 in right and left hands. An increased value was reported by Devgan, which is in contrast with the present study.

**TFRC**

The association of ridge count and cancer was reported as early as in 1972. A significant association between TFRC and carcinoma breast was observed in this study. Similar findings were reported by Oladipo, Shivaji, Aprajitha, and Lavanya.

**AFRC**

A significant association between a decrease in AFRC and carcinoma breast was seen in this study. Shivaji, Aprajitha also reported a significant decrease in both TFRC and AFRC. Srivedi has reported an increase in both TFRC and AFRC in carcinoma breast cases, but the present study showed a decrease in both.

**a-b Ridge Count**

A significant association of a-b ridge count with carcinoma breast in the present study was also noted by Shivaji, Devgan.
Natekar\textsuperscript{11} and Yunyu Zhou.\textsuperscript{12} An increased a-b ridge count was reported by Sridvi,\textsuperscript{11} and Fuller\textsuperscript{1} in his studies has observed that a-b ridge count do not change in cancers.

\textbf{atd Angle}

A significant lower angle was noted here and was in uniformity with the findings reported by Oladipo\textsuperscript{4}, Lavanya\textsuperscript{9}, Natekar\textsuperscript{10} and Sridvi.\textsuperscript{11}

\textbf{Screening Tool}

The present study on the dermatoglyphics and carcinoma breast suggests that this method can be used as an effective screening tool. The importance of dermatoglyphics as a valuable aid in screening campaigns was reported as early as 1983 by Harvey.\textsuperscript{13} Further studies conducted at national and international level emphasised the use of dermatoglyphics as an anatomical, effective, noninvasive, cheap and easy screening tool in high risk population.\textsuperscript{14,15,16} The dermatoglyphics in breast cancers can also be used as a predictor tool\textsuperscript{17} and can also serve as a base for future research.\textsuperscript{7}

\textbf{CONCLUSION}

An increase in the arch pattern, low pattern intensity in hands, a decreased total and absolute finger ridge count, a decreased a-b ridge count in the left hand and a decreased ATD angle were significantly associated with carcinoma breast. Similar studies conducted at different centres in the country will help to standardise the dermatoglyphic markers. When done, this could be effectively used as a screening tool in hospitals and medical camps to assess the risk of carcinoma breast in a susceptible population.

\textbf{REFERENCES}