



Geographical variation in planter dermatoglyphic patterns of breast cancer patients of Rajasthan and Punjab states

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ABSTRACT

The breast cancer is the most common cancer after ovarian cancer. Brca-1, brca2 and p-53 genes have been studied in the development of breast cancer. The genetic basis of an individual can be altered during first trimester of pregnancy due to environmental and genetic factors, which are expressed as variation in dermatoglyphic patterns. Dermatoglyphic is used as a diagnostic tool in a number of diseases that have a strong hereditary basis. In the present study, we studied the effect of geography of two different states [Rajasthan and Punjab] on the dermatoglyphic patterns of breast cancer patients.

This study consists of 400 subjects, out of which 200 were from Punjab state and 200 from Rajasthan state. The subjects from each state included 100 control and 100 breast cancer patients. Qualitative and quantitative analysis has shown statically significant difference among two states. It was observed that plain arches [p<0.0001, for both great toes] and loop fibular patterns [p<0.0001 -for right great toe, p<0.001- for left great toe] were significant in both great toes [right and left] of patients of Rajasthan and Punjab states whereas whorls [p<0.0001] and plain arches [p<0.0001] were highly significant in right hallucal area & loop tibial [p<0.002] and loop fibular [p<0.03] were significant in left hallucal area.

INTRODUCTION

The scientific study of dermal ridges of hand and feet was first begun in 1823 by Evangelista purkinje[1]. Dr. Harold Cummins, Father of dermatoglyphic, coined the term "Dermatoglyphic" in 1926[2]. Overtime, several studies have emerged which progressively show that dermal ridges of hand and feet can be employed in the prediction of a range of medical conditions and diseases. Individual epidermal ridges are highly variable configuration and details of ridges are permanent and unchangeable. These epidermal ridges configuration begins to develop at about 13th week of gestation.

Dermatoglyphic polymorphism results from the interplay of genetic and environmental factors during the early stage of ontogenesis. However the dermatoglyphic patterns are in part, from genes of parents but the inheritance is not pure mendelian. The reason for departure from pure mendelian inheritance is that the "theoretically inherited patterns" laid down at conception are modified during first few weeks in the womb due to pressure on the volar pads. This result in individual characteristics, but these patterns may be affected by environment during first trimester of pregnancy but postnatal the configuration persist unchanged in all

respect expect dimension.

Research has shown that a positive correlation exists between some disease conditions, especially those that have a genetic basis and dermatoglyphic patterns[3,4], which may aid in diagnosis of such conditions⁵. Dermatoglyphic pattern determinations and linkage to diseases could be an important diagnostic tool in diagnosis of genetic disorder[6,7].

Breast cancer is a malignant tumor that often manifests with fibrosis causing retraction of the nipple, necrosis and ulceration of the overlying skin[8]. A family history of breast cancer has been documented as an important factor for development of the disease. It is the most common malignancy among women after ovarian cancer[9,10] and its genetic base is well-established. BRCA1, BRCA2 and p-53 genes have been extensively studied as underlying the development of breast cancer[11]. A family history of breast cancer might be associated with specific dermatoglyphic patterns.

In present study, the main aim is to find out the effect of geography on the planter patterns of breast cancer patients of two different states [Rajasthan and Punjab].

MATERIAL AND METHODS

This study consists of 400 subjects, out of which 200 were from Punjab state and 200 from Rajasthan state. The subjects from Punjab state included 100 control and 100 breast cancer patients. The 200 subjects which belong to Rajasthan state was also categorized in the same manner. All the cases were selected, who visited Acharya Tulsi Cancer Research Center, P.B.M. and Associated group of hospitals, for their treatment from June 2008 to may 2010. Diagnosis was based on their history and clinical and laboratory examination. This study was approved by ethical committee of institute. Patients, who were taking Radiotherapy or chemotherapy for treatment of the Breast cancer at different stages, were included for this study.

To obtain the planter impression, a slight modification of ink method was used. This technique is known as "modified cotterman's technique".

The materials used for prints are:

1. A-4(international size) glazed paper for prints
2. Kores duplicating ink
3. Ink spreading roller
4. Magnifying lens
5. 30×30 cm glass plate used as inking slab

The great toe and hallual patterns were classified into arches, loops and whorls using "loesch and skrinjarie's method[12]. The findings were analyzed, tabulated and their statically significance was noted. For statically analysis SPSS version 12 was used.

OBSERVATION

Table I reveals that there are few planter patterns which show great difference in their frequency of distribution in two different

geographical regions.

Plain arches show a highly significant difference in its frequency of distribution in Rajasthan and Punjab state. There were found to occur only in 2% cases in Rajasthan state while the same pattern occurred at a frequency of 16% in breast cancer patients of Punjab state. Its significance value is $p=0.0001$. Loop fibular shows highest frequency of distribution in patients of both the geographical areas. In Rajasthan state its frequency of distribution was 83% and in Punjab state it was 48% so its p value becomes 0.0001, which is highly significant.

Whorls and loop tibial also show significant difference in their frequency of occurrence in two states. Whorls were present in 5% patients of Punjab whereas Loop tibial was present in 6% patients. While these patterns were absent in breast cancer patients of Rajasthan state (for whorls $p=0.02$, for loop tibial $P=0.01$).

Table II reveals that two planter pattern show significant differences in frequency of their distribution in two different geographical areas (Rajasthan and Punjab).

According to this table plain arches show a highly significant variation ($p=0.0001$) in Rajasthan and Punjab state. Its frequency of distribution was 1% in Rajasthan state and 23% in Punjab state and loop fibuler also show a significant variation between two state, their frequency of occurrence were 11% in Rajasthan and 6% in Punjab ($p=0.001$).

Rest all the planter patterns although show geographical variation but their frequency of distribution was not significant.

Table III clearly depicts that there is highly significant geographical variation in the distribution of whorls and plain arches on the right hallual area of breast cancer patients of Rajasthan and Punjab state.

Table I. Comparison of percentage distribution of pattern on Right great toe of breast cancer patient of Rajasthan and Punjab state

Plantar patterns	Rajasthan	Punjab	X^2	P
Whorl	-	5	5.12	0.02
Plain Arches	2	16	11.96	0.0001
Tented Arches	15	25	3.12	0.07
Loop fibuler	83	48	27.64	0.0001
Loop tibial	-	6	6.18	0.012

Table II. Comparison of percentage distribution of pattern on Left great toe of breast cancer patient of Rajasthan and Punjab state

Plantar pattern	Rajasthan	Punjab	X^2	P
Whorl	7	12	1.45	0.22
Arches	1	23	22.91	0.0001
Tented Arch	23	15	2.07	0.15
Loop fibuler	58	42	5.11	0.001
Loop tibial	11	6	1.60	0.20

Table III. Frequency and percentage of distribution of patterns on Right hallucal area of breast cancer patient of Rajasthan and Punjab state

Plantar pattern	Rajasthan	Punjab	X ²	P
Whorl	8	31	16.84	0.0001
Loop tibial	29	12	8.86	0.002
Arches	24	5	14.55	0.0001
Tented Arch	-	-	-	-
Loop fibuler	39	51	2.30	0.08

Table IV. Frequency and percentage of distribution of patterns on Left hallucal area of breast cancer patient of Rajasthan and Punjab state

Plantar patterns	Rajasthan	Punjab	X ²	P
Whorl	13	16	0.36	0.54
Loop tibial	29	12	8.86	0.002
Plain Arches	12	11	0.049	0.82
Tented Arches	-	-	-	-
Loop fibular	46	61	4.52	0.03

**Fig. 1.** Illustration of the technique used in taking a print.

Frequency of distribution of whorls in breast cancer patients of Rajasthan state was found to be 8% while the same patterns express itself in 31% cases in Punjab state. So geographical variation for whorls, compared in two states came out to be highly significant ($p=0.0001$). Besides whorls, plain arches were also seen to show great geographical variation in breast cancer patients. Of the two states, in Rajasthan state it was observed to occur in 24% cases, while in Punjab state its frequency of distribution was found to be 5% which shows a highly significant variation with respect to this parameter ($p=0.0001$). For loop tibial and loop fibular the respective p values were 0.002 and 0.08.

Perusal of data in table IV reveals that left hallucal area of

breast cancer patients of the two states show significant occurrence only in loop fibular and loop tibial pattern.

As can be seen in above table loop tibial show the greatest geographical variation in its frequency of distribution which is 29% in Rajasthan and 12% in Punjab ($p=0.002$) which is significant. The loop fibular shows highest frequency of occurrence in breast cancer patients of both the state (Rajasthan-46% and Punjab 61%). The difference of which shows a significant geographical variation in two state ($p=0.03$).

RESULTS

The arches were almost absent in great toes of breast cancer patients of Rajasthan state where as in Punjab state they were significantly present in right as well as in left great toe [$p<0.0001, p<0.0001$]. Whorls and loop tibials patterns show significant 'p' value in right hallucal area [for whorls $p<0.0001$, for loop tibial $p<0.002$]. Loop tibial were the only pattern which show significant difference in both hallucal areas [$p<0.002$].

DISCUSSION

Two great toe patterns show highly significant 'p' value in right as well as left great toes in the patients of both states [Rajasthan and Punjab states], one is the plain arches [for right and left great toes $p<0.0001$] and other is the loop fibular [for right great toe $p<0.0001$, for left great toe $p<0.001$]. Whorl shows their significant presence only in the right great toes of patients of Punjab state [$p<0.02$]. None of the patients was reported having whorl pattern in right toes of patients of Rajasthan state. Not much work has been done on the planter dermatoglyphic patterns of breast cancer patients. The palmer study by Murry and chintamani [13,9] reported a pattern of 6 or more digital whorls in women with breast cancer as compared to control.

Dermatoglyphic analysis of hallucal pattern shows that loop tibial was significant in right and left hallucal area of both geographical areas [for both hallucal area $p < 0.002$]. Plain arches and whorls show great geographical variation in breast cancer patients. They are highly significant for right hallucal area [for both patterns $p < 0.0001$]

Chintamani et al reported that whorls in right ring finger and right little finger were found to increase among the breast cancer as compare to control[9].

CONCLUSION

In the present study we can conclude that the breast cancer patients had no specific planter patterns. These patterns may vary within limit according to the geography of the state, because geography is the factor which can alter the dermatoglyphic patterns during first trimester of pregnancy.

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