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Original Research Article

STUDY OF DERMATOGLYPHICS IN CARCINOMA CERVIX

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ABSTRACT

Background: Over the last 40 years or so more than 4000 papers have been written on significance of skin ridge patterns. Many of them are restricted to the study of genetic or congenital disorders. At present, throughout the globe, there are nearly one million women each year getting cervical cancer. Carcinoma cervix is the most common cancer in women in most of the developing countries including India.

Materials and Methods: The subjects of this study were 90 histopathologically confirmed patients of carcinoma cervix and control group of 90 healthy females ranging from age group 25-65 years. Dermatoglyphic prints were taken by using ink method. Different qualitative parameters like fingertip patterns, patterns in interdigital areas and quantitative parameters which included total finger ridge count (TFRC), a-t-d angle, a-b, b-c, c-d and t-d ridge counts were taken and studied. The data was analyzed by using Chi^2 test and student 't' test

Results: There was statistically significant decrease in total finger ridge count, a-t-d angle and t-d ridge count in patients of carcinoma cervix compared to the control group. While other parameters like fingertip patterns, interdigital area patterns and or a-b, b-c and c-d ridge counts did not show any statistically significant difference in females having carcinoma cervix.

Conclusion: This study has shown certain specific associations between Carcinoma of cervix & ridges like other studies. This study may help in screening of females particularly with risk factors like family history by studying their dermatoglyphics along with other screening tests.

KEY WORDS: Dermatoglyphics, Fingertip Patterns, Atd Angle, Total Finger Ridge Count.

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INTRODUCTION

The entire human body is clothed with skin which happens to be the largest & most important organ of the body. It performs many vital functions. However the skin on the ventral side of the hands & plantar side of foot is exclusively designed & is corrugated with the ridges & configurations.

Cummins and Charles Midlo MD coined the term 'Dermatoglyphics' to this field of science. They showed that the hand contained significant dermatoglyphic configurations that would assist the identification of Mongolism in the newborn child and thus they set the stage for much of the later dermatoglyphic research work. They also researched the embryogenesis of skin ridge

patterns and established that the fingerprint patterns actually develop in the womb and are fully formed by 4thfetal month & these patterns do not change throughout life [1].

Dermal ridge differentiation takes place early in fetal development. The resulting ridge configurations are genetically determined and influenced by environmental forces. Developmental mechanism is not clearly known but the ridge patterns form at the sites of fetal volar pads. Fetal volar pads are mound shaped elevations of mesenchymal tissue situated above the proximal end of most distal metacarpal bone on each finger, in each interdigital area, in thenar and hypothenar areas of palms and soles and in the calcar area of the sole. It has been established that the critical period of ridge formation begins in the fetus at approximately 70mm crown rump length, i.e. about 3 months of age, when volar pads are near or just beyond their peak development[2]. Development of these patterns has been extensively studied & has been found to be affected by genetic & environmental factors.

Past research has demonstrated that the epidermal ridge patterns are under genetic influence. Galton [3] and Wilder [4,5] are the first to have studied the hereditary basis of dermal patterns, which has since been confirmed by numerous genetic studies. At present, there is wide agreement that the heredity of most dermatoglyphic features confirms to a polygenic system with individual genes contributing a small additive effect. It was Cummins (1936)[6] who first reported the use of dermatoglyphics as a diagnostic aid in mongoloids. Since then, large numbers of studies have been carried out making the use of this science as a diagnostic tool in various medical disorders. Due to this fact, dermatoglyphics can be used as supportive evidence in diagnosis of hereditary clinical disorders.

In India, cancer of cervix is the second most common number one killer cancer among women. It is estimated to have incidence rate of 22 per lac population and 20.7% of all cancer deaths in women. It affects relatively young women with incidence increasing rapidly from the age of 25 to 45, then leveling off and finally falling again [7]. But some cancers are more common in certain races & this suggests a genetic cause. Hence the incidence of carcinoma of the cervix in certain populations is less which may be partly due to genetic factors. Evidences supporting that the carcinoma of the cervix has a genetic cause, have also started accumulating. The causes of human cancers are diverse, but malignant transformation is invariably caused by the development of genetic alterations that disrupts cell growth. Although the biological basis is unknown, studies from nationwide tumor, twin and other family registries in Scandinavian countries indicate that cervical cancer aggregates in families. In general an approximate twofold increase in risk of precancer or invasive cervical cancer relative to general population risk is observed in family members of cervical cancer patients. It is not settled how much of this elevation in risk among relatives of individuals affected with cervical cancer can be attributed to shared environment versus genetic effects [8].

AIMS AND OBJECTIVES:

Dermatoglyphics as a diagnostic aid is now well established in a no. of diseases which have strong hereditary basis. Hence the present study was undertaken with following objectives:-

· To evaluate dermatoglyphic features in females having carcinoma cervix and compare the results with dermatoglyphic features of healthy females.

· To compare and correlate this study with available data.

· Attempt to draw any conclusion regarding diagnosis of carcinoma cervix from dermatoglyphic study, if possible.

A significant association probably will point towards its genetic basis & may help in predicting the disease.

MATERIALS AND METHODS

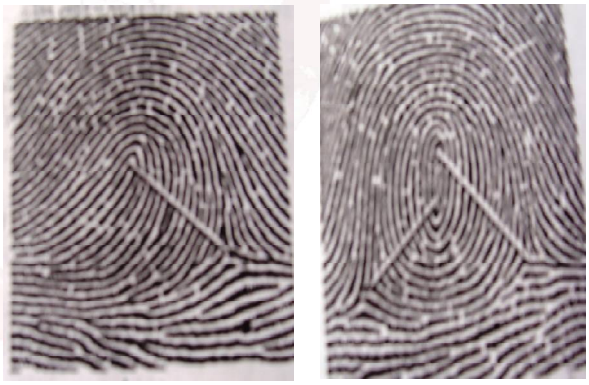
The subjects of this study were 90 females above the age of 25 years having carcinoma of cervix from the outpatient department of gynaecology of Shri Chhatrapati Shivaji Sarvopachar Rugnalaya, Solapur. Prior approval from the Institution's Review board (Human

Ethical committee) of Dr. V. M. Government Medical College, Solapur, Maharashtra, India were taken. Informed consent was taken from the patients as well as from the control group. The patients were histopathologically confirmed cases & they did not have any other associated genetic disorder. These patients were compared with 90 healthy females above 25 years of age. While selecting controls care was taken to rule out any hereditary disease & carcinoma in the family. Palm & fingertip prints were taken by Ink & pad method described by Cummins [9] using Kore's duplicating ink. The prints were then subjected for detailed dermatoglyphic analysis with the help of magnifying hand lens; ridge counting was done with the help of a sharp needle. Following parameters are observed on the prints.

Qualitative parameters – i) fingertip patterns - the ridge patterns on the distal phalanges of the fingertips are divided into three groups – arches, loops and whorls. ii) Patterns in five interdigital areas- Thenar and first interdigital areas closely related anatomically. They are usually considered as one area labeled as thenar/first interdigital (Th/I_1). In most cases there is no pattern in Th/I_1 area but ridges follow a mild curve around the base of the thumb. Similarly second, third and fourth interdigital areas are found in the distal palm in the region of the heads of metacarpal bones. They are termed as I_2, I_3 and I_4 respectively. Hypothenar area shows most commonly presence of arches. Typically there are four digital triradii found in the metacarpal region at the base of the digits II, III, IV and V. Each triradius is normally associated with one digit and are termed as a, b, c and d proceeding in a radio-ulnar direction. Another important landmark is core which is in the approximate center of the pattern. In ridge counting not the whole core but the point of core only is used. Apart from the digital triradii, there is another important triradius, the axial triradius. The symbol 't' is reserved for axial triradii found in the proximal region of the palm, near the wrist crease.

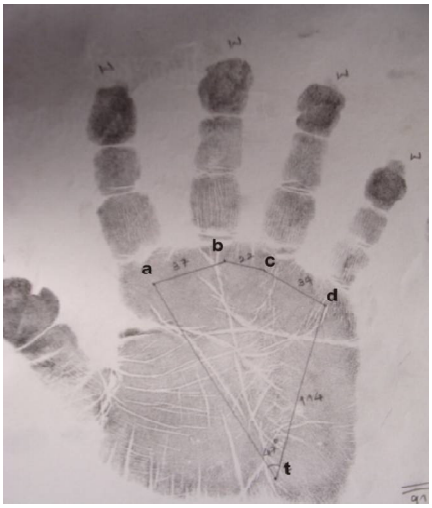
Quantitative parameters - many dermatoglyphic characteristics can be described quantitatively also, e.g. by counting the number of triradii or ridges within a pattern and measuring distance or angles between specified points. For finger ridge counts the counting is done along a straight line connecting the triradial point to the point of core. Every ridge crossing the line is counted. Only the largest count is scored in a pattern with more than one possible count. Ridge counting is shown in fig.1. Total finger ridge count (TFRC) represents sum of ridge counts of all ten fingers, where only large count is used on those digits with more than one ridge count. **'atd' angle** is the most widely used parameter as shown in fig.2. It is formed by lines drawn from digital triradius a to the axial triradius and from this triradius to the digital triradius d. Ridges are often counted between two digital triradii. The ridge count most frequently obtained is between triradii a and b and is referred to as a-b ridge count. Similarly b-c, c-d and t-d ridge counts are done.

Fig. 1: showing finger ridge counting in (a) arch and (b) whorl.



a b

Fig. 2: Showing atd angle and different ridge counts.



OBSERVATIONS AND RESULTS

The data for qualitative dermatoglyphic features is given in table 1 and that of quantitative in

Table 2. Qualitative data was statistically analyzed by using 2x2 contigency 'X^2' test. All these quantitative parameters i.e. total finger ridge count (TFRC); a-t-d angle; ridge counts in interdigital areas like a-b, b-c, c-d & t-d ridge counts were studied and analyzed according to Penrose [10]. For quantitative data Student's 't' test was used.

There is no statistically significant difference in the frequency of arches, loops or whorls in both hands of patients as compared to controls. Same was observed for the frequency of presence of patterns in all the five interdigital areas. There was statistically significant decrease in total finger ridge count and atd angle. t-d ridge count was also statistically decreased in carcinoma cervix patients.

Table 1: Showing percentage frequency distribution of qualitative parameter.

Parameters	Carcinoma cervix			Control		
	R	L	R+L	R	L	R+L
Arches	5.1	2.6	3.8	3.5	4.2	3.8
RL	2.2	1.8	2	3.7	3.1	3.4
UL	56.7	62.2	59.3	57.3	58.8	58.1
Whorls	36.2	33.3	34.8	35.3	33.8	34.6
Th/I_1	10	15.6	12.8	14.4	17.8	16.1
I_2	17.8	14.4	16.1	15.6	8.9	12.2
I_3	15.6	7.8	11.7	20	11.1	15.6
I_4	8.9	12.2	10.6	13.3	18.9	16.1
Hypothenar	7.8	13.3	10.6	10	8.9	9.4

Table 2: showing statistical analysis for quantitative parameters.

Parameter	Carcinoma cervix(mean+SD)			Control(mean+SD)		
	R	L	R+L	R	L	R+L
a-b	35.6+5	34.8+5	35.2+5	36.4+5	36.1+5	36.3+5
b-c	23.7+5	23.2+5	23.5+5	24+5	23.6+5	23.8+5
c-d	30.2+5	30.2+5	30.2+5	31.8+5	31.7+5	31.7+5
t-d	98.2+9.6*	98.6+9.1*	98.4+9.3*	103.6+8.9	103+8.2	103.4+8.5
Atd angle	38.8+3.8*	38.8+4.4*	38.8+4.1*	47.4+6.4	47.3+6.3	47.3+6.4
TFRC	65.5+16.8*	65.2+14.9*	65.3+15.9*	79.8+10.3	78.6+12.4	79.1+11.4

R – right hand, L – left hand, RL – radial loop, UL – ulnar loop, Th – thenar, SD – standard deviation, TFRC – total finger ridge count, ð† - p value <0.001

DISCUSSION

At present throughout the globe, there are nearly one million women each year getting cervical cancer. Carcinoma cervix is the most common cancer in women in most of the developing countries including India. In India the prevalence is more amongst the comparatively younger age group. Major factors affecting the prevalence of carcinoma cervix in a population are economic factors, sexual behaviors and degree of effective mass screening. Carcinoma cervix is rare in women who are sexually not active. Male circumcision is only partially protective against cervical carcinogenesis [11].

The present study is compared with Reddy et al [12], Pal et al [13], Inamdar et al[14], Baluskar et al [15] & Patil et al [16].

The present study did not show any statistically significant changes in the frequency of arches, loops or whorls in patients as compared to controls, in both the hands. While Reddy et al[12] have found significant high frequency of whorls in patients while Pal et al[13] observed significant high frequency of arches & low frequency of ulnar loops in patients as compared to controls as was same observed by Patil et al[16]. Inamdar et al[14] have mentioned increased frequency of whorls in both hands & a high frequency of arches in left hand while low frequency of ulnar loops in both hands of patients. Baluskar et al[15] observed increased frequency of whorls with decreased ulnar loops in patients.

The present study has revealed decreased total finger ridge count in both hands of patients as compared to controls. Pal et al[13] & Patil et al [16] showed a similar decrease in total finger ridge counts in both hands of patients. While Reddy et al[12] & Inamdar et al[14] & Baluskar et al[15] observed an increase in total finger ridge counts in patients compared to controls. The variation of mean total finger ridge count between the study of other workers and the present study is considerable because there is considerable variation with respect to finger ridge count asymmetry and diversity from finger to finger[17]. Baluskar et al[15] in addition to total finger ridge count also studied the absolute finger ridge count which showed increased frequency in carcinoma cervix patients. The other workers did not study absolute finger ridge count.

In this study atd angle was found to be decreased in patients. The same was observed by Reddy et al[12] & Inamdar et al[14]. But Pal et al[13], Baluskar et al[15] & Patil et al[16]

found an increase in the value of atd angle in carcinoma cervix patients. While in the present study a decrease in t-d ridge count has been seen which is corresponding to the observations from Reddy et al[12], Pal et al[13] & Inamdar et al[14], Baluskar et al[15] & Patil et al[16].

Since the atd angle has a negative correlation with t-d ridge count[18], a decreased t-d ridge count will give higher value of atd angle. However this correlation was not observed in this study as well as by Reddy et al [12].

The present study did not show any significant difference in the frequency of presence of patterns in all the five interdigital areas i.e. I1, I2, I3, I4 & hypothenar areas in patients & controls. The same was observed by the other studies also.

A few contradictory findings between present study and other studies cannot be explained at this stage. However further studies in other populations will be helpful along with genetic study.

The results of this study along with those of Reddy et al[12], Pal et al[13], Inamdar et al[14], Baluskar et al[15] & Patil et al[16] have shown certain specific associations between Carcinoma of cervix & ridges indicating that genes which are responsible for this disease or making the individual susceptible to disease are also responsible for abnormal ridge formation. Probably heredity may increase the susceptibility of an individual towards environmental factors for this disease.

CONCLUSION

In the present study dermatoglyphic features of 90 females having Carcinoma cervix were studied and the findings were compared with 90 normal healthy females. The dermatoglyphic findings observed in patients of Carcinoma cervix were decrease in the total finger ridge count, atd angle and t-d ridge counts in both the hands. There was no difference for the frequencies of arches, loops or whorls in both the hands. Hence this study may help in screening of females particularly with risk factors like family history by studying their dermatoglyphics along with other screening tests.

Conflicts of Interests: None

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