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Original Research Article

PALMAR AND DIGITAL DERMATOGLYPHIC PATTERNS IN INFERTILE MALES IN THE POPULATION OF BIHAR

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Abstract

Background: Dermatoglyphics is a science which can help to predict occurrence of a specific disease. Dermatoglyphics may be useful to find out suspected infertile male patients from a large population which can further be subjected to more investigations. Different diseases have different dermatoglyphic patterns associated with them. Some diseases showing association with Dermatoglyphics include Sickle cell anaemia, congenital heart disease, Rheumatoid Arthritis, Diabetes mellitus, Down's syndrome and Cancers such as Breast and Prostate.

Objective: The purpose of this study is to compare the frequencies of different fingerprint patterns of infertile males with normal populations.

Materials and Methods: This study was conducted on 108 infertile male patients with abnormal semen profile and compared with an equal number of age matched fertile males. We studied fingerprint patterns in all subjects.

Result: Loop was the commonest pattern followed by Whorls and Arch in both groups. There is a significant difference between the numbers of arches in infertile cases and controls. We also found the statistically significant difference between patterns of finger ridge count in thumb and ring finger (left hand) of infertile males and controls. The mean of atd angle, dat angle and adt angle on the left hand of infertile males were statistically significant from those of the controls. Whereas the mean of all these angles is not being statistically significant in right hand of both cases as well as controls.

Conclusion: Dermatoglyphics may be used for infertility screening of a large population because it is simple, non-invasive and inexpensive technique. It may be also used as a supportive investigatory tool for clinicians.

Keywords: Dermatoglyphic, male infertility, fingerprint patterns, finger ridge count, palmer prints.

Introduction:

Study of dermatoglyphic and its implications in male infertility is an interesting area that requires to be explored in recent time. Dermatoglyphics is the scientific study of the skin ridges patterns on fingers, toes, palm of the hand and sole of feet. It can be used as a supportive diagnostic tool in male infertility as well as many other genetic disorders. Different diseases have different dermatoglyphic patterns associated with them. Some diseases showing association with Dermatoglyphics include Sickle cell anaemia, congenital heart disease, Rheumatoid Arthritis, Diabetes mellitus, Down's syndrome and Cancers such as Breast and Prostate (1-6). These patterns are important in anthropology and medical sciences due to their diagnostic usefulness.

Dermal ridge development takes place early during foetal development. The ridge configuration is genetically determined and influenced by environmental factors. They are stable throughout life. Several dermatoglyphic studies have been done to diagnose infertile males in different populations (7-9).

Infertility is defined as lack of conception giving rise to live birth after one year of regular unprotected coitus. During the last 25 years the number of cases of infertility has increased worldwide. It would be better if we can detect the disease well before its onset.

The vertebrate HOX gene family is responsible for limb and genital development The HOX genes are part of homeobox genes. HOX and HOX d are required for the growth and patterning of digits and differentiation of genital bud (10, 11). Based on this observation, we can say that infertility has correlation with dermatoglyphic.

Materials and Methods

The present study was done to compare the dermatoglyphic pattern in infertile male with that of the normal individuals. The cases were taken from the Indira IVF centre, Patna, Bihar. Sample size consists of 108 males with infertility and equal number of controls. The consent was taken from both cases and controls. They were informed regarding the procedure in their own language briefly. All cases and controls were of same reproductive age group. Controls were taken from the general population. Equipments used were fast drying printer ink, a roller, a glass, good quality of paper (A3 size), turpentine oil, spirit, cotton, protractor, pencil, eraser and magnifying hand lens.

The prints were collected by standard ink method (12). The hand was impregnated with ink and pressed on paper. Digital patterns were classified into loops, whorls and arches. Finger ridge counting was done using a hand lens. The angles atd, dat and adt were observed using a magnifying glass. Finding of both hands of cases and controls was compared. Statistical analysis of the data was done using 't'test and chi square test. Data was compiled and analyzed in the Department of Anatomy, AIIMS Patna.

Fig 1: Dermatoglyphic print of fingertips of Control male.

Fig 2: Dermatoglyphic print of fingertips of Infertile male.

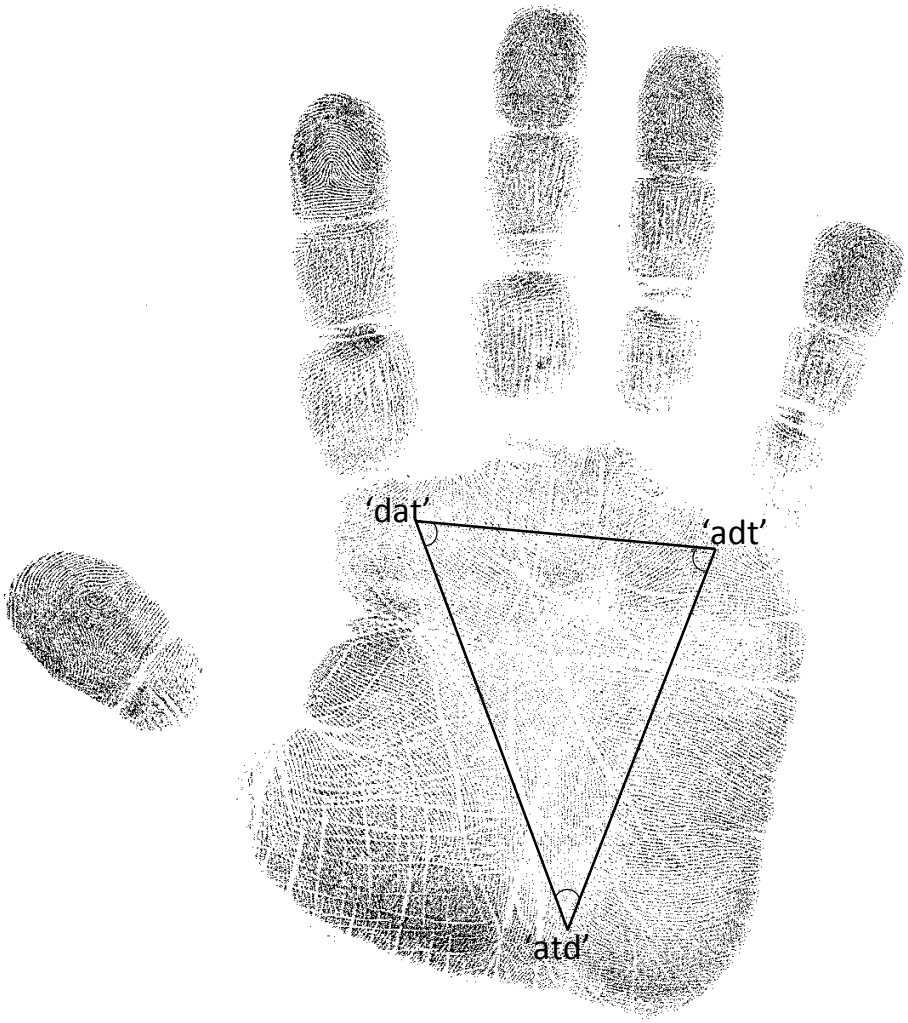

Fig 3: atd angle (Left hand) of infertile male.

Result and Discussion:

In the present study loop was commonest pattern (621; 57.50%) in infertile males as well as in controls (672; 62.22%). The total number of loops was less in infertile subjects (621) as compared to controls (672). Whorls were second most common pattern observed in infertile males (321; 29.72%) as well as in controls (320; 29.63%) which is approximately same. While there is

a significant difference between the numbers of arches (138 in infertile males and 88 in the controls). Table 1 shows a fingertip pattern of both hands a statistically significant increase in arches and decrease in loops in infertile cases when compared to controls.

Table 1: Fingertip pattern in all digits in cases and controls

Hand	Type	Cases (n=108)	Controls (n=108)	*p* value
		No.	No.	
Right Hand	Loop	292	340	.003**
	Whorl	191	168	.140
	Arch	57	32	.005**
Left Hand	Loop	329	332	.851
	Whorl	130	152	.127
	Arch	81	56	.024**
Combined (Right + Left)	Loop	621	672	.025**
	Whorl	321	320	.962
	Arch	138	88	.004**

** Significance at 5%

It was observed that on comparing the fingertip pattern of the right hand of cases and controls, arches showed a statistically significant increase in thumb and index finger. The fingertip pattern of the left hand of cases and controls, whorls and arches showed a statistically significant difference in the thumb. We found a significant decrease in the number of whorls in left thumb of cases who compared to controls (Table 2).

Table 2: Fingertip pattern in fingers and hands in cases and controls

Fingers	Type	Right Hand					Left hand				
		Cases (n=108)		Controls (n=108)		*p* value	Cases (n=108)		Controls (n=108)		*P* value
		No.	%	No.	%		No.	%	No.	%	
Thumb	Loop	49	45.37	48	44.44	.891	62	57.41	50	46.30	.102
	Whorl	40	37.04	54	50.00	.054	23	21.30	48	44.44	.000**
	Arch	19	17.59	6	5.56	.005**	23	21.30	10	9.26	.014**
Index	Loop	54	50.00	68	62.96	.054	53	49.07	56	51.85	.683
	Whorl	31	28.70	28	25.93	.647	21	19.44	30	27.78	.149
	Arch	23	21.30	12	11.11	.042**	34	31.48	22	20.37	.062
Middle	Loop	73	67.59	82	75.93	.174	71	65.74	72	66.67	.886
	Whorl	28	25.93	18	16.67	.097	18	16.67	20	18.52	.721
	Arch	7	6.48	8	7.41	.789	19	17.59	16	14.81	.580
Ring	Loop	43	39.81	54	50.00	.132	55	50.93	62	57.41	.339
	Whorl	62	57.41	50	46.30	.102	52	48.15	42	38.89	.170
	Arch	3	2.78	4	3.70	.701	1	0.93	4	3.70	.175
Little	Loop	73	67.59	88	81.48	.019**	88	81.48	92	85.19	.465
	Whorl	30	27.78	18	16.67	.049**	16	14.81	12	11.11	.418
	Arch	5	4.63	2	1.85	.249	4	3.70	4	3.70	1

** Significance at 5%

The mean of atd angle, dat angle and adt angle on the left hand of infertile males were statistically significant from those of the controls. Whereas the mean of all these angles is not being statistically significant in right hand of both cases as well as controls. (Table 3).

Table 3: Mean pattern of angles of palmer triradii in right and left hand of cases and controls

Angles	Mean ±SD		*p* value
	Cases	Controls	
Right Hand			
atd	41.07±5.55	40.80±4.12	0.2736
dat	59.56±5.52	59.22±4.18	0.6104
adt	79.37±5.28	79.98±3.58	0.3218
Left Hand			
atd	40.20±4.43	41.48±4.41	0.0345**
dat	59.55±5.99	58.07±4.48	0.0478**
adt	79.63±5.37	80.44±4.02	0.0385**

** Significance at 5%

Table 4 shows TFRC (Total Finger Ridge Count) and AFRC (Absolute Finger Ridge Count) in infertile male patients and controls. The mean of TFRCs in infertile males and controls was 125.02 and 129.12 respectively, and the mean of AFRCs in those two groups were 168.75 and 170.72 respectively their differences were not statistically significant.

Table 4: TFRC and AFRC observed in cases and controls**.**

Parameter	Cases (n=108)		Controls (n=108)		t value	P value	Result
	n	Mean	N	Mean			
TFRC	13503	125.02	13946	129.12	0.7280	0.4674	NS
AFRC	18225	168.75	18438	170.72	0.1890	0.8502	NS

NS=Not significant

Dr. Harold Cummins in 1936 reported significant changes in children with trisomy 21 and controls (13). The dermal patterns of individuals once formed remain constant throughout life. It may be a sensitive indicator for different disease.

Fingertip pattern:

Loops: In our study total loops were decreased in infertile male patients (621, 57.5%) as compared to the control group (672, 62.22%). These findings were supported Sontakke et al. (2012) the authors reported the significant reduction of loops in infertile male patients (8) but Oladipo et al. (2009) and Makol et al. (1994) reported the significant increase in loops in primary infertile males as compared to the general population (14, 15).

Whorls: In the present study, we found insignificant increase in whorl pattern in infertile male patient and control group.

Arches: In the present study we observed significant increase in arch in infertile male patients (138, 12.77%) when compared to the control group (88, 8.14%) (Table 1). Our study was matched with the study done by Sontakke et al. (2012) (8). Similar findings were observed in the study done by Bindu Singh and Sajjad Jafar (7).

Finger ridge count: We found palmer patterns like TFRC and AFRC were not statistically significant difference between

infertile male patients and that of control. While other authors who studied in infertile male patients reported similar findings while comparing the palmer Dermatoglyphics of infertile males with controls (8, 9).

atd angles: Infertile male studied presently show a significant difference in atd angle in their left hand. Whereas the mean of atd angle in there right hand was not statistically significant in infertile males as compared to that of controls. These findings are partially similar to that of Sontakke et al. (2012) who found non-significant differences between infertile males and that of controls (8).

Conclusion:

With the help of Dermatoglyphics screening of infertility can be done from a large population. It may be used as a supportive investigatory tool to reveal a predisposition of infertility of an individual. The suspected person may undergo further confirmatory investigations like karyotyping et al. the detected cases may be counseled and treatment may be given accordingly. The awareness of clinical significance of dermatoglyphic is increasing with the development of human Cytogenetics. This study attempts to analyze whether there exists any pattern specific to infertility and whether that serves as a diagnostic tool for early detection of infertility. In our study arches significantly increase in infertile males with no significant difference in the number of whorls compared to controls. On the other hand loops are more in number in controls compared to cases. So we can say that there is a possible genetic influence on the digital ridge pattern in infertility patients and dermatoglyphics can be used as cost effective non-invasive anatomical technique to screen it.

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Conflict of Interest: None

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