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DERMATOGLYPHICS IN HIV INFECTION

Dermatology

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ABSTRACT

This concurrent study involving 50 HIV posititve case and 50 controls (HIV negative) was carried out in a Hospital during 2018-19 to find out whether there is any statistically significant difference in their dermatoglyphic patterns so that on this basis people at high risk could be screened, identified and suitably advised. The study, did reveal significant differences in presence of ulnar whorl and radial whorl among the left hands of both (x2 = 3.90;d.f.1), for the presence of ulnar loop and ulnar whorl in both (x2 =5.24;d.f.1) and for the difference for ulnar/radial C-line termination the left hands (x2 = 4.25;d.f.1) and both hands (x2 = 4.25;d.f.1). When the difference between C-line endings was observed by treating proximal as absent, then the difference for Ulnar, Radial and Absent C-line endings in both groups was also found to be statistically significant (x2 =12.09;d.f.2) for both hands. These findings couldn't be compared with findings of others due to non-availablity of literature on this topic. This pioneer study thus suggests a dire need to take up similar studies on larger scales, both as concurrent and follow-up studies.

KEYWORDS

Dermatoglyphics, HIV/AIDS

INTRODUCTION

Dermatoglyphics refers to systemic study of innumerable epidermal ridges of fingers,palms and soles. Since these dermatoglyphic patterns are genetically inherited and remain unaltered from womb to tomb, they have been utilitsed in the field of criminology for personal identification and also in the field of embryology, comparative anatomy, physical anthropology, genetics and medicine[1]. The role of dermatoglyphics in the diagnosis of some chromosomal disorders e.g; trisomy-21 (Down's syndrome), Klinefelter's syndrome etc, is well established [2,3]. However, very few studies have been carried out in respect of communicable diseases, although theoretically the genetic predisposition may be responsible for reduced body immunity in case of some of these diseases. Some earlier studies carried out include – rubella syndrome, rubella embryopathy, leprosy and rheumatic fever (although not a communicable disease but results from a communicable disease i,e streptococcal pharyngitis) [4,5,6,7].

Although first recognised in USA in 1981, the HIV infection/AIDS has already reached a pandemic proportion and has become an area of major health concern, since no preventive vaccination and curative drugs are available against it at affordable costs. India's entry into the third phase of HIV epidemic is signalling a major AIDS crisis in the offing. According to Indian Health Organisation (IHO), post 2000AD AIDS will be killing about 10,000 victims daily[8].

No study has been carried out in India in the past for knowing the dermatoglyphic patterns in respect of HIV infected cases. A knowledge of dermatoglyphic patterns in HIV infection can be utilised to identify people at risk who can be given proper health education and vaccination as and when it becomes available. So far only one study has been carried out in the world in respect of children having parentally acquired HIV infection [9]. Analysis of dermatoglyphic patterns as a diagnostic tool is also an atraumatic simple procedure, readily available and inexpensive. This is the main reason behind selecting this pioneer study.

Materials and Methods :

This analytical study was carried out in a Hospital, Pune during the period from Feb 1998 to Nov 1999. It consisted of 50 HIV positive cases and 50 HIV negative control individuals, all males, irrespective of age. The ink and pad method was used to take the fingerprints as described by Schaumann and Alter [10]. A magnifying hand lens of X5 power was used for analysis and classification of various patterns as per Bhanu's system and Galton system [11,12]. A proforma was devised for recording all relevant data in respect of every study subject. Statistical analysis of this data was carried out by applying the test of significance. Whether the difference was found to be significant (i,e. $P<0.05$) or not, it was mentioned in the results.

RESULTS:

The findings are presented in Table 1 to Table 7.

Table 1. Frequency of hand wise distribution of finger patterns among the patient & the control (Galton system)

Position	Whorl		Loop		Arch		Total
	No	%	No	%	No	%	
Lh	111	44.4	138	55.2	1	0.4	250
Patient Rh	105	42.0	143	57.2	2	0.8	250
Lh+Rh	216	43.2	281	56.2	3	0.6	500
Lh	91	36.4	155	62.0	4	1.6	250
Control Rh	106	42.4	135	54.0	9	3.6	250
Lh+Rh	197	39.4	290	58.0	13	2.6	500

Table 2. Frequency of hand wise distribution of finger patterns among the patient & the control (Bhanu system)

Radial	Ulnar		Radial		Total
	No	%	No	%	
Lh	231	92.4	19	7.6	250
Patient Rh	227	90.8	23	9.2	250
Lh+Rh	458	91.6	42	8.4	500
Lh	225	90.0	25	10.0	250
Control Rh	217	86.8	33	13.2	250
Lh+Rh	442	88.4	58	11.6	500

Table 3. Frequency distribution of finger patterns among the patient & the control on Left hand [Lh] (Bhanu system)

Type	W-Ulnar	W-Raidal	L-Ulnar	L-Raidal	A-Ulnar	A-Radial	Total
No	99	12	131	7	1	0	250
Patient %	39.6	4.8	52.4	2.8	0.4	-	
No	72	19	149	6	4	0	250
Control %	28.8	7.6	59.6	2.4	106	-	

Table 3.1 Frequency distribution of finger patterns among the patient & the control on Right hand [Rh] (Bhanu system)

Type	W-Ulnar	W-Raidal	L-Ulnar	L-Raidal	A-Ulnar	A-Radial	Total
No	86	19	139	4	2	0	250
Patient %	34.4	7.6	55.6	1.6	0.8	-	
No	82	24	128	7	7	2	250
Control %	32.8	9.6	51.2	2.8	2.8	0.8	

Table 3.2 Frequency distribution of finger patterns among the patient & the control on Lh+Rh (Bhanu system)

Type	W-Ulnar	W-Raidal	L-Ulnar	L-Raidal	A-Ulnar	A-Radial	Total
No	185	31	270	11	3	0	500
Patient %	37.0	6.2	54.0	2.2	0.6	-	
No	154	43	277	13	11	2	500
Control %	30.8	8.6	55.4	2.6	2.2	0.4	

Table 4. Frequency hypothenar patterns among the patient & the control

Status	Present		Absent		Total
	No	%	No	%	
Lh	36	72.0	14	28.0	50
Patient Rh	38	76.0	12	24.0	50
Lh+Rh	74	74.0	26	26.0	100
Lh	35	70.0	15	30.0	50
Control Rh	36	72.0	14	28.0	50
Lh+Rh	71	71.0	29	29.0	100

Table 5. Frequency Thenar/Ist int.dig. patterns among the patient & the control

Status	Present		Absent		Total
	No	%	No	%	
Lh	38	76.0	12	24.0	50
Patient Rh	43	86.0	7	14.0	50
Lh+Rh	81	81.0	19	19.0	100
Lh	41	82.0	9	18.0	50
Control Rh	45	90.0	5	10.0	50
Lh+Rh	86	86.0	14	14.0	100

Table 6. Frequency of hand wise distribution of anatomical position of C line termination among the patient & the control

Position	Radial		Ulnar		Proximal		Absent		Total
	No	%	No	%	No	%	No	%	
Lh	12	24.0	27	54.0	7	14.0	4	8.0	50
Patient Rh	27	54.0	18	36.0	1	2.0	4	8.0	50
Lh+Rh	39	39.0	45	45.0	8	8.0	8	8.0	100
Lh	21	42.0	18	36.0	4	8.0	7	14.0	50
Control Rh	29	58.0	11	22.0	3	6.0	7	14.0	50
Lh+Rh	50	50.0	29	29.0	7	7.0	14	14.0	100

Table 7. Frequency of hand wise distribution of Transverse Crease among the patient & the control

Position	Present		Absent		NP		Total
	No	%	No	%	No	%	
Lh	6	12.0	44	88.0	0	-	50
Patient Rh	0	-	50	100.0	0	-	50
Lh+Rh	6	6.0	94	94.0	0	-	100
Lh	7	14.0	43	86.0	0	-	50
Control Rh	5	10.0	44	44.0	1	2.0	50
Lh+Rh	12	12.0	87	87.0	1	1.0	100

Results:

The results findings reveal that:-

1. Digital patterns: According to Galton system of classification, the frequency of whorl, loop and arches among the patients were 43.2, 56.2, 0.6 percent and among the controls 39.4, 58.0, 2.3 percent respectively (**Table 1**). Though frequency of whorls was more in patients' left hand and both hands compared to controls but it was statistically non-significant (x^2=2.95;d.f.1 for left hand and x^2=0.91;d.f.1 for both hands).

The higher frequency of loop on right hand fingers of patients, compared to controls, was also statistically non-significant (x^2=0.13;d.f.1).

According to Bhanu's system of classification, the findings are presented in Table2 and Tables 3,3.1 and 3.2. The existing difference in finger patterns among patients and controls was found statistically non-significant for left hand (x^2=0.90;d.f.1), right hand (x^2=2.01;d.f1) as well as for both hands (x2=2.84;d.f.1), as per Table 2. However, a significant difference for the presence of ulnar whorl and radial whorl was found among the left hands of patients and controls and (x^2=3.90;d.f.1) as per Table 3, which also showed that the difference for the presence of ulnar whorl and ulnar loop among the patients and controls was statistically highly significant (x^2=5.24;d.f.1).

2. Palmar patterns: As per Table 4, total patterns present on hypothenar area were 26.0% among the patients and 29.0% among controls. Their frequency was lower among the patients (28.0%) than among controls (30.0%) on left hand as well as right hand of the patients (P=24.0%, C=28.0%). Thus, their frequency among the patients were not exceeding as compared to controls but patterns on right hand of the patients were low, compared with left hands of patients as well as those in the controls. But these differences on left hand (x^2=0.05;d.f.1) and right hand (x^2=0.21;d.f.1) of the patients and controls were non-significant.

3. Thenar/Ist interdigital patterns: As per Table 5, the frequency of these patterns, in patients and control both, was higher on left hand (P=24.0%, C=18.0%) than on right hand (P=14.0%, C=10.0%). The presence of patterns in both hands of patients was also more (19.0%) than in the controls (14.0%). The existing difference for the presence of more patterns on left hand (x^2=0.54;d.f.1), right hand (x^2=0.38;d.f.1) and both hands (x^2=0.91;d.f.1) was statistically non-significant.

4. C-line termination position: Table 6 shows that the frequency of C-line termination at the anatomical position of ulnar is higher among the patients left hands compared to the controls (P=54.0%, C=36.0%) and also when both hands merged together (P=45.0%, C=29.0%). The existing difference for ulnar/radial C-line termination among the patients and the controls for left hand (x^2=4.25;d.f.1) and both hands (x^2=4.25;d.f.1) was statistically significant. But exactly reverse trend was observed hand wise i,e. right hand having more radial C-line endings among the patients as well as among the controls. But this existing difference on right hand was statistically non-significant (x^2=1.47;d.f.1). The difference between all possible C-line endings i.e; Ulnar, Radial, Proximal and Absent on both hands among the patients and the controls was statistically non-significant (x^2=6.52;d.f.1). However, when the difference between C-line endings was observed by treating proximal as Absent, the possible difference for Ulanr, Radial, Absent C-line endings among the patients and controls was found to be statistically significant (x^2=12.09;d.f.1) only for both hands.

5.Presence/absence of transverse crease (Simian crease) According to Table 7, the transverse crease was absent among 94.0% of the patients and 87.0% of the controls. No patient had presence of transverse crease on their right hand. The frequency of presence of transverse crease was found to be lower in patients as compared to controls, but this difference was found to be statistically non-significant (x^2=0.38;d.f.1).

DISCUSSION

HIV infection produces a spectrum of disease ranging from early asymptomatic carrier stage to full blown life threatening end stage-AIDS. In some patients, it progresses faster towards full blown AIDS, whereas some remain long term non-progressors. Presently it is not known what factors decide this wide diversity. Keeping in view that, since dermatoglyphic patternsare inherited, they might give some insights for this wide diversity in clinical spectrum of HIV infection in different individuals, the topic of 'Dermatyoglyphics in HIV infection' was selected for this study.

This concurrent study, however included a small sample size of 50, both in respect of case and control and did not include follow-up of controls due to paucity of time. Since the patients belonged to various socio-economic groups, hailing from different parts of the country, the problem was in selection of properly matching controls. Initially, it was therefore decided to have controls from the family of the patients, but this idea had to be abandoned since many of the HIV positive patients were unwilling to involve their family members to whom they had not disclosed about their HIV infection. Besides this, many family memberswere not available in most cases. Thus, a heterogenous male group population without HIV infection was used as controls.

Dermatoglyphic patterns in HIV infected cases showed a trend in reduced frequency of loops and arches and slight increase in whorls in digital patterns. A slightly higher frequency of ulnar patterns was

found as compared to control group and a significant difference was observed among HIV infected cases for the presence of Ulnar whorl pattern.The Pattern Intesity Index (PII), however did not show any significant differences between cases and controls. No significant differences were observed between cases and controls in relation to Arch/Loop, Arch/Whorl, Radial/Ulnar index, Hypothernar patterns and Thenar/Ist interdigital patterns. However, significant difference was found for the presence of C-line terminations among the HIV infected cases having more ulnar terminations on left hand and both hands as compared to the control group. However, the findings of this pioneer study could not be compared due non-availability of literature on this topic.

Since the world is now sitting on'AIDS Time Bomb', there is a dire need to undertake similar with a larger sample of cases and controls to bring into light the evidences which would help physicians to employ this seldom used tool as an aid to diagnosis and also in detecting the individuals genetically predisposed to a high risk of HIV infection/AIDS, so that when a prophylactic vaccine becomes widely available, these people can be given a high priority in its administration.

It is hoped, this pioneer study would definitely provoke further such studies in this field in future. Based on dermatoglyphic patterns, it would be difficult at this stage to comment upon the susceptibility of various individuals to HIV infection and the likely course of the disease and thus a follow-up study of cases is also recommended.

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