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Finger Dermatoglyphic Patterns in Diabetes Mellitus

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ABSTRACT A sample of 60 male and 28 female individuals suffering from diabetes mellitus has been examined for possible association of finger dermatoglyphic characteristics with the disease. The results of the present study support the difference between diabetic patients and normal controls.

INTRODUCTION

The literal meaning of diabetes mellitus is passage of increase amount of urine which is sweet to taste. It is a chronic degenerative disorder affecting carbohydrate, fat and to some extent protein metabolism, due to deficiency or diminished clinically by hyperglycaemia and its consiquences. There are different type of diabetes mellitus known. The two common types are Insulin Dependent Diabetes Mellitus (IDDM or type I) and Non Insulin Dependent Diabetes Mellitus (NIDDM or type II). Heredity has been recognised as an important factor in the occurrence of diabetes mellitus, and NIDDM is known to be more influenced by genetic factors than IDDM.

In the last few decades quite a large number of congenital and hereditary disease are being investigated for dermatoglyphic markers. Finger dermatoglyphics in diabetes mellitus patients have been studied by a large number of workers (Chakravartti, 1967; Barta et al., 1970; Knussmann, 1971; Buti et al., 1972; Verbon, 1973; Dzuiba, 1973; Vormittag and Weninger, 1974; Garcia Sagredo, 1975; Kolski et al., 1976, 1980; Hirsch, 1977; Floris, 1981; Iqbal et al., 1978; Banerjee et al., 1985 etc.) and have produced inconsistant result with regard to the association of dermatoglyphics with diabetes mellitus.

Surveying the literature on finger dermatoglyphics in diabetes, it appears that very little work has been done on Indian diabetics and especially from north eastern region. Considering the dearth of data, in the present study an attempt has been made to determine some selected qualitative as well as quantitative parameter of finger tips in a further series of patients with diabetes mellitus from Assam and to assess whether they show any marked departure from the variations observed in the normal controls. Within the brief limits of this note, an attempt has also been made to compare the present findings with the available data on finger dermatoglyphic features in diabetes mellitus conditions. In this preliminary note classification of diabetes mellitus type has not been made and only few important features of digital patterns are discussed.

MATERIAL AND METHODS

Material for the present study comprise the finger prints of 88 (male 60, Female 28) of clinically diagnosed patients of diabetes mellitus, and these were collected mainly from Assam Medical College, Dibrugarh. Due to some unavoidable reasons, it was not possible to compare dermatoglyphic features of the patients with their normal sibs. Therefore, data for normal control series (male 45, female 35) collected from general population of comparable age group keeping in view of the same ethnic and religious background with that of the patients. All patients and control subjects are adults, selected at random, and were taken from the same geographical area.

In the present work, the analysis of finger dermatoglyphic characteristics were restrict-

ed to papillary patterns, digital indices and total finger ridge count only and the methods of analysis were those of Cummins and Midlo (1961) and Holt (1968). The data have been subjected to chi-square and t-test analysis.

RESULTS AND DISCUSSION

In case of male diabetes mellitus patients, whorls are comparatively more than loops, but it is just reverse in case of female (Table I). Pattern arch in male show relatively higher frequency than female. In both male and female control series, loops are found to be more than that of whorls. The frequency of loop is more in female than male. Occurrence of arch is almost similar in both the sexes. The salient feature thus emerges out are relatively less frequency of loop as compared with control group in both the sexes but other finger patterns are found to be more in patients than controls. Chi-square values for bimanual difference in each sexes of patients and controls are statistically not significant, however, significant bisexual variation is observed in both patients and controls for digital pattern distribution. Test of significance also record significant variation when patients are compared with normal controls (Table 4).

Male diabetic patients of the present series shows slightly increased frequency of whorls as compared to loops. The picture is however not similar with that of the female diabetics. The studies by Knussmann (1971) and Hirsch (1977) also reported similar higher incidence of whorls in both the sexes of their samples. However, when male and female sample of the present study considered together, then higher frequency of loops are found, which is in conformity with Banerjee et al. (1985). Chakravartti (1967) also reported rise of loops among the diabetics. Arch pattern in present sample shows much higher frequency than low incidence noted by Banerjee et al. (1985). The present findings also at variance with Floris (1981) who noted decrease in finger arches among the diabetics.

Finger pattern indices like the Furuhata's and Dankmeijer's indices are considerably higher in diabetic patients than normal control series. This observation stands true irrespective of sex. However, in pattern intensi-

Table 1 : Percentage frequency distribution of digital patterns

Group	*Sex*	*Hand*	*Pattern Types*						
			Whorl	*Loop*			*Arch*		
				Ulnar	*Radial*	*Total*	*Simple*	*Tented*	*Total*
Diabetes Mellitus	Male (N=60)	R	24.17	22.17	0.33	22.50	2.00	1.33	3.33
		L	22.50	23.33	-	23.33	1.83	2.33	4.17
		R+L	46.67	45.50	0.33	45.83	3.83	3.67	7.50
	Female (N=28)	R	16.43	30.71	-	30.71	1.43	1.43	2.86
		L	22.14	24.64	0.36	25.00	0.71	2.14	2.86
		R+L	38.57	55.36	0.36	55.71	2.14	3.57	5.71
	M+F (N=88)	R+L	44.09	48.64	0.34	48.98	3.30	3.64	6.93
Normal Control	Male (N=45)	R	21.56	26.44	0.44	26.89	1.33	0.22	1.56
		L	21.78	26.89	0.67	27.56	0.67	-	0.67
		R+L	43.33	53.33	1.11	54.44	2.00	0.22	2.22
	Female (N=34)	R	15.30	33.53	0.29	33.82	0.59	0.29	0.88
		L	18.24	28.53	1.18	29.71	1.76	0.29	2.06
		R+L	33.53	62.06	1.47	63.53	2.35	0.59	2.94
	M+F (N=79)	R+L	39.11	57.09	1.27	58.36	2.15	0.38	2.53

Table 2 : Values of principal indices

Group	*Sex*	*Hand*	*Furuhata's index*	*Dankmeijer's index*	*Pattern intensity index*	
					Mean	*S.E.*
Diabetes	Male	R	107.41	13.79	7.08	0.25
Mellitus		L	96.43	18.52	6.83	0.28
		R+L	101.82	16.07	13.92	0.50
	Female	R	53.49	17.39	6.36	0.36
		L	88.57	12.90	6.93	0.37
		R+L	69.23	14.81	13.29	0.71
	M+F	R+L	90.02	15.72	13.72	0.41
Normal	Male	R	80.16	7.22	7.00	
Contol		L	79.03	3.06	7.11	
		R+L	79.59	5.13	14.11	0.84
	Female	R	45.22	5.77	6.44	
		L	61.39	11.29	6.62	
		R+L	52.78	8.77	13.06	
0.57						
	M+F	R+L	67.03	6.47	13.66	0.41

Table 3: Mean total finger ridge count

Group	*Sex*	*Hand*	*Mean*	*S.E.*
Diabetes	Male	R	57.70	2.99
Mellitus	(N=56)	L	55.60	2.85
		R+L	112.71	5.58
	Female	R	58.20	3.63
	(N=27)	L	58.60	3.56
		R+L	114.10	7.19
	M+F	R+L	113.70	4.34
	(N=83)			
Normal	Male	R+L	149.40	5.73
Control	(N=45)			
	Female	R+L	133.32	5.58
	(N=38)			
	M+F	R+L	142.04	3.99
	(N=83)			

ty index, the diabetic patients exhibit very close affinity with the control series (Table 4).

Both the sexes of diabetic patients show relatively higher Furuhata's and Dankmeijer's indices than the value reported by Banerjee et al. (1985). In case of pattern intensity index, present results, however, shows close affinity with diabetics from Bengal (Banerjee et al., 1985).

Among the diabetic mellitus patients, the

Table 4 : Test of significance : Finger dermatoglyphics

Group	*Sex*	*Finger pattern* (χ^2 *value*) (*d.f.=2*)	*Pattern intenstiy index* (*t-value*) (*d.f.=60, 120*)	*Total finger ridge count* (*t-value*) *d.f.=60, 120*)
Bimanual Variation				
Diabetes	Male	1.01	0.67	0.51
mellitus	Female	4.01	1.10	0.08
Normal	Male	1.64	-	-
control	Female	3.38	-	-
Bisexual Variation				
Diabetes mellitus (DM)		7.52[1]	0.73	0.15
Normal Control(NC)		7.89[2]	1.03	2.01[1]
Variation between Patients and Controls				
DM (male) x NC (male)		18.16[3]	0.19	4.59[3]
DM (female x NC (female)		5.47	0.25	2.11[1]
DM (M+F) x NC (M+F)		25.94[3]	0.10	4.81[3]

1. indicates statistically significant at 5% level of probability
2. indicates statistically significant at 2% level of probability
3. indicates statistically significant at 0.1% level of probability

total finger ridge count in female is comparatively higher than male. On the contrary, in normal series male shows much higher mean value than female (Table 3). It is also apparent that the diabetic patients record very low total finger ridge count than their normal counterparts. The above mentioned variation is also established as statistically significant (Table 4).

In the present series, low total finger ridge counts are found compared with the data provided by Iqbal et al. (1978) and Banerjee et al. (1985) from Hyderabad and Bengal, respectively. Vormittag and Weninger (1974) also noted low total finger ridge count in female diabetics. The present result however, is at variance with Barta et al. (1970) who reported higher total finger ridge count in diabetic patients.

The results of the present study support the difference between diabetic mellitus patients and normal control population. However, it seems such relationship might be different in different population (ethnic) groups and association might be group specific.

The present study, as it is based on few finger dermatoglyphic variables with smaller sample size, prevent us to make any definite statements. Our results of relative rise in whorls and low total ridge count on finger tips, corroborate with the observation which even noted earlier. However, it points to the necessity of conducting systematic study on fairly large sample involving various categories/types of clinically diagnosed diabetic mellitus subjects and greater number of dermatoglyphic variables on palm and soles.

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