



Sushma Jaswal

## DEGREE OF DISCRIMINATION BETWEEN NORMALS, MONGOLS (DOWN SYNDROME) AND NON-MONGOL MENTAL RETARDATES WITH RESPECTS TO DERMAL CONFIGURATIONS

**ABSTRACT:** The present study presents the degree of deviations in selected dermatoglyphic characters (on fingers, palms and soles) of retardates and mongols (Down Syndrome) from normals through separation indices. The values of separation indices between retardates and normals for various dermatoglyphic characters precisely indicate that the discrimination between these two groups on the basis of their dermatoglyphic characters is much less effective than between mongols and normals.

**KEY WORDS:** Dermatoglyphics — Down Syndrome — Discrimination — Mental retardation.

### INTRODUCTION

There are numerous investigations concerning the association of mongolism (Down Syndrome) and dermatoglyphic patterns. However, non-mongol mental retardation (of unknown aetiology) has not been investigated so extensively in this manner (Jaswal & Jaswal 1984). In the present study a particular emphasis has been given to eliminate many of the discrepancies of the earlier reports concerning the homogeneity of the sample of non-mongol mental retardates. It attempts at projecting the degree of deviations of selected dermatoglyphic features of retardates and mongols from normals through separation-indices. For this purpose, dermatoglyphic configurations on digits, palms and soles have been taken into consideration.

### MATERIALS AND METHODS

#### A) The sample

Table 1 shows the sample size of normals (control group), non-mongol mental retardates and mongols (Down Syndrome) with respect to the analysis of digital, palmar and plantar dermatoglyphic features. The sexes have been combined in all the three groups.

The non-mongol mental retardates and mongol subjects investigated in this study were inmates of the Institutes of Special Education located in various cities of North India. The individuals who constituted the non-mongol retardates sample had no overt cause for their low IQ or any other physical, neurological, metabolic or chromosomal abnormality. This group could also be identified as a group of mental retardates of unknown aetiology. Careful screening of mentally retarded individuals in consultation with their attending physicians and psychologists and their past medical histories assured homogeneity of the sample. The other abnormal sample of this study included only those subjects who were declared mongols by the Institute's Physicians after proper medical examination including cytological tests. Further, for the

sake of homogeneity, only Panjabi subjects were included in both the groups under study. The normal subjects forming the control group were drawn from the government schools of Chandigarh. Thus the abnormal and control groups matched as to their ethnic and geographic backgrounds.

#### B) Methods

The set of dermatoglyphic characters chosen on account of their discriminating power when considered alone, included: topologically significant pattern elements on soles and palms (loops and triradii) considered separately and in combination; distal exit of the A-line; loops and whorls on finger tips and all the measurements as listed in Table 2. For analysis, each character was scored as described by Loesch and Smith (1975). Accordingly, all 'non-measurable' dermatoglyphic characters have been expressed in numerical terms. Though this way of expressing the qualitative characters may not be absolutely the most efficient method possible, it appears adequate for the purpose.

In order to measure the degree to which abnormalities (mongols and retardates) and normals are separated from one another with regard to each dermatoglyphic character, the 'separation-index' has been calculated as under:

For any character, 'X' let  $\bar{X}_A$ ,  $\sigma_A$  represent respectively the observed mean value and the standard deviation in abnormalities. Let  $\bar{X}_N$ ,  $\sigma_N$  be the corresponding values in normal individuals. Then the 'separation-index' D, for the given character X, is computed by using the following formula:

$$D = \frac{\bar{X}_A - \bar{X}_N}{\sigma_A + \sigma_N}$$

TABLE 1. Sample size.

	Normals	Retardates	Mongols
Fingers	271	239	68
Palms	272	236	67
Soles	161	167	39

TABLE 2. Mean and standard deviations of dermatoglyphic characters (selected to test their discriminating power) in normals, retardates and mongols (sexes combined).

Characters	Mongols		Retardates		Mongols		
	Mean	± SD	Mean	± SD	Mean	± SD	
<b>Fingers</b>	n = 271		n = 239		n = 68		
Σ - ulnar loops*	5.01	2.88	5.44	2.75	7.29	2.14	*Sum of ulnar loops on all fingers
Σ - W and R.L. on I & II + P I P*	2.13	1.39	1.66	1.61	0.76	0.99	+ Sum of whorls and radial loops on fingers I & II
U C on I, II, III %	13.74	3.78	12.92	3.99	12.29	2.27	*Pattern intensity on fingers
U C on IV, V, **	79.63	30.21	73.70	32.12	95.19	24.97	%Total ulnar count on fingers I, II, & III
	60.27	19.36	57.70	21.57	55.94	17.37	**Total ulnar count on fingers IV, V
<b>Palms</b>	n = 272		n = 236		n = 67		
I + I'	0.51	1.41	0.58	1.67	0.27	1.04	π Pattern intensity on palms
II	0.39	0.99	0.33	0.97	0.54	1.18	
III + III	2.47	1.55	2.11	1.63	3.40	1.16	
IV + IV	2.47	1.98	2.61	1.91	0.92	1.41	
H	0.59	1.25	0.58	1.26	2.54	1.89	
H	0.92	1.25	0.80	1.41	0.18	0.76	
PIP π	3.62	1.70	3.52	1.81	3.92	1.51	
t	1.05	0.88	0.88	0.86	1.10	0.89	
t'	1.11	0.94	1.21	0.97	0.82	0.97	
t''	0.14	0.46	0.21	0.52	1.43	1.00	
t <sup>b</sup>	0.47	0.73	0.42	0.75	0.07	0.36	
All Z (Z, Z', Z'')	0.09	0.73	0.14	0.44	0.06	0.29	
A-line exit distal	1.13	1.07	1.07	0.80	1.49	0.66	
<b>Soles</b>	n = 161		n = 167		n = 39		
I	1.60	0.66	1.61	0.73	0.90	0.94	+ + Pattern intensity on soles
I	0.66	0.83	0.70	0.84	0.08	0.35	
II	0.23	0.50	0.14	0.40	0.08	0.27	
II	0.60	0.79	0.50	0.74	0.36	0.70	
III	1.17	0.86	1.06	0.90	0.82	0.88	
III	0.37	0.71	0.36	0.72	0.15	0.54	
IV	0.33	0.64	0.35	0.66	0.67	0.87	
IV	0.04	0.22	0.08	0.33	0.15	0.49	
V	0.33	0.68	0.59	0.83	0.43	0.72	
PIS + +	5.34	2.18	5.38	2.43	3.54	2.36	
e	0.87	0.88	0.80	0.87	0.10	0.38	
f	1.62	0.70	1.63	0.72	0.87	0.92	
p	0.87	0.89	0.71	0.86	0.28	0.65	
p'	0.53	0.76	0.47	0.73	0.74	0.91	
p''	0.19	0.49	0.26	0.59	0.51	0.82	
S - Z	1.40	1.53	1.29	1.61	0.82	1.47	
f count	35.53	20.31	35.41	21.25	16.97	21.89	
Σ - distal loops on palms & soles <sup>xx</sup>	6.71	2.04	6.29	2.09	6.28	2.30	<sup>xx</sup> Sum of distal loops on palms and soles
Σ - Proximal loops on palms & soles <sup>oo</sup>	2.51	1.74	2.61	2.11	1.33	1.78	<sup>oo</sup> Sum of proximal loops on palms and soles

The separation-index D represents an easily calculated number which roughly shows how good is the discrimination between abnormals and normals by using the character X. Moreover, it is applicable (unlike other measures of degree of discrimination) even when the standard deviations ( $\sigma_A$ ,  $\sigma_N$ ) in abnormals and normals are quite different (Loesch and Smith 1975).

#### RESULTS AND COMMENTS

The mean value and the corresponding standard deviation for each character of each of the three groups (sexes combined) are given in Table 2. The 'separation indices' between retardates

and mongols are more or less equal to those observed between mongols and normals. This is because of the fact that the majority of dermatoglyphic characters in retardates show little or no deviation from normals. Furthermore, the values of 'separation indices' between retardates and normals for various dermatoglyphic characters precisely indicate that the discrimination between these two groups on the basis of these dermatoglyphic characters would be less effective. On the other hand, it is well indicated by the 'separation indices' between mongols and normals and between mongols and retardates that most of the dermatoglyphic characters (Table 3) afford best discrimination between these two groups.

As observed from Table 3, the degree of distance between normals and mongols as indicated by 'separation indices' is highest for Σ - W + RL on I and II digits (0.157); for the frequency of patterns in the third (III & III = 0.113) interdigital area of the palm and for the frequency of patterns in fifth (V = 0.172) interdigital area of the sole. It is readily observable from Table 3 that values of 'separation indices' between mongols and normals are much higher in respect to all selected dermatoglyphic characters than those found between retardates and normals. On the other hand values of 'separation-indices' between retardates

TABLE 3. Separation indices between normals (N) and mental retardates (MR); normals (N) and mongols (M); mental retardates (MR) and mongols (M) in respect of various digital, palmar and plantar dermatoglyphic characters.

SEPARATION INDICES											
	Fingers				Palms				Soles		
	N-MR	N-M	MR-M		N-MR	N-M	MR-M		N-MR	N-M	MR-M
Σ - UL	.076	.454	.378	I + I	.023	.098	.114	I	.007	.437	.425
Σ - W + RL on I, II	.157	.576	.346	II	.031	.069	.098	I	.024	.491	.521
P I F	.105	.240	.101	III + III	.113	.344	.464	II	.065	.161	.097
U C on I, II, III	.095	.282	.376	IV + IV	.036	.457	.509	II	.065	.161	.097
U C on IV, V	.063	.118	.045	H	.004	.560	.662	III	.062	.201	.135
				H	.045	.368	.286	III	.007	.176	.167
				PIP	.028	.093	.120	IV	.015	.225	.209
				t	.098	.028	.126	IV	.072	.154	.085
				t'	.052	.152	.201	V	.172	.071	.103
				t''	.071	.884	.803	PIS	.009	.396	.384
				t <sup>b</sup>	.034	.367	.315	e	.040	.611	.560
				All Z (Z+Z'+Z'')	.067	.050	.110	f	.007	.463	.463
				A-line exit distal	.038	.248	.288	p	.091	.383	.285
								p'	.040	.126	.165
								p''	.065	.244	.177
								Σ - Z	.035	.193	.152
								f-count	.003	.439	.427
								Σ - distal loops on palms and soles	.102	.099	.002

#### REFERENCES

- JASWAL S. and JASWAL I. J. S., 1984: Dermatoglyphic and Mental Retardation: A Review. *Man in India* 64: 210 - 216.  
 LOESCH D. and SMITH C. A. B., 1975: Discriminant functions and 21-trisomy mosaicism. *Ann Hum. Genet. Lond.* 39: 127 - 134.

Sushma Jaswal  
 Dept. of Child Development  
 Punjab Agricultural University  
 Ludhiana - 141004 (India)