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DERMATOGLYPHICS IN MENTALLY RETARDED CHILDREN

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ABSTRACT

Objective: This study was undertaken to evaluate the dermatoglyphic features in children belonging to primary mental retardation and co-relating the findings with previous workers.

Methods: Dermatoglyphics obtained from the palm and finger tips in 72 children of primary mental retardation were compared with the similar studies in 72 normal children. These cases were from special institution for mentally retarded children in Pune.

Results: The features which showed significant variations included: reduced whorl pattern and increases in ulnar loop on the finger tip, increase frequency of pattern in thenar / I1 and I3 area with distal displacement of axial triradius, higher atd angle, and increase incidence of simian crease.

Conclusion: Dermatoglyphics features were noticed in the mentally retarded groups. These are increase ulnar loops on finger tips, decrease in whorl on finger tip, thenar / I1 and I3 area showed significant increase in pattern, higher atd angle, distal shift in axial triradius. It can be assumed that the cases of primary mental retardation could be dermatoglyphically varied from the normal, though the number of cases studied is not enough to make a definite statement.

Key Words: Atd angle, Axial triradius, Simian crease

INTRODUCTION

The human body is a wonder. Because of innumerable gifts offered by the nature, man is superior to the rest in animal kingdom. As the skin on the palmar and plantar surfaces of man also the tips of fingers shows characteristic. It has ridges which form configurations that are unique to every individual¹. This fact has been known for centuries and its use was made for purposes of personal identification. It also attracted the attention of both scientists and layman alike for the purpose of study. This study of prints came to be termed as 'dermatoglyphics'.

The word dermatoglyphics is derived from the Greek word 'Derma' means skin and 'glyphae' meaning carving. The term was introduced by Cummins and Midlow in 1926.¹

As the scientists studied this particular branch, they found that dermatoglyphic features once formed remain unchanged throughout life. They also observed that these patterns are heritable traits and influenced by a number of genes during their formation. Being genetically inherited, the pattern is

highly influenced by insults during early fetal life. Hence genetically related disorders may be studied by this method.

This study was undertaken to evaluate the dermatoglyphic features in children belonging to primary mental retardation. Varied causes of mental retardation are antenatal, natal and postnatal. Antenatal causes of mental retardation are highly related to genetic factors and therefore affect dermatoglyphic features as well.

MATERIAL AND METHODS:

In the present study, the dermatoglyphic features were studied in 72 mentally retarded children of both sexes between age groups 3yrs-18yrs. These children were from special institutions for mentally retarded children in Pune. All these children were thoroughly investigated and diagnosed as mentally retarded with I.Q. less than 70. The children with exogenous or extrinsic causes were excluded from the study. Similar studies were conducted in 72 normal school children of the same age groups control.

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The dermatoglyphic studies were carried out by the means of palm and finger print. These prints were taken by using Ink-method. In each case the dermatoglyphic patterns were studied using the following parameters.

- 1) Finger tip patterns e. g. whorl, loop, arch,
- 2) Patterns in four interdigital areas i.e. I_1 , I_2 , I_3 , and I_4 . (Fig I)
- 3) Patterns in Thenar, Hypothenar areas. (Fig I)
- 4) Position of axial triradii designated as 't'. (Fig I)
- 5) atd angles (Fig II)
- 6) Type of palmer flexion creases. (Fig. III & Fig. IV) (Simian crease and Sydney line)

STATISTICAL METHODS

The results were compared statistically to find out significant variation between the mentally challenged retarded group and controls (together for males and females) by using chi square test.

RESULTS

Table I shows the number of cases studied and their sexwise distribution.

Table II shows percentage of frequency of patterns distribution on fingertip. There is a significant increase in ulnar loop pattern and reduction of whorl pattern in mentally retarded as compared to the normal children. There is incidence of pattern in interdigital areas including thenar and hypothenar.

Table III shows percentage wise incidence of the presence of some pattern on five main interdigital areas in control and mentally retarded children comparatively. In Thenar / I_1 and I_3 areas showed a significant increase in pattern in mentally retarded as compared to normal. The site of actual triradius—The position of axial triradius was noted according to t, t', t'' nomenclature basis.

Table IV shows percentage distribution of the site. The distal displacement of axial triradius (t'') were observed in mentally retarded, whereas the normal children showed a significant proximal axial triradius (t). There was a widening of atd angle in mental retarded children as compared to the normal children (Fig. III).

Palmar crease pattern – Number of cases having simian crease (Fig. III) and Sydney line (Fig. IV) are compared in table V. It shows a significant increase in simian crease in mentally retarded as compared to normal. The decrease in the Sydney line in mentally retard was not significant.

DISCUSSION

The study of various dermatoglyphic features, when considered with other clinical signs and symptoms may serve as a supportive investigation. Our study which considered of 72 mentally retarded children included cases with primary cause which were microcephaly-16, Down syndrome-10, cerebral palsy-32, mucopolysaccharoidosis-1, epilepsy and hydrocephalus-13. Cases with exogenous causes were excluded from study.

Previous Work

1. Alter M & Bruhl H (1967) (376 idiopathic cases): Increase frequency of pattern in I_2 on right hand and Simian Crease in males².
2. Kher M.B. (1971) (200 mentally retarded cases): Significant decrease in percentage of whorls, increase in percentage of loops and arches³.
3. Purandare and Hema, Atre P.R. (1978) (50 idiopathic mentally retarded children) and: Low TRC in male, higher atd angle, increase frequency of hypothenar pattern and higher incidence of tibial arch⁴.
4. Pote Anand, Herekar N.G (1994) (52 mentally retarded children): increase frequency of ulnar loops, decrease frequency of radial loops, I_2 area showed decrease and I_3 and I_4 area showed higher frequency of pattern with distal displacement of axial triradius and higher incidence of palmar crease pattern.⁵
5. Present study (1996) (72 mentally retarded children): Increase frequency of ulnar loop decrease in whorls on fingertip. Thenar/ I_1 , I_3 area showed significant increase in pattern, higher atd angle, Distal shift in axial triradius with increased frequency of simian crease.

As seen from Table VI, the increase in ulnar loop pattern in our study is similar to the findings of Kher M. B. and Pote. There was increase in pattern in I_2 , I_3 and I_4 areas. Higher atd angle and shift of axial triradius is similar to the finding by Purandare. Presence of simian crease can be co-related with finding by Alter M.

Few of the differences in the findings in our study and other workers could be due to the difference in causes of mental retardation. It would therefore require a large and selective sample to make a definitive statement regarding mentally retarded cases on basis of dermatoglyphic. Thus dermatoglyphic can serve to strengthen diagnostic impression and is useful in screening device for further extensive investigation.

CONCLUSIONS

The following dermatoglyphic features were noticed in the mentally retarded groups.

- Increase ulnar loops on finger tips
- Decrease in whorl on finger tip
- Thenar / I1 and I3 area showed significant increase in pattern.
- Higher atd angle.
- Distal shift in axial triradius.

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ETHICAL CLEARANCE:

Before the study conducted, ethical clearance was taken from institute’s ethical committee.

Informed Consent: These children were from special institutions for mentally retarded children in Pune. Hence prior

to the study, informed consent has been taken from head of the institute.

Source of Funding: To conduct this study there is no any external source of funding.

Conflict of Interest: Here I declare that, there is no any conflict of interest related to this study.

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Table I: The Number of Cases Studied and Their Sex Wise Distribution.

Sex/Type	Normal (Control)	Mentally retarded
MALE	38	44
FEMALE	34	28
TOTAL	72	72

Table II: Percentage Frequency of Pattern Distribution On Finger Tips In Normal (Control) and Mentally Retarded.

Type of Patterns	Normal (Control)		Mentally Retarded		X ²	P
	No.	%	No.	%		
Whorl	304	42	224	31	18.66	P<0.001**
Ulnar loop	372	51.6	428	59	8.50	P<0.01*
Radial loop	21	3	35	5	3.14	P<0.05
Arch	23	3	36	4.5	1.85	P<0.05

* P < 0.05 ----significant, ** P < 0.005 ----- highly significant

Table III: Percentage frequencies of patterns in various areas of palm in normal and mentally retard

PALMAR AREA	CONTROL		MENTALLY RETARDED		X ²	P
	No.	%	No.	%		
Thenar/l ₁	5	3	24	17	12.42	<0.001**
l ₂	5	3	9	6	0.67	>0.05
l ₃	35	24	55	38	5.83	<0.05*
l ₄	36	39	61	42	2.23	>0.05
Hypothenar	51	25	60	42	0.93	>0.05

Table IV: Percentage frequencies of angle atd > 45°, position of axial triradii.

	CONTROL		MENTALLY RETARDED		X ²	P
	No.	%	No.	%		
Angle atd > 45°	70	48.6	97	67	9.63	<0.01*
Position of axial triradius						
t	73	51	47	39.5	8.92	<0.01*
t'	54	37.5	57	28	0.05	>0.05
t''	16	11	40	67	11.72	<0.001**

Table V: Percentage frequencies of palmar flexion crease type in both the groups.

FLEXION CREASE TYPE	CONTROL		MENTALLY RETARDED		X ²	P
	No.	%	No.	%		
Simian Crease	6	4	17	12	4.72	<0.05*
Sydney line	20	14	18	12.5	0.03	>0.05

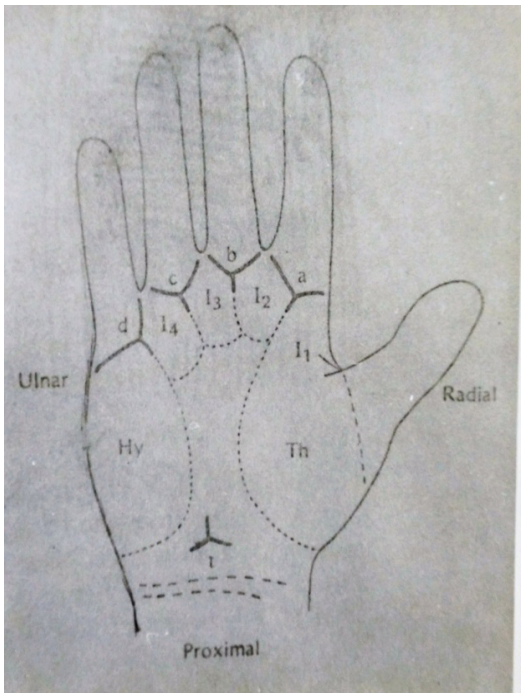


Figure I: Palm showing the dermatoglyphic pattern areas.



Figure II: Palm showing the atd angle.



Figure III: Simian Crease and angle atd



Figure IV: Sydney line