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ASSOCIATION OF FINGERPRINT PATTERNS WITH β-THALASSEMIA MAJOR

Anatomy

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ABSTRACT

Various studies have been carried out to study fingerprint patterns among β-thalassemia major patients all over India with mixed results. Therefore, an attempt was made to study the association of fingerprint patterns with patients with β-thalassemia major in comparison to controls. This cross-sectional study was conducted in 400 study participants (200 cases & 200 controls) in Department of Anatomy, R.N.T. Medical College & attached group of hospitals, Udaipur to analyse fingerprint patterns among patients of β-thalassemia major. In present study Ulnar Loop (UL) fingerprint pattern was the most common type of fingerprint in cases as similar to controls. However, Whorl (W) type fingerprint pattern was more frequent in cases than controls. Present study also found significant ('p'<0.001) association between fingerprint patterns and β-thalassemia major.

KEYWORDS

Dermatoglyphics, Cooley's Anemia, Ulnar loop (UL), Whorl (W)

INTRODUCTION

Dermatoglyphics literally means skin carvings (from the Greek, derma means skin and glyphe means carve) the term is also used as a collective name for all the features of ridged skin. The papillary layer of dermis of skin gives out finger-like projection called dermal papillae that project into the overlying epidermis. In the palms and soles these dermal papillae and the adjacent epidermal ridges produce typical pattern on fingertips, palms, and soles. The designs formed by these lines have basic similarities but they are not identical in any two individuals. Because they are precise and easy to reproduce, fingerprints are customarily used for identification of individuals. The study of these ridges is termed as dermatoglyphics and have genetic basis. Study of these patterns is used in medico legal investigations, for establishing identity of an individual and in medical genetics. It is used as a diagnostic tool in individual having chromosomal abnormalities like Down's syndrome and in certain medical conditions viz. Cancer, hypertension, mental illness and diabetes and as well as hemoglobinopathies[1]. β-thalassemia is also a common disorder of hemoglobin synthesis in India. It is a single gene disorder having autosomal recessive mode of inheritance. Various studies have been carried out to study fingerprint patterns among β-thalassemia major (cooley's anemia) patients all over India with mixed results [1-8]. Therefore, an attempt was made to study the association of fingerprint patterns in patients with β-thalassemia major in comparison to controls.

MATERIAL METHODS

This cross-sectional study was carried out in 400 study participants (200 cases & 200 controls) in Department of Anatomy, R.N.T. Medical College & attached group of hospitals, Udaipur (Rajasthan) after getting approval from the institutional ethical committee and institutional research board. 200 cases of β-thalassemia major were randomly selected from thalassemia ward of Pediatric Department of M.B. Government hospital, Udaipur and Umaid Hospital, Jodhpur receiving regular blood transfusion and their Age and sex matched 200 controls were selected from school going children & UG medical students of Rabindra Nath Tagore Medical College, Udaipur. All the participants who were having intact surface of fingertips, no dermatological problems or burns which could ruin fingerprints, no amputation of any of hand fingers and without having any other major illness having impact on fingerprint patterns and willing to participate and cooperate in the study were included. All the eligible study participants were approached by the investigator herself nature and purpose of the study was explained. After obtaining their informed and written consent, their socio-demographic data and detailed history was taken. Standard ink method by Cummins and Mildo, 1943 was used in the present study [9]. Rolled fingerprints were taken separately in order:- left little finger, left ring finger, left middle finger, left index finger, left thumb and then right thumb, right index finger, right middle finger, right ring finger and right little finger. Rolling of the fingers was done to record the finger prints from radial to ulnar side but the thumb was rolled from ulnar to radial side. After that fingerprints were analysed by using magnifying lens.

In the present study Fingertip patterns were broadly categorised into 3 types following standard method [10]:

1. Arch (A) which did not typically contain a triradius.
2. Loop (L) was characterized by a triradius that open towards a side of the hand, and a core. The loops were further classified into Radial Loop (RL) and Ulnar Loop (UL).
3. Whorl (W) was closed pattern characterized by having at least two triradii and a core.

FIG-1: SHOWING VARIOUS TYPE OF FINGGERPRINT PATTERNS

RESULT & DISCUSSION

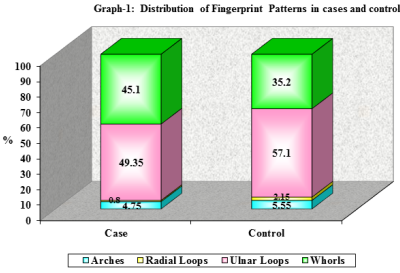

Table-1: Comparison of Fingerprint Patterns distribution in all the fingers of both Right and Left Hand among cases and controls with the previous studies

S.No.	Author	Study year	Sample size	Arch (A)	Radial Loop (RL)	Ulnar Loop (UL)	Whorl (W)	Others	Chi-square	'p' Value
1.	Solhi H et al[11]	2010	67 Cases	18 (3%)	328 (49%)		265 (40%)	59 (9%)	-	<0.001
			144 Controls	120 (8%)	856 (59%)		364 (25%)	100 (10%)		
2.	Basu D et al[1]	2016	50 Cases	27 (5.4%)	5 (1.0%)	276 (55.2%)	192 (38.4%)	-	8.22	<0.05
			50 Controls	30 (6.0%)	14 (2.8%)	297 (59.4%)	159 (31.8%)	-		

3.	Present study	2018	200 Cases	95 (4.75%)	16 (0.80%)	987 (49.35%)	902 (45.10%)	-	49.294	<0.001
			200 Controls	111 (5.55%)	43 (2.15%)	1142 (57.10%)	704 (35.20%)	-		

In present study Ulnar Loop (UL) fingerprint pattern was the most common type of fingerprint pattern in cases as similar to controls. However, Whorl (W) type fingerprint pattern was more frequent in cases than controls and the Ulnar Loops (UL) were counted less in cases than controls. These findings of present study was well supported by studies of Bhalla AK et al (2006)[6], Solhi H et al (2010)[11] and Basu D et al (2016)[1] who also found higher frequency of Loop (L) type fingerprint pattern in all study participants while higher whorl count was found in cases than controls as similar to present study. Moreover, present study also found significant association of fingerprint patterns with β-thalassemia major as similar to studies of Solhi H et al (2010)[11] and Basu D et al (2016)[1]. Contrary to the present study significant increase in Whorls among the thalassemia patients was also found in the different studies [7&12] and these variations could be due to difference in methodology used for recording or analysing fingerprint. **(Table-1)**

CONCLUSION

In present study, overall, Ulnar Loop (UL) fingerprint pattern was the most common type of fingerprint in cases as similar to controls. However, Whorl (W) type fingerprint pattern was more frequent in cases than controls and the Ulnar Loops (UL) were counted less in cases than controls Besides, present study also found significant ('p'<0.001) association between fingerprint patterns and β-thalassemia major.

LIMITATIONS

Possibility of selection bias may not be ruled out completely as present study was a hospital based and conducted in government hospital.

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