

STUDY OF PALMAR DERMATOGLYPHICS PATTERN CHANGES IN β -THALASSEMIA MAJOR PATIENTS

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ABSTRACT

Palmar dermatoglyphics pattern in β -Thalassemia major patients and in normal subjects were studied to find out any statistically significant changes if present.

SETTING AND DESIGN

Qualitative and quantitative changes in the pattern may be present, as these patterns are genetically determined.

BACKGROUND

β -Thalassemia major is a serious and prevalent form of haemoglobin disorder in these regions with autosomal recessive pattern of inheritance. Study of population by applying different tools is an important aspect of prevention. Dermatoglyphics study may be helpful to know the phenotypic trait of the individual.

METHODS AND MATERIALS

50 diagnosed cases of β -thalassemia major and the equal number of matched control group of either sex were included in the investigation. Palmar imprints were taken by traditional paper and ink method.

STATISTICAL ANALYSIS

Chi square test and t- test were used.

RESULTS AND CONCLUSION

Arch, loop and whorl's character, a-b ridge counts and 'atd' angles were studied. Significant rise in number of whorls and changes in 'atd' angles were detected in the cases. This information may be useful in population genetics study, though more detail research is needed.

KEYWORDS

Dermatoglyphics, Palmar, β -Thalassemia.

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INTRODUCTION

Epidermis of palms and soles has a characteristic pattern of epidermal ridges appeared during intrauterine life. Apart from some other factors, heredity plays an important role in development of these ridges. Dermatoglyphics is a scientific study of epidermal ridges of palms and soles. Such studies started back in 1926.^[1] Because of its unique nature, the dermatoglyphic studies are increasingly drawing attention in anthropological survey, population genetics. In medical practice it can be an alternative tool for diagnosing hereditary diseases like diabetes, hypertension, schizophrenia as well as some haemoglobinopathies. Common disorder of haemoglobin synthesis in our country is β -thalassemia.^[2] It is a single gene disorder with autosomal recessive pattern of inheritance. In homozygous state β -thalassemia is the most severe form of the disease with high morbidity and mortality and is classified as β -thalassemia major.

It puts immense pressure on the health system of the country, as survival of these patients depends on regular blood transfusion. Objective of this study is to find out whether there are any statistical significant changes in the palmar dermatoglyphics patterns of the β -thalassemia major patients in comparison with normal subjects.

MATERIALS AND METHODS

Fifty diagnosed β -thalassemia major patients of either sex attending haematology O.P.D. of Medical College, Kolkata, were selected as cases. Matched control group of same number of healthy volunteers of either sex of 1st year M.B.B.S. class. The data on dermatoglyphics patterns of both palms and fingers were collected by traditional ink and paper method.

Measuring Different Parameter

Dermatoglyphics is the scientific study of epidermal ridge configurations of fingers, toes, palms and soles. The following characters of the palmar prints were considered for evaluation in the present study. A triradius is the meeting point of three systems of parallel ridges. These epidermal ridges form different patterns like Arch, Loop and Whorl.

1. The Arches may be simple (Fig. 1a), where parallel ridges pass across the finger with slight distal bow and there is no triradius. In tented arch epidermal ridges overtop a triradius (Fig. 1b).

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- In case of loops (Fig. 2a), the ridges curve around only one extremity of pattern known as head. The opposite extremity is known as 'Open.' There is a single triradius. According to the side of opening of the curve loops may be ulnar loop or radial loop (Fig. 2b).
- Whorls (Fig. 3) are patterns where ridges curve around 360 degrees with two triradii.

RESULTS

On the basis of above characters, the following parameters are taken into consideration

- Arches, loops and whorls of both palms were observed and distribution pattern in control group and β -thalassemia major patients were compared (Pattern type).
- a-b ridge count: Triradius below the 2nd finger is marked. If more than one triradius is present, the nearest point to the radial border was taken into account (a). Triradius below the 3rd digit was marked as (b). They were joined by a fine straight line and the ridges are counted (Fig. 4).
- 'atd' angle: It was recorded by drawing lines from the digital triradius 'a' to the axial triradius 't' and from this to digital triradius 'd.' The maximal 'atd' angle is an important parameter for this study (Fig. 5).

DISCUSSION

In this study, statistically significant increase in the whorl pattern was observed which corroborate with findings of Rosner and Spriggs^[3] Saha et al^[4] observed that in β -thalassemia, the incidence of whorls is higher with decreased frequency of loops, which is similar to present observations. Dehenkar et al^[5] also found statistically significant increase of the whorl pattern in thalassemic patients. However, Bhalla et al^[6] observed an increased incidence of loops, but number of whorls was less.

Rosner and Spriggs^[3] found no significant change of a-b ridge count in β -thalassemia. Similar results were also provided by Saha et al^[4], Bhalla et al^[6] reported a higher mean a-b ridge count in patients. In this study, the result reflected some decrease in mean a-b ridge count in the imprints of β -thalassemic palms.

Regarding 'atd' angle, Rosner and Spriggs^[3] found no observable differences. This is similar to results of Saha et al^[4]. However, Dehenkar et al^[5] reported increased 'atd' angles in β -thalassemic patients than control group. In this study, a significant increase in 'atd' angle in β -thalassemia cases was observed.

Subject	No. of Individuals	Whorl (%)	Ulnar Loop (%)	Radial Loop (%)	Arch (%)	χ^2	Remarks
Control individuals	50	31.8 (159)	59.4% (297)	2.8% (14)	6.0% (30)	8.22	Significant
Thalassemic patients	50	38.4 (192)	55.2% (276)	1.0 % (5)	5.4% (27)		
		Whorl = W	Ulnar loop = L ^u	Radial loop = L ^r	Arch = A		

Table 1: Shows Distribution Pattern Type in Both Groups

Subject	No. of Individuals	Mean a-b Ridge Count	±S.E.	S.D.	t-value	Remark
Control Individuals	50	77.02	1.04	7.41	1.06	Insignificant
Thalassemia Patients	50	75.30	1.22	8.65		

Table 2: Shows Mean 'a-b' Ridge Count (Sum Both Hands)

Subject	No. of Individuals	Mean 'atd' Angle	±S.E.	S.D.	t-value	Remark
Control Individuals	49	42.22	0.76	5.38	2.13	Significant
Thalassemia Patients	46	44.93	1.02	6.96		

Table 3: Shows Mean 'atd' Angle of Left Hands in Both Groups

Subject	No. of Individuals	Mean 'atd' Angle	±S.E.	S.D.	t-value	Remark
Control Individuals	49	41.69	0.66	4.63	2.17	Significant
Thalassemia Patients	46	43.95	0.81	5.50		

Table 4: Shows Mean 'atd' Angle of (Sum Both Hands) in Cases and Control

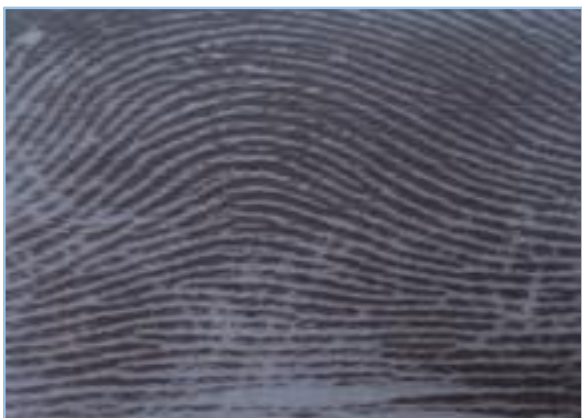


Fig. 1a: The Arches (No Triradius)



Fig. 3: The Whorl



Fig. 1b: Tented Arches (With Triradius)

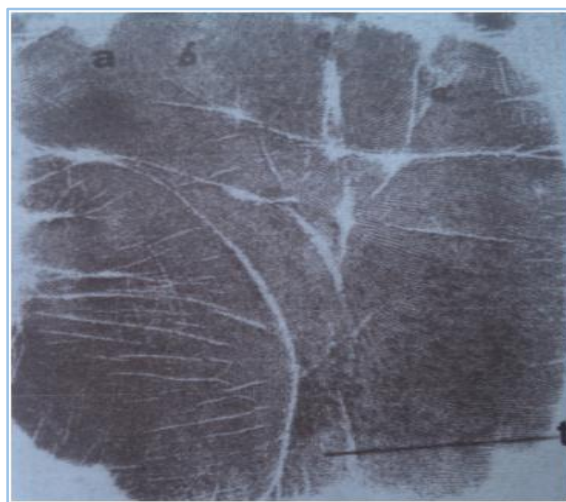


Fig. 4a: Different Triradius



Fig. 2a: The Loops



Fig. 4b: Ridges between 'a' and 'b'

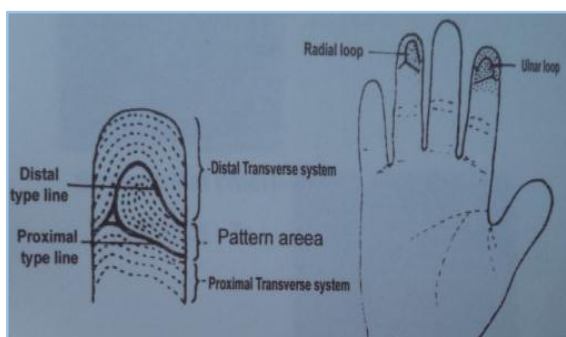


Fig. 2b: Showing Ulnar and Radial Loops

CONCLUSION

Significant Pattern Changes in the Cases are

1. Increase in whorls in digital imprints.
2. There is statistically significant rise of 'atd' angles in both palms.

Therefore, there are some suggestive changes in dermatoglyphics pattern in palms of β -thalassemia patients. However, more extensive studies are needed.

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