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Palmar Dermatoglyphic Patterns of Female β Thalassemia Major Patients in Bangladeshi Population

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Abstract

Context: Dermatoglyphics have proven to be a helpful tool in identifying specific syndromes of genetic origin. Many studies were carried out in different parts of the world where comparison between dermatoglyphic patterns of female β thalassemia major patients with normal individuals were done. Unusual dermatoglyphic patterns were reported in β thalassemia major patients. So far it is known, there is no published article on this topic in Bangladesh. This study was aimed to establish a standard baseline data of the palmar dermatoglyphic patterns of female β thalassemia major patients in Bangladesh and to make comparison with healthy individuals.

Materials and Methods: This cross sectional study with some analytical component was carried out in the Department of Anatomy, Sir Salimullah Medical College, Dhaka, Bangladesh. This study recruited 25 β thalassemia major female patients and 31 healthy female individuals. Dermatoglyphic prints of the study subjects were taken by ink & paper method and then the palmar dermatoglyphic patterns on the distal phalanges of each hand were studied with 6X magnifying glass. The palmar dermatoglyphic patterns of the female β thalassemia major patients were observed and compared with the healthy individuals.

Results: The palmar dermatoglyphic patterns of the female β thalassemia major patients were significantly different from that of the healthy female individuals ($p < 0.05$).

Conclusion: This study concludes that palmar dermatoglyphic patterns can be useful in the management of female β thalassemia major patients specifically in early prediction & at the level of prevention.

Key words: Dermatoglyphic, β thalassemia major, Bangladeshi population.

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Introduction

Palmar dermatoglyphics have been proven to be a helpful tool in identifying genetic diseases which have a strong hereditary basis such as thalassemia, Ca-cervix, Ca-breast, Ca-colon, retinoblastoma, psychological disorders e.g.-depression, schizophrenia, neurological disease such as epilepsy, skin disease like psoriasis, leprosy, vitiligo, genetic disorder e.g.- Down's syndrome, Klinefilter's syndrome and many other medical conditions e.g.-diabetes, hypertension, coronary artery disease, bronchial asthma, pulmonary tuberculosis. [1] The thalassemia is a heterogeneous group of disorders caused by gene mutation. In thalassemia there is a genetically determined reduction in the rate of synthesis of one or more types of normal haemoglobin polypeptide chain. [2] Unusual dermatoglyphic patterns are reported in β thalassemia major patients which

is the most common single gene disorder in the world.[3] According to World Health Organization (WHO) approximately 6000 thalassemic children are born each year in Bangladesh. Among them 3% are carriers of β-thalassemia and 4% are carriers of Hb-E β- thalassemia. A recent study showed that carrier state of Hb-E β-thalassemia is 6.1% and as high as 40% in tribal children in Bangladesh.[4] Dermatoglyphic patterns in female β thalassemia major patients can be used as risk indicator. This may be used as a preliminary screening to determine those at risk of developing β thalassemia major and proper monitoring can be instituted to prevent morbidity and mortality associated with this condition. [5]

Materials and Methods

This cross sectional study with some analytical component was carried out in the department of Anatomy, Sir Sallimullah Medical College, Dhaka, Bangladesh between the periods of January, 2016 to December, 2016. Twenty five female β thalassemia major patients aged between (5-25) years were considered as study group and 31 healthy individuals of the same age & sex were considered as control group were enrolled in this study. All the subjects were free from other congenital or acquired deformities of finger and palm of hand. Study group were selected from the day care unit of transfusion medicine department (where patients receive transfusion of blood and blood component service which is an alternative to hospital admission) of Bangabandhu Sheikh Mujib Medical University, Dhaka, on the basis of Hb electrophoresis. The healthy individuals of the same age and sex were selected as control group. After selection of the subjects, dermatoglyphic print was taken by the ink & paper method.[6] Two white papers were fixed on the clip board to take the print of both hands. Both hands were painted with ink and both hand prints were taken on white paper. Then dermatoglyphics of each hand were studied with 6X magnifying glass to identify the finger ridges for determination of different dermatoglyphic patterns. Sir Francis Galton, in 1892 classified the dermatoglyphics into three patterns arches, loops and whorls. In arches pattern epidermal ridges start on one side, rise towards the center and then leave on the other side (Fig:1.a). In ulnar or radial loop pattern epidermal ridges start on one side either ulnar or radial side rise towards the center and return back to the side they started from (Fig:1.b). In whorl pattern epidermal ridges form circle or spiral with a central core (Fig:1.c).[7] The core forms the center of the pattern area (Fig:2). Delta or tri-radius is located at the meeting point of three opposing ridge systems (Fig:3). A triangle is formed at the center.[8] Arch pattern has no tri-radius, loop pattern has one tri-radius and whorl has two tri-radius (Fig:1.a,b & c). Ethical permission was taken from the Institutional Review Committee of Sir Salimullah Medical College, Dhaka. Data were expressed as mean ±SD and statistical significance of difference among the group was calculated by Chi-square test. Statistical analysis was done by using Statistical package of social service (SPSS) for windows version- 21. P value <0.05 was considered as significant.

Results

Frequencies of fingerprint patterns of right, left and both hands in the female case and control groups were shown in Table I and in Figure 4, 5 and 6.

In the present study, percentage of arch pattern were significantly higher in right hand ($P<0.05$), left hand ($p<0.005^{**}$) & both hands ($p<0.005^{**}$) of female β thalassemia major patients than healthy female individual.

(a) No tri-radius in arch (b) One tri-radius in loop (c) Two tri-radius in whorl

Fig.-1: *Diagrammatic representation of (a) arch (b) loop (c) whorl pattern*

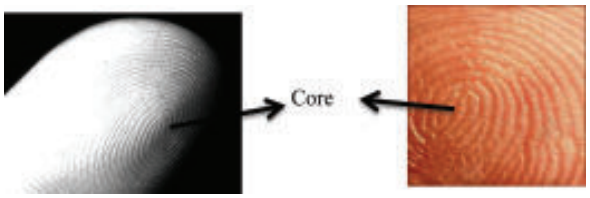

Fig.-2: *Photograph of distal phalange of the palmar surface of the digit showing core or center of a pattern area*

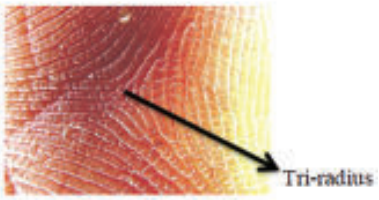

Fig.-3: *Photograph of distal phalange of the palmar surface of the digit showing delta or Tri- radius of a pattern area*

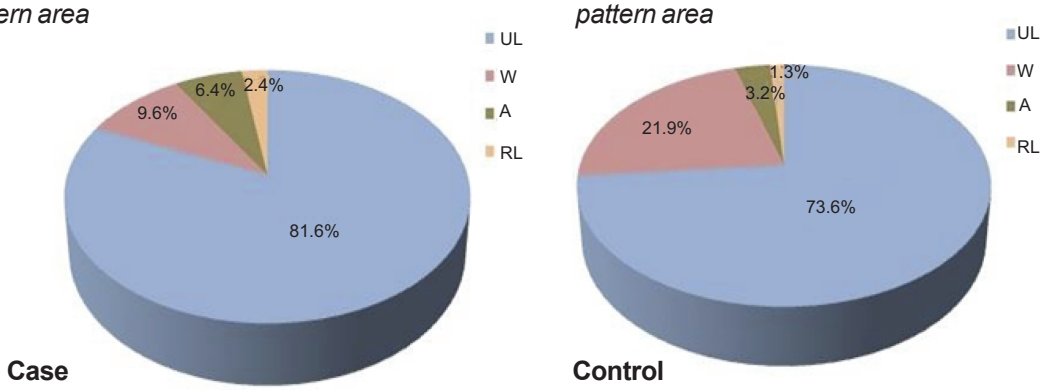

Fig.-4: *Pie chart showing different dermatoglyphic patterns in distal phalanges of right hand*

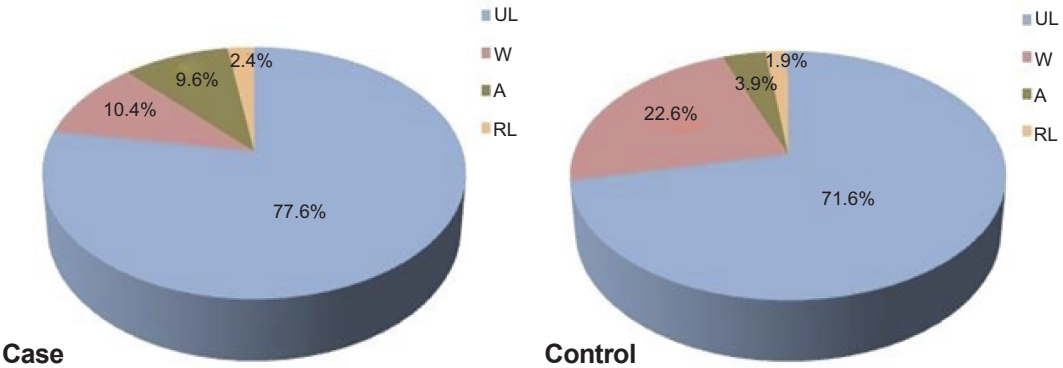

Fig.-5: *Pie chart showing different dermatoglyphic patterns in distal phalanges of left hand*

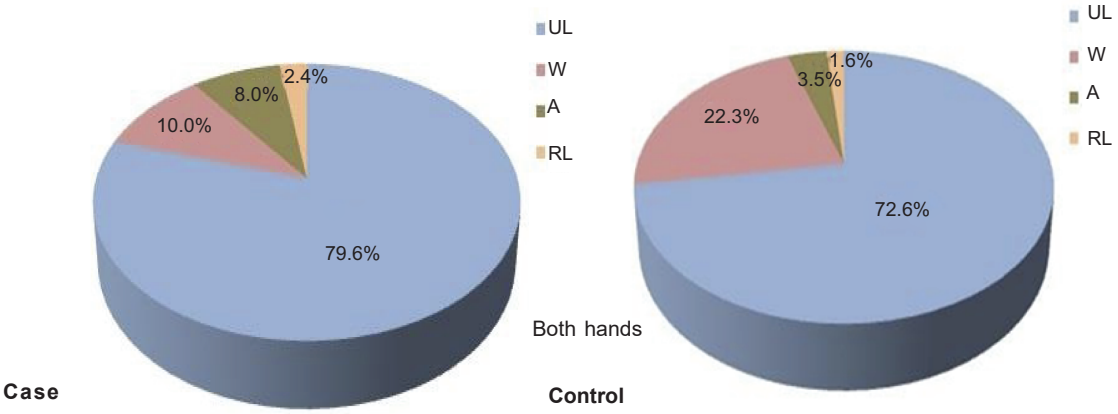

Fig.-6: *Pie chart showing different dermatoglyphic patterns in distal phalanges of both hands of case and control* .Case: (Female β Thalassemia major patients) Control: (Healthy individuals)

Discussion

This study attempts to analyse whether any specific dermatoglyphics pattern exist for female β thalassemia major and whether that serve as an early diagnostic tool. Arch pattern was found more in distal phalanges of the digits of right hand, left hand and both hands of female case group when compared with control group. These observations coincide with the study of Das et al.[9] They found increased number of arch pattern in female β thalassemia patients. Saha et al[10], Solhi et al[11], Basu et al[12] observed increased number of whorl pattern in female β thalassemia major patients. This finding was dissimilar with the findings of the present study. According to the study of Dogramaci[13] frequency of ulnar loop pattern was higher in female β thalassemia major patients. This finding was dissimilar with the findings of the present study. Observed results showed some similarities as well as dissimilarities with the available information present on different publications. The similarities might be due to the fact that palmar dematoglyphics and β thalassemia major are genetically determined and once established, dermatoglyphic patterns remain unchanged throughout life. Substantial dissimilarities in selected dermatoglyphic feature of β thalassemia major patients have been noted in studies from different parts of the world. These differences appear to be racial/ethnic in origin.

Conclusion

This study might have established a standard baseline data on palmar dermatoglyphics patterns of female β thalassemia major patients in Bangladesh. The dermatoglyphics findings might be a diagnostic and preventive tool for thalassemia.

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