

A study on transpalmar distance among the autistic males of Bengalee Hindu caste population of West Bengal, India

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Summary

Objective. Dermatoglyphics traits have been used as clinical marker for many neurodevelopment disorders and chromosomal aberrations as well. Morphogenesis of dermatoglyphic patterns and neural tissues originate from ectodermic layer around 7th-24th weeks of gestation; from this stage onwards, they are unaffected by the environment. Autism is well known as a complex neurodevelopmental disorder characterized by significant disturbances in social communicative and behavioral functioning. To best of the knowledge, the present study is the first attempt to understand the association of transpalmar distance among the autistic patients from India.

Methods. To achieve the purpose bilateral palm prints were taken from clinically diagnosed 67 male autistic patients from Bengalee Hindu caste population of West Bengal, India. Apart from autistic patients, apparently healthy 55 males without any family history of autism as controls have also been collected from Bengalee Hindu caste population of the same area. Bilateral palm prints of all the participants were collected by using standard ink and roller method.

Results. The results revealed significant ($p < 0.05$) relationship in terms of shorter transpalmar distance among the autistic patients than that of con-

trols which is indicative of more distal position of axial triradius.

Conclusion. Therefore, the present study envisaged that the importance of dermatoglyphic traits in terms of transpalmar distance as one of the non-invasive technique could play as valuable aid for clinical diagnosis of autism. The relationship of shorter transpalmar distance might effectively be incorporated as another useful measure for early prognosis of autism.

KEY WORDS: transpalmar distance; autism; India.

Introduction

Dermatoglyphics are cutaneous ridges on the fingers, palms, and soles, formed during 7th-24th week of gestation. During this period, and only then, genetic and environmental factors can influence their formation. Since the skin and the brain develop from the same ectoderm, dermatoglyphic variations are informative for early developmental brain disturbances (1). Therefore, the neurodevelopmental hypothesis of complex disorder related to neurological and thereby behavioral aspects are major research concepts that is consistent with the presence of minor physical abnormalities and dermatoglyphic variations, which are indicators of developmental problems (2). The neurodevelopmental hypothesis states that the interaction of genetic and environmental factors influences the ways in which nerve cells are laid down, differentiated, and remodeled. These changes begin in utero, affected by events around birth, and become fully expressed in early adulthood. Dermatoglyphic traits serve as a diagnostic tool in a number of neurodevelopmental disorders that have a strong hereditary background (3). Like other dermatoglyphic traits the Transpalmar Distance also is a marker of chromosomal aberrations (4). Autism is well known as a complex neurodevelopmental disorder characterized by significant disturbances in social communicative and behavioral functioning. Autism is a multifactorial disease caused by genetic and environmental factors. Several chromosomal loci contribute to genetic susceptibility in autism. Autism reveals significant genetic heterogeneity: several dozen distinct genetic disorders or identified chromosomal abnormalities can result in autism (5). To best of the knowledge, the present study is the first attempt to understand the relationship between transpalmar distances among the autistic patients from India.

Materials and methods

Present study incorporated 67 clinically diagnosed (according to DSM-IV-TR - American Psychiatric Association, 2000) autistic males and 55 control males without having any family history of autism, from Bengalee Hindu caste population of Kolkata, West Bengal, India. Informed consent has been obtained from the guardians of the autistic patients. Mean age of the autistic patients was 22.54 (SD 1.96) years, while the mean age of the controls was 23.01 (SD 1.68) years. Bilateral palm prints of both hands were collected according to the standard ink and roller method (6). All the prints were analyzed and classified according to Schaumann and Alter (1976) (3). To obtain the position of axial triradius positions transpalmar distance (ratio between length of palm and length of distance between wrist crease and axial triradius) was done using standard technique (4). All the data were analyzed in SPSS (version 16.0) for descriptive statistics and inferential statistics. Cut off value was set as $p = 0.05$.

Results

Examination on transpalmar distance among the autistic male patients revealed significantly ($p < 0.05$) shorter (Table 1) transpalmar distance with that of the control males. Nevertheless, significantly ($p < 0.05$) shorter transpalmar distance has been noticed among the autistic patients (Table 2) in comparison to the controls for the both hands.

Table 1 - Distribution of transpalmar distance among the autistic patients and controls.

	Autistic male Mean \pm SD	Control male Mean \pm SD
Left hand	9.66 \pm 6.90	11.67 \pm 2.99*
Right hand	8.90 \pm 4.58	11.58 \pm 3.21*

* $p < 0.05$

Table 2 - Transpalmar distance among the autistic patients and controls.

	Autistic patients Mean \pm SD	Controls Mean \pm SD
Left & Right hand	9.16 \pm 5.28	11.09 \pm 3.39*

* $p < 0.05$

Discussion

It is well known that the main growth of neural tissues and the skin are formed within a same period of 7th-24th week of gestation and also shared the same ectodermic origin and it is most likely, that the alteration

of the brain growth or the neurodevelopmental imbalance might have close relationship with the occurrence of discrete dermatoglyphic traits. In the context of neurodevelopmental complex disorder association between dermatoglyphics and schizophrenia has been reported from abroad (7) and in Indian (8) population. Autistic disorder (AD) is a pervasive developmental disorder characterized by marked impairment in brain development beginning during the intrauterine period and an etiopathogenesis in which multiple genes play an important role (9). Several studies reported spectrum of specific dermatoglyphic traits of the digito-palmar complex in autistic patients (10-12). Like other dermatoglyphic traits the dispersion of axial triradius t is also being a measure of chromosomal aberration. The association between chromosomal aberration and the presence of axial triradius in comparatively distal position indicated by shorter transpalmar has been demonstrated (4). However, the significant incidences of double axial triradius (t'') among the autistic patients of Bengalee population from India have already been reported (13). The measure of transpalmar distance is used to determine the position of the axial triradius by using the ratio between the length of the palm and the length of the distance between the wrist crease and the distal axial triradius t (4, 14). In the present study we also report that the autistic patients demonstrated significantly ($p < 0.05$) short transpalmar distance than the controls. The significant ($p < 0.05$) decrease of transpalmar distance, eventually, indicates more distal position of axial triradius among the autistic patients. Therefore, the present study envisaged that the importance of dermatoglyphic characteristics in terms of transpalmar distance as one of the non-invasive technique could play as valuable aid for clinical diagnosis of autism.

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