

DERMATOGLYPHIC STUDY OF POSITIVE AND NEGATIVE SYMPTOMS IN SCHIZOPHRENIA

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SUMMARY

The study of dermal ridges in schizophrenia has been extensive, but only recently has fluctuating asymmetry been described. This study relates dermatoglyphic patterns with the specific positive and negative symptoms of the disease in 72 DSM-III-R defined schizophrenic subjects and 72 normal unrelated ethnically matched controls. Schizophrenic subjects had significant lower ridge counts in both hands. Fluctuating asymmetry in the *a-b* ridge counts was significantly lower in schizophrenic subjects (0.50 vs 0.70, $p < 0.05$). The positive and negative symptom scale (PANSS) was used to determine symptom severity. Schizophrenics with predominantly negative symptoms showed significantly lower counts and higher fluctuating asymmetry than schizophrenics with positive symptoms.

Our study showed findings congruent with the hypothesis that schizophrenia could be related to central nervous system developmental abnormalities.

Key words: Dermatoglyphics, schizophrenia, positive and negative symptoms.

RESUMEN

El estudio del conteo y forma de las huellas digitales (dermatografía) en la esquizofrenia ha sido extenso, pero recientemente se ha descrito un nuevo parámetro, que es la asimetría fluctuante. En este estudio se relacionaron los patrones dermatoglíficos con los síntomas positivos y negativos de la enfermedad en 72 pacientes con esquizofrenia, de acuerdo a los criterios diagnósticos del DSM-III-R, y en 72 sujetos controles. Los sujetos con esquizofrenia tuvieron cuentas menores de ondulaciones en los dedos de ambas manos. La asimetría fluctuante en la cuenta de las ondulaciones tipo *a-b* fue significativamente menor en los sujetos con esquizofrenia (0.50 vs 0.70, $p < 0.05$). Se utilizó la Escala de Síntomas Positivos y Negativos para la Esquizofrenia (PANSS) para determinar la severidad de los síntomas. Los sujetos esquizofrénicos con predominio de síntomas negativos mostraron un menor conteo y una mayor asimetría fluctuante que aquellos sujetos esquizofrénicos con predominio de síntomas positivos.

Los hallazgos de nuestro estudio son congruentes con la hipótesis de que la esquizofrenia puede estar relacionada con anomalías en el desarrollo del sistema nervioso central.

Palabras clave: Dermatoglifos, esquizofrenia, síntomas positivos y negativos.

INTRODUCTION

Genetic liability for schizophrenia has been strongly suggested by family, twin and adoption studies (26, 11, 12). A specific mode of transmission has not been established, but a polygenic model has been proposed as the most feasible possibility (14). As Mellor (21) describes, fluctuating asymmetry is “the random differences between corresponding morphometric characters on each side of the plane of symmetry”. If one side is equal to the other, then the asymmetry index is zero, but if a character tends constantly to differ in one direction, then we say there is “directional asymmetry”. For example, the heart is almost always in the left side of the body and the liver on the right side, these are traits with directional asymmetry.

Dermatoglyphology is the study of dermal ridge counts and figures in fingers, palms and soles. The value of dermatoglyphic traits in medicine has been described for several chromosomal and congenital disorders such as Down syndrome (23).

Dermatoglyphy is considered as a classical model of polygenic inheritance (16). This means that several genes are involved in the inheritance of the dermal traits. Additionally, heterozygous individuals are more able to buffer a range of environmental interference; therefore high levels of heterozygosity are associated with

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higher degrees of bilateral symmetry, while homozygosity results in fluctuating asymmetry or increased bilateral differences (19).

The differences between hands or feet sizes or the dermal ridge counts, tend to be randomly distributed in both directions, thus they are distributed with fluctuating asymmetry. If fluctuating asymmetry is greater than in normal subjects then this suggests that disturbances of fetal development may play some part in the later development of schizophrenia (5, 8).

Dermal ridges in schizophrenia were thoroughly studied decades ago with inconsistent findings (6,24). More recently, several authors have used dermatoglyphics as an index to measure fluctuating asymmetry, establishing that schizophrenic patients tend to have a greater degree of fluctuating asymmetry than controls (13,19,20, 22). Also, there is some evidence that schizophrenia severity, early onset and declining course of illness are associated with a higher degree of fluctuating asymmetry (19).

There is also data postulating that positive and negative symptoms may have different biochemical, pharmacological, neuroanatomical or even genetic substrates (25). It has long been suggested that all biological markers proposed for schizophrenia should be related to specific symptoms clusters to disclose a relation if any (15).

The present study was designed to assess the relationship between the dermatoglyphic patterns and fluctuating asymmetry in schizophrenic patients with positive and negative symptoms and compared with normal controls.

METHODS

Subjects

Subjects were recruited from two psychiatric units in Mexico City (National Institute of Psychiatry and "Fray Bernardino Alvarez" Psychiatric Hospital). All inpatients or outpatients met DSM-III-R (1) criteria for schizophrenia; the diagnosis was obtained with the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) (27,28), and the dermatoglyphics were assessed by two fully trained psychiatrists (FP and AP). Approximately half of the subjects were also participating in clinical pharmacological trials.

A control group ethnically matched by phenotype (mestizo) was selected among staff members working at both institutions. The criteria for the control group were the absence of mental disease assessed by the SCAN (27,28) and to have parents and grandparents born in Mexico.

We evaluated 72 patients and 72 controls. No significant differences were found in gender (69.4% male

cases vs 60.6% controls) or age (cases 31.3 ± 9.3 vs controls 28 ± 5.2).

Procedures

Psychotic symptoms were evaluated with the positive and negative symptom scale (PANSS) in Spanish (4,18). To differentiate between positive or negative predominant cases, we used the method proposed by Kay and colleagues (17) where the negative scale is subtracted from the positive and if the resulting value is positive the case is considered "positive symptom-predominant" and if not, "negative-predominant".

Dermatoglyphics: Handprints were obtained and counted according to the methods described by Cummings et al (10). First, all fingerprints were classified into three figures: arches, loops or whorls, and then the following quantitative dermatoglyphic measures were analyzed: single finger ridge counts (SFRC), total ridge count (TRC), *a-b* ridge count (*ab*-RC), and the *atd* angle (*atd*-A) all for each hand.

Fluctuating asymmetry: To determine the fluctuating asymmetry, we used the method applied by Mellor (21) in a similar paper, where all the measures obtained were squared-correlated with the Pearson's test, and the formula $1-r^2$ estimated their unshared variance which was used as a fluctuating asymmetry measure.

Data analysis

For all mean contrasts a T-test was performed and the X^2 test with Yates correction when necessary in all categorical variables. We used ANOVA for correlations for single finger ridge counts. To contrast the fluctuating asymmetry measures we used a Z test.

RESULTS

Dermatoglyphic traits

Table 1 shows the distribution of figures between cases and controls. A significantly less proportion of whorls was found among schizophrenic patients. The comparisons between cases and controls relating ridge counts and *atd* angles are shown in table 2. The total ridges count (TRC) for both hands were significantly lower in the schizophrenic patients. No differences were found for palmar *atd* angles in both hands.

TABLE 1
Fingerprint figure distribution

	Cases	Controls
ARCHES (%)	38 (5.3)	22 (3.05)
LOOPS (%)	398 (55.3)	329 (45.7)
WHORLS (%)	284 (39.4)	369 (51.25)
Total (%)	720 (100)	720 (100)

$\chi^2 = 23.26$, df 2, $p = 0.0001$

TABLE 2
Dermal ridge counts in schizophrenic patients and controls

	Schizophrenie (n=72)	Normal (n=72)	p *
Right Hand			
TRC**	65.9 (22.1)	81.7 (23.5)	<0.01
ab-TC	39.8 (6.1)	43.9 (7.3)	n.s
atd ANGLE	43.9 (8.2)	42.9 (5.5)	n.s
Left Hand			
TRC**	64.7 (24.7)	82.2 (23.4)	<0.01
ab-TC	41.0 (5.4)	42.8 (8.1)	<0.01
atd ANGLE	45.2 (10.5)	46.6 (14.4)	n.s

(S.D.)

* Paired "t" test.

** TRC total ridge count, ab-RC a-b triradius ridge count.

Fluctuating asymmetry

We did not find significant differences in fluctuating asymmetry of total ridge counts (0.21 vs 0.23, n.s.) or *atd* angle (0.57 vs 0.93, n.s.) between cases and controls.

Dermatoglyphics, positive and negative symptoms

Table 3 shows the contrasts of the dermatoglyphic counts and fluctuating asymmetry among the negative-predominantly versus positive – predominantly – schizophrenic patients. Patients with predominant negative symptoms showed significantly lower counts and higher fluctuating asymmetry.

DISCUSSION

Many of the studies involving dermatoglyphics in schizophrenia have yielded ambiguous results. Our results concerning the distribution of palmar figures in schizophrenic patients are consistent with previous reports, where schizophrenics showed significantly fewer whorls and more loops than controls (6,21,22, 24).

An interesting finding was the dermatoglyphic differences within the schizophrenic group depending upon the presence of positive and negative symptoms.

TABLE 3
Dermatoglyphic counts and fluctuating asymmetry between positively and negatively predominant schizophrenia

Dermatoglyphic measure	Positive Schizophrenie (n=19)	Negative Schizophrenie (n=53)	p
Right hand			
a-b TC	50.3 (22.6)	40.5 (9.9)	0.01
Angle	45.8 (14.2)	43.2 (4.6)	ns
TRC	73.3 (22.0)	63.3 (21.7)	ns
Left hand			
a-b TC	51.5 (22.0)	42.7 (12.2)	0.03
Angle	47.1 (13.8)	44.6 (9.2)	ns
TRC	70.0 (26.8)	62.8 (23.9)	ns
Fluctuating Asymmetry			*
a-b TC	0.64	0.99	<0.05
Angle	0.06	0.95	<0.01
TRC	0.18	0.21	ns

(S.D.)

* Contrasts using a Z test.

TRC total ridge count, ab-RC a-b triradius ridge count.

The schizophrenics with predominantly negative symptoms showed significant lower counts and higher fluctuating asymmetry than the predominantly positive group.

The distinction between positive and negative symptoms that brought the classic Type I - Type II subdivision of schizophrenia (9), which is based upon the following clinical data: delusions and hallucinations are typically considered to be positive symptoms (Type I), whereas deficit states, such as blunted affect and alogia, constitute negative symptoms (Type II). The negative symptoms are marked by various hypothesized correlates of structural brain abnormality, including large ventricle: brain ratios, poor premorbid adjustment, cognitive dysfunction and poor response to treatment. In contrast, normal brain structure, better premorbid adjustment, lesser cognitive impairment and a relative good outcome characterize positive symptoms (2).

A variety of investigators have examined the abnormalities in specific brain regions, and theories about symptoms-region relationship, such as negative symptoms in the frontal cortex or hallucinations in the superior temporal gyrus (7). This approach explains clinical symptoms as a consequence of disruptions in anatomically identified circuits that mediated a fundamental cognitive process.

Based on relative consistent observations of abnormalities in frontal, thalamic, and cerebellar regions in schizophrenia, using both magnetic resonance imaging and positron emission tomography, we can postulate that the symptoms emerge from impaired connectivity between these regions as a consequence of a neurodevelopmental defect or perhaps a series of them (3).

Following this line of anatomical data our study showed findings congruent with the hypothesis that schizophrenics with negative symptoms may have a higher degree of asymmetry that could be related to central nervous system developmental abnormalities. However, this finding needs to be replicated in a larger sample, measuring some other anatomical or imagining parameters as well.

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RESPUESTAS DE LA SECCIÓN
AVANCES EN LA PSIQUIATRÍA
Autoevaluación

1. C
2. B
3. C
4. C
5. D
6. C
7. D
8. A
9. E
10. C
11. A
12. B
13. A
14. B
15. C