Abnormal Cerebral Dominance In Chronic Schizophrenia

Aytekin Sır[1] Mustafa Özkan[1] Ahmet Ataoğlu[2] Ramazan Özcankaya[3]

1Assistant Prof. of Psychiatry, Dicle Univ. School of Medicine Department of Psyc., DİYARBAKIR.
2Associate Prof. of Psychiatry, Dicle Univ. School of Medicine Department of Psyc., DİYARBAKIR.
3Associate Prof. of Psychiatry, S.D. Univ. School of Medicine, Department of Psyc. Head Director, ISPARTA.

Abstract

The purpose of this study is to determine how the hand preference is affected in chronic schizophrenia, and getting information about cerebral organization. For this reason, 61 male and 12 female right handed(in self reports) chronic schizophrenic cases have been studied.

Annet's peg moving task was performed to the subjects to determine the hand preference. Subjects were divided into three groups as right handed (RH), left handed (LH) and mixed handed (MH) according to the task results. Hand preferences of the patients were 30(41.1%) RH, 9(12.3%) LH, 34(46.6%) MH

Statistically, there was significant difference in hand preferences between sexes(p= 0.0245). It is concluded that shift to left trend is only related with males.

The difference between right and left handed groups in the duration of disease was statistically meaningful(p=0.0213). The left hemispheric functions regressed relative to the right hemispheric functions. It was observed that shift to left trend increased and it is thought that various organic pathologies determined in the left hemispheres of the patients progressed during the disease.

Keywords: *chronic schizophrenia, handedness, cerebral lateralization*

Kronik Şizofrenide Anormal Serebral Dominance

Özet

Bu çalışmanın amacı kronik şizofrenide el tercihinin nasıl etkilendiğini araştırmak ve serebral organizasyon hakkında bilgi edinmekti. Bu amaçla 61 erkek 12 sağ elini kullanan kronik şizofrenik kadın çalışmaya alındı.

Ahmet peg moving testi el tercihini araştırmak için hastalara uygulandı. Vakalar sağ elini kullananlar sol elini kullananlar ve her ikisini kullananlar olarak üçe bölündü. Hastaların el tercihleri 30 sağ (%41,1) 9 sol el(%12,3) ve 34 karışık (%46,6) idi.

İstatistiksel olarak her iki cinsiyet arasında el tercihi yönünden fark mevcuttu. P(0,0245). Sol ele dönüş sadece erkek hastalar ile ilişkili idi.

Hastalığın süresi yönünden sağ ve sol el kullanan gruplar arasındaki fark istatistiksel olarak anlamlıydı. (p=0,213). Sol hemisferik fonksiyonlar sağ hemisferik fonksiyonlara göre geriledi. Sol eğilime dönüşen arttığı gözlendi ve hastalarda sol hemisferdeki çeşitli organik patolojilerin hastalık sırasında ilerlediği düşünüldü.

Anahtar Kelimeler: *Kronik şizofreni, el tercihi, serebral lateralizasyon*

Although the precise relationship between handedness and brain organization has not been specified yet, handedness is generally considered to be an important variable in neuropsychological studies of cerebral organization. There were some problems of classifying handedness. Many investigators considered those who used only the right hand virtually in all activities to be right handed (RH), while all others were classified as left handers (LH). Some investigators accept the presence of a different group that consists of mixed or ambidextrous individuals.

Some of the confusion in the literature may result from the varying measures of handedness that have been employed. Annet has chosen to use

a peg moving task as a measure of hand proficiency to avoid from this confusion (1).

The relationship between schizophrenia and cerebral asymmetry, and the reasons for this relationship have been the subject of extensive writing and discussions among researchers. Some authors have reported that there is an excess of left handedness in schizophrenia (2, 3, 4, 5, 6, 7, 8, 9). On the contrary, numerous authors have claimed that schizophrenia is associated with increased incidence of right handedness(10, 11, 12).

Material And Method

The patients hospitalized in Elazığ Mental Health Care Hospital have been screened. For inclusion the patients had to satisfy DSM-III-R criteria (on case note review), 5 years cumulative exposure to antipsychotic medication, be cooperative, and not to have extrapyramidal symptoms. 61 male and 12 female right handed(in self reports) chronic schizophrenic cases that meet inclusion criterias have been studied. The following demographic and treatment variables were noted: The mean (± SD) age of schizophrenic subjects was 35.15 ± 10.3 years (range 17-65 years) and the mean duration of illness was 12.57 ± 8.73 years (range 5-42 years), the age at onset of the disease was 22.57 ± 6.25 years (range 12-39 years)

To measure the hand skill, a peg moving task was used (1). The pegboard consisted of two parallel rows of 10 peg holes. There were 10 loose-fitting doweling pegs in one row. The subjects were required to insert 10 pegs into the corresponding opposite holes as fast as possible. Pegs were moved from right to left with the right hand and than from left to right with the left hand. The time elapsed for the right and left hand was measured with a chronometer. One trial consisted of the time elapsed to move 10 pegs with one hand. Ten trials were given to each hand, and the time differences between hand skills were analyzed using unpaired t test. We accepted the patient as a right handed(RH) or left handed(LH) as a related with the superiority of the hand skill that is statistically meaningful. If the difference was not significant, the patient was accepted as a mixed handed (MH). In this way three groups were constituted as RH, LH and MH.

Results

Hand preferences of the patients according to peg moving task results were 30(41.1%) RH, 9(12.3%) LH, 34(46.6%) MH.

Peg moving task results of the male and female schizophrenics were statistically assessed using Mann-Whitney U test. The results were statistically significant between male and female subjects (z= -2.249; p= 0.0245) (Table 1, Figure 1).

Table I. Handedness in male and female schizophrenics

	RH		MH		LH		Total	
	n	%	n	%	n	%	n	%
Male	20	32.8	33	54.1	8	13.1	61	83.6
Female	10	83.3	1	8.30	1	8.30	12	16.4
Total	30	41.1	34	46.6	8	12.3	73	100.0

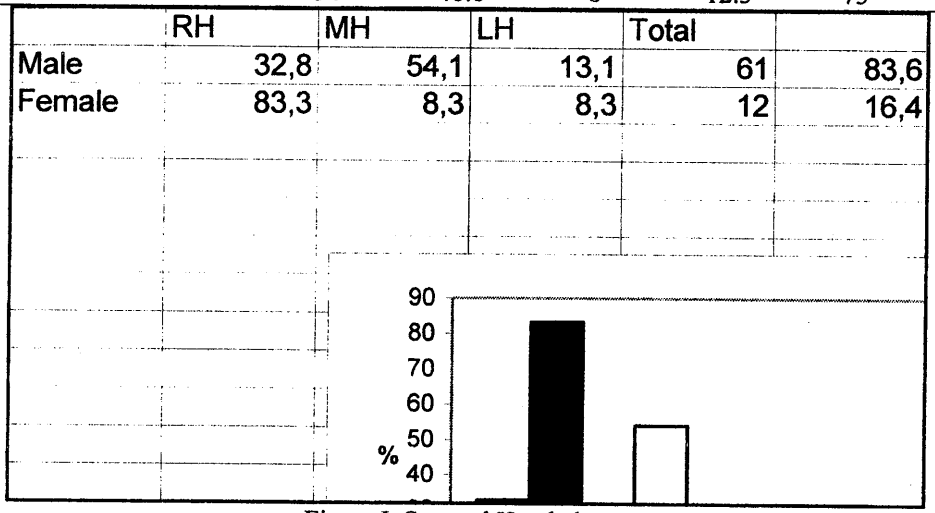

Figure I. Sex and Handedness

The relationship between the age at onset of disease and handedness was analyzed in the three groups. The ages at onset of disease in the three groups were RH 22.7±6.25, MH 22.6±6.45, LH 22±6.09. There were no significant differences among the three groups. The difference between male and female schizophrenics on the onset of disease was insignificant (22.5±5.67 for females vs. 22.59±6.40 for males).

The mean ages of the three groups were RH 32.8±10.01, MH 36.09±10.48, LH 39.88±9.48. The difference between LH and RH schizophrenics in the mean ages was not meaningful using unpaired t test (t=1.975, p=0.081). The difference between male and female schizophrenics in the mean ages was insignificant (32.75±10.57 for females vs. 35.62±10.27 for males) (Fig. 2).

The mean duration of disease in the three groups were RH 10.1±6.70, MH 13.49±8.88, LH 17.88±12.36. The result of the comparison of the RH and LH schizophrenics on the mean duration of disease using unpaired t test (two tailed) was significant (t=2.41, p=0.0213). The difference between male and female schizophrenics in the mean duration of disease was insignificant (10.25±6.33 for females, 13.03±9.01 for males)(Fig. 3). A correlation found between right and left hand's total elapsed time difference and the mean duration of disease using Spearman's rank correlation(r=0.252; p=0.031)

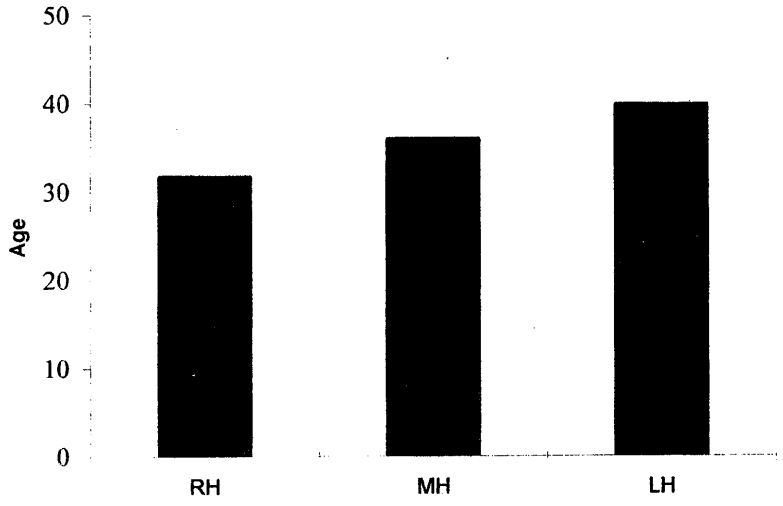

Figure II. Age and Handedness

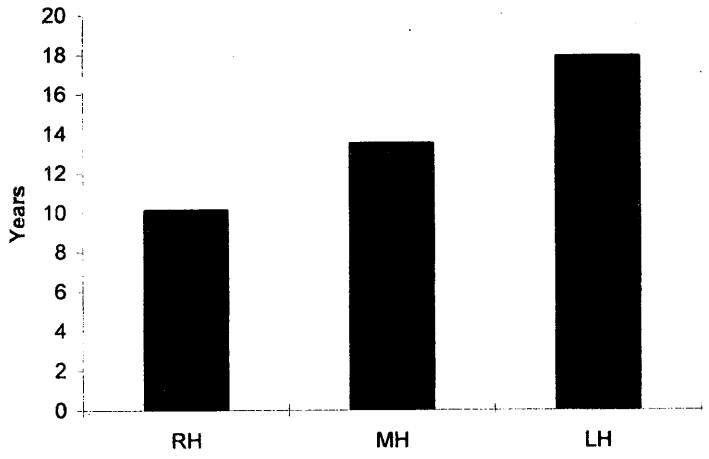

Figure III. Duration of Illness and Handedness

Discussion

In this study the difference between sexes in peg moving task result was so significant (see table 1). Dextrality rate was very high between female subjects(83.3 %) but left handedness and mixed handedness was observed only in two.

Tan reported that shift to right trend was higher than the male cats on paw preference between female cats (13). In another study Yan-Shan-Ming and Flor Henry declared that sinistrality was related only with males (14). Similarly in our study left handedness was high in male subjects (13.1 % vs. 8.3 %).

In another study Bullmore and et al. measured Radius of gyration (Rg) of schizophrenic and control subjects in MRI. They have found that in right-handed controls, Rg of right brain boundaries was significantly greater than Rg of left brain boundaries; in left-handed controls, Rg of left brain boundaries was significantly greater than Rg of right brain boundaries. In right-handed males (both schizophrenic and control) there were significant differences in Rg between hemispheres; whereas in females (both schizophrenic and control), there were no such differences(15)

The peg moving task results of the chronic schizophrenic patients were 34 (46.6 %) MH, 30(41.1%) RH, 9(12.3%) LH. It's thought that chronicity of the disease causes shift to left. Andreasen has been declared that dextrality is related with acute schizophrenia and positive symptoms, whereas sinistrality is related with chronicity and negative symptoms (16). Similarly Dvirskii found that sinistrality was related with progressive course (4).

In a review study of the temporal lobe asymmetries in schizophrenia Crow declared that morphological abnormalities were apparent in the temporal lobe and on the left side of the brain (17). Left hemisphere abnormalities have been detected in a great number of studies. In a postmortem study, Crow compared ventricular enlargement of the schizophrenic patients with control subjects and Alzheimer type dementia patients. Enlargement of the ventricle on the right side of the brain, the difference between the schizophrenic and temporal horn area was negligible; on the left side, it was in excess of 100 %. No such asymmetry was seen in the changes associated with Alzheimer type dementia. The glial reaction that was expected to response to an exogenous pathogen or a degenerative process was not accompanied by the structural changes(18).

In another study that supports the findings of Crow, Dauphinais examined early onset schizophrenic siblings, and reported that temporal lobe volume was significantly decreased by approximately 10 % compared with normal controls (19).

The mean ages of the RH, MH and LH subjects were respectively 31.74, 36.00, 39.88. The difference between the mean ages of RH and LH subjects was insignificant, but shift to left trend was increased by aging. But Meudell have reported that aging of the right hemisphere was faster than the other and left dominance was superior between elderly people(20). This contradiction may be explained by left hemispheric pathologies that originate from development in schizophrenic patients.

The relationship between peg moving task results and the duration of disease were searched. The mean duration of the disease of the three groups were RH 10.1±6.70, MH 13.49±8.88, LH 17.875±12.36. The result of the comparison of the RH and LH schizophrenics on the mean duration of disease using unpaired t test (two tailed) was significant ($t= 2.41$; $p=0.0213$). This result may indicate that the cause of shift to left trend may be related by the course of disease. On the other hand Aso et al found that asymmetry of the ventricle significantly correlated inversely with age at the onset of disease but not correlated with the duration of illness and concluded that greater asymmetry of the ventricle is associated with earlier onset of schizophrenia.(21)

As a result, left hemispheric functions are impaired in schizophrenia because of the anatomical changes which may be developmental. Consequently the right hemispheric functions would have a larger share of control over otherwise left hemisphere functions. Impairment in the left hemispheric functions may increase by the course of disease, so that shift to left (LH, MH) trend increase with the chronicity.

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Corresponding Address:
Doç. Dr. Ramazan Özcankaya
S. Demirel Üniversitesi Tıp Fakültesi
Psikiyatri Anabilim Dalı
Tel: +90-246-2326657
Fax: +90-246-2329422
GSM:+90-532-4175765
32040/Isparta/Türkiye