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Research Article

Schizophrenic Patients' Visual Neglect in Bells Test

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Abstract

Introduction: Visual neglect is one of the symptoms that can be seen in many psychiatric patients. Problems with spatial thinking, often associated with parietal lobe lesions, may cause visual neglect, and the patient, despite having no difficulty in seeing and receiving sensory stimuli in vision, shows impairments in visuo-perception tasks. One of the tests that has been introduced in neuroscience studies for assessing visual neglect and identification of vision perception is "bells test".

Materials and Methods: This study was conducted in 25 patients with schizophrenia. The patients (n = 25) were selected randomly in psychiatric hospital and were matched with normal participants (n = 25) in age and education levels. Then two groups were individually assessed using bells test.

Results: Findings show that time performance ($F_{1,49} = 23.98$, $p < 0.0001$) and frequency of circled bells ($F_{1,49} = 9.75$, $p < 0.003$) are statistically different in two groups.

Conclusion: According to this study, it is suggested that bells test may be considered as a proper task to evaluate the spatial impairments and visual neglect in schizophrenic patients.

Keywords: *Bells Test; Schizophrenia; Visual Neglect; Visual Scan*

Introduction

The sense is the gateway to understanding the world. Although all senses are involved in providing the information and play an important role in human life, the role of vision is unique due to the ease, speed, and capabilities that make human to connect with the environment and discover the world. In some psychiatric patients, visual perception and brain functions may be damaged in such a way that the patient is neglected. In fact, he/she does not perceive a part of the visual stimuli while he/she sees them and the stimuli passes through the sensory system.

Visual neglect is one of the cognitive impairments that are reported in schizophrenic patients in comparison with healthy control group [1] and spatial bias due to sad mood to the right side in depression [2].

Various tests have been designed to assess visual neglect. Drawing an object is one of the clinical tests in this field. The patient is asked to draw a shape like a cube or a simple flower pot. The patient may be unable to draw the shape, or may draw it unfinished. Also, these patients may not draw the half of the circle in the clock drawing test (CDT), or they may show all the numbers of the clock just in half of the circle that they are given (Figure 1).

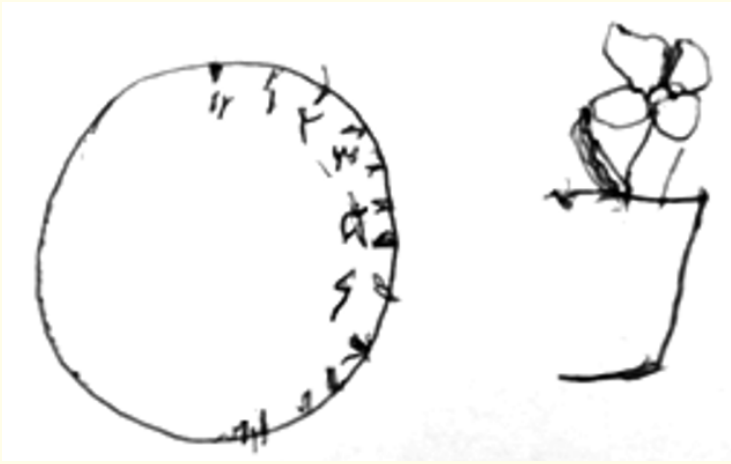

Figure 1: *Visual neglect in the clock drawing test (CDT) and drawing a simple flower pot.*

One of the appropriate tests for evaluation the visual neglect as well as the assessment of visual scan in neuropsychological patients is bells test. The bells test is aimed to assess the visual selective, focused attention, visual perception and visual motor processing speed [3]. It contains a number of different visual stimuli that are distributed on one page. The distribution of the stimuli is in seven columns and each of the columns contains a number of fixed targets. By looking at the page, the participant assumes that the distribution is random. The paper and pencil bells test is provided on a 28 * 21.5 cm sheet (A4) containing various types of stimuli (houses, horses, etc.) as shown in figure 2. A total of 35 bells or triggers are distributed in the seven columns (Figure 3). Each column has the same target number (N = 5) as well as several different stimuli (N = 40). All the triggers are black. As it can be seen in figure 2 and figure 3, Of the 7 columns, 3 columns are to the left, one column is in the middle and 3 columns are to the right. So, if the patient does not specify the stimuli by drawing the circle in the first column to the left, it can be assumed that his/her vision neglect is on the right hemisphere.

Figure 2: *The bells test.*

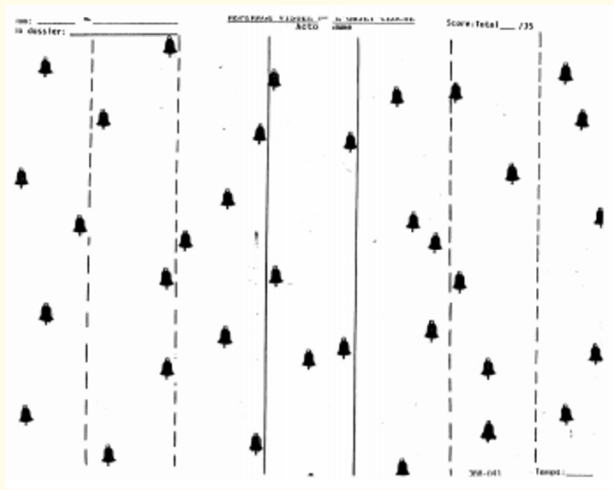

Figure 3: *The score sheet of bells test.*

Because of sensitive to detect the mild to moderate visual neglect [4], it seems that the bells test is a proper test to evaluate the visual scan and visual neglect in schizophrenic patients. According to Gauthier., *et al.* [4] Six or more omissions out of 35 possible targets indicated abnormal behavior. In the other studies Azouvi., *et al*. [5,6] show that more than 2 omissions on the left versus right on the page, and starting search from right-sided columns (5^{th} column or beyond; left most column = 1 and right most column = 7) indicate presence of left egocentric neglect. The recent studies are focused on using the bells test for case studies. In this study two groups of participants were assessed and the scores of them were compared.

Aim of the Study

The aim of this study was to compare the visual neglect of schizophrenic patients with healthy subjects in bells test.

Materials and Methods

Participants

The participants of this study were randomly selected among male schizophrenic patients (n = 25, mean age = 30.2 ± 2.1) from Modares psychiatry hospital, Isfahan, Iran. The range of age of patients was between 25 to 40 years old and their education was 8 years. The sample of this study was selected from patients who

1. Had enough attention to understand the instruction of bells test and
2. Did not suffer from visual or motor disabilities.

The normal healthy subjects were selected among the patient's families who were in the same age and education level. All of the control group members were male and were selected by convenience sampling method.

Material

The instruction of test was given to the participant individually. The method of evaluation was according to the quantitative standard instruction suggested by Gauthier., *et al* [4]. The participant was asked to locate the bells and cross them out in the shortest possible time. Using a chronometer, the time was spent for searching the bells and finishing the task was assessed.

Statistical techniques

After gathering data, the time to finish the task (time performance) and the frequency of circled bells were analyzed by SPSS 16. To comparison between variables in two groups, one way analysis of variance (ANOVA) was used.

Results

In table 1, descriptive Statistics of time performance and frequency of circled bells in two groups are shown.

		N	Min	Max	Mean	SD
Time performance (min)	Control	25	2.23	6.36	2.72	1.137
	Schizophrenia	25	2.13	9.25	4.72	1.696
Frequency of circled bells	Control	25	25	35	32.20	2.102
	Schizophrenia	25	9	33	27.08	7.921

Table 1: *Descriptive Statistics of time performance and frequency of circled bells in two groups.*

According to table 1, mean of time performance in Schizophrenic patients is 4.72 ± 1.69 min and in healthy participants is 2.72 ± 1.13. Also in frequency of circled bells, mean of performance in normal participants is 32.20 ± 2.10 and it is 27.08 ± 7.92 in schizophrenic participants.

To compare the time performance (min) and frequency of circled bells in schizophrenic patients and normal participants, ANOVA was calculated and according table 2, the differences between time performance (min) ($F_{1,49} = 23.98$, $p < 0.0001$) and frequency of circled bells ($F_{1,49} = 9.75$, $p < 0.003$) are statistically significant.

		Sum of Squares	df	Mean Square	F	Sig.
Time performance (min)	Between Groups	50.000	1	50.000	23.981	.0001
	Within Groups	100.080	48	2.085		
	Total	150.080	49			
frequency of circled bells	Between Groups	327.680	1	327.680	9.758	.003
	Within Groups	1611.840	48	33.580		
	Total	1939.520	49			

Table 2: *ANOVA to comparison the variables between two groups.*

Discussion

The results obtained from this study approved the differences between schizophrenic patients and matched healthy group in time performance and frequency of correct answers in bells test. There is agreement between this findings and Paiva., *et al.* [3] that showed bells test is a relatively easy task for normal and neurologically healthy subjects. They mentioned that effective strategies can help subjects to save time and do the task in a shorter time significantly.

In the present study, the function of normal subject is in the normal range that is reported in previous study by Gauthier., *et al* [4]. They reported that six or more omissions out of 35 possible targets indicated abnormal behavior and the normal participants in this study showed the mean of circled bells 32.20 ± 2.10 that mean about 3 omissions in average. On the other hand the mean of circled bells in schizophrenic patients was 27.08 ± 7.92 which can be considered as a neurologically impairment by omissions about 8 non-circled bells in average. The patients were chronic schizophrenic individuals but the young participants were selected for this study in comparison with 40 - 59 and 60 - 75 years old subject that Pavia., *et al.* [3] reported in their study. In sum it can be stated that the age is not effective on the present results and the most important factor in the schizophrenic patients' performance is their cognitive impairments. It seems that negative symptoms like Slow in thought flow and psychomotor disabilities lead to more time performance in schizophrenic patients. Also brain damaged and abnormalities in brain structure in schizophrenia may change attention process [7], attention deficits in filtering out irrelevant visual information [8] and the process of visual scan [9-11] that probably lead to neglect and less frequency of circled bells in patients.

One of the limitations in this study was the education level in patients that effect on patients' function in the bells test. The results of this study cannot be generalized to schizophrenic patients who have the lower education level than 8 years.

It is suggested that in future research, mental function of female schizophrenic patients and patients with other levels of education in the bells test and other tasks which are related to neglect (like line bisection task, Stroop, Apples test etc.) evaluate.

Conclusion

In conclusion it can be reported that neuropsychiatric dysfunctions in schizophrenia change the process of visual scan, attention and the normal filtering process that are effective factors in patients' performance in the bells test. The present study is an attempt to introduce and use the bells test as an appropriate tool to evaluate the visual neglects in schizophrenic patients' functions.

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Conflict of Interest

The author declares no conflict of interest.

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