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Short Communication **Open Access**

Processing Speed and Functional Outcome in Patients with Major Depressive Disorder

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Abstract

In this naturalistic cross-sectional study, the author tested the hypothesis that cognitive function, namely processing speed, would predict functional outcome in major depressive disorder. The subjects consisted of 37 clinic adult out-patients. The author found that, in the patients with current episode of major depressive disorder, functional outcome was significantly correlated with both Symbol Coding Task scores and depressive scores. Meanwhile, in remitted patients, functional outcome was significantly correlated with Symbol Coding Task scores, but not with depressive scores.The findings in this study suggested that enhancement of processing speed function may be useful to achieve normalization of functioning as an important component of remission in addition to symptomatic remission.

Keywords: Cross-sectional study; Functional outcome; Major depressive disorder; Processing speed.

Introduction

Major depressive disorder (MDD) is a significant health problem with economic implications, and estimates of the economic burden of depression range from $52 billion in 1990 to $83 billion in 2000 [1]. Among several factors, employment is considered to have a great impact on the societal costs of depression, due to lost income, lost productivity, and disability income payments.

Patients with MDD have been reported to perform less well in various neurocognitive tests than normal controls; even their depression is successfully treated with modern antidepressants [2-5].In addition, Gualtieri and Morgan [6] reported that substantial numbers of patients with depression are cognitively impaired. In a previous report [7], the author demonstrated that a depression-associated deficit in verbal working memory existed even after remission. Moreover, the author also demonstrated the relations between depression-associated deficit in verbal working memory and functional outcome after remission [8].However, still little emphasis has been placed on relation between neurocognitive function and psychosocial or functional outcome in studies of depression to date. The purpose of this study was to test the hypothesis that another specific type of cognitive impairment, namely speed function, in patients with MDD would predict functional outcome.

Methods

The subjects for this naturalistic cross-sectional study consisted of 37 clinic adult out-patients (aged 21-65 years): 26 patients who met DSM-IV [9] criteria for current episode of unipolar MDD (nonpsychotic) and 11 patients who were in remission (full/partial). Patients had no comorbid psychiatric disorders and no medical, neurological or developmental conditions that might affect cognition (e.g., ADHD, brain injury, MCI, chronic pain). The investigation was carried out in accordance with the Declaration of Helsinki and the informed consent was obtained from all subjects. Fifteen (41%) were women; the patients had a mean age of 41.7 (SD=13.0), and a mean age at onset of 38.1 (14.4) years. Twenty-second out of 26 (85%) patients with current episode of MDD were on the following antidepressants: duloxetine, 5; escitaropram, 4; fluvoxamine, 2; milnacipran, 1; mirtazapine, 7; paroxetine, 3; sertraline,3; sulpiride, 2.Three patients were receiving two antidepressants, and one was receiving three antidepressants. Fifteen (58%) of 26 were on benzodiazepines. Seven out of 11 (64%) remitted patients were on the following antidepressants: duloxetine, 3; milnacipran, 1; mirtazapine, 3; paroxetine, 1; trazodone, 1. One patient was receiving two antidepressants, and five (45%) of them were on benzodiazepines.

The assessments were performed using the Zung Self-Rating Depression Scale (SDS, range: 20–80) [10] for severity of depression and remission: remission of depression defined as a SDS of 40 or less, and Brief Assessment of Cognition in Schizophrenia (BACS) [11] Symbol Coding Task (as quickly as possible, patients write numerals 1–9 as matches to symbols on a response sheet for 90s, range: 0–110) for processing speed. The BACS Symbol Coding Task has been validated in normal controls [11]. Symbol Coding Task scores for each depression group was normalized against their respective age-matched control group (data available upon request). Functional outcome (productivity) was defined as follows: 0=non-impaired, 1=mildly impaired, 2=moderately impaired, 3=severely impaired). Demographic data are presented in Table 1.

Table 1: Demographic data

	N (F/M)	Age (yrs)	Education (yrs)	Age at onset (yrs)	Duration of the episode (mo)	Dose of antidepressants (mg/d)[a]	Dose of benzodiazepines (mg/d)[b]	SDS (Total)	Functional outcome (productivity)	BACS Symbol Coding Task score (z-score†)
Total Patients	37 (15/22)	41.7 (13.0)	13.8 (2.8)	38.1 (14.4)	19.9 (14.9)	28.3 (24.7)	5.8 (8.8)	44.3 (11.8)	2.4 (1.2)	-1.52 (1.24)
Patients in acute depression	26 (11/15)	41.2 (13.5)	13.5 (2.7)	38.9 (14.9)	18.6 (13.8)	31.8 (25.7)	6.5 (9.3)	48.5 (11.7)****	2.7 (1.1)*	-1.60 (1.30)
Patients in remission	11 (4/7)	43.0 (12.1)	14.4 (3.0)	36.2 (13.8)	22.9 (17.6)	21.4 (21.7)	4.2 (7.5)	34.5 (3.6)	1.6 (1.2)	-1.32 (1.25)

Data are given as mean (SD).
BACS, Brief Assessment of Cognition in Schizophrenia; SDS, Zung Self-Rating Depression Scale.
†z-scores were calculated using the age-matched control group means and standard deviations
[a]Paroxetine equivalent
[b]Diazepam equivalent
*p < .05 and ****p < .0001, vs. patients in remission by t-test

JMI (Version 10.0.2) for Macintosh was used to perform the analysis. For numerical variables, the t-tests procedures for independent group comparison were used to compare the differences in variables between two groups, and the differences between three groups were compared by the analysis of variance (ANOVA), followed by post hoc comparisons. Pearson's correlation was used to examine the relationships between two numerical variables. A logistic regression model with forward selection criteria was used to predict the functional outcome using the demographic variables, depressive and processing speed scores.

Results

First, Symbol Coding Task scores were not significantly different between the two groups of patients with current episode of MDD and in remission. However, the mean score of Symbol Coding Task was less than -.1 (>1 SD below the normative mean) for both groups.

Second, examination of the relationships between functional outcome and Symbol Coding Task and depressive scores in the two groups, patients with current episode of MDD and in remission, the results were different between the two: In the patients with current episode of MDD, functional outcome was significantly correlated with both depressive scores ($r=.61$, $df=25$, $p<.001$) and Symbol Coding Task scores ($r=-.41$, $df=25$, $p<.05$). Meanwhile, in remitted patients, functional outcome was significantly correlated with Symbol Coding Task scores ($r=-.73$, $df=10$, $p<.05$), but not with depressive scores ($r=.41$, $df=10$, $p>.05$).

Third, examination of the relationships between Symbol Coding Task and depressive scores in the patients revealed that Symbol Coding Task scores were significantly correlated with depressive scores ($r=-.44$, $df=36$, $p<.01$). In addition, Symbol Coding Task scores were not significantly correlated with either doses of antidepressants ($r=-.16$, $df=36$, $p>.05$) or benzodiazepines ($r=-.28$, $df=36$, $p>.05$).

Discussion

A recent systematic review [12] concluded neurocognitive deficits are significant and clinically important factors related to the quality of life and level of social and occupational functioning of individuals with MDD, but the literature is limited. The findings in this study suggested relations between MDD-associated deficit in processing speed and functional outcome after remission. The author have already demonstrated the relations between MDD-associated deficit in verbal working memory and functional outcome after remission [8], and, therefore, the results in the present study could emphasize the importance of cognitive functions for functional outcome after remission in patients with MDD. Nonetheless, it has to be mentioned again that the findings in this study do not underscore the importance of clinical remission from depression, which is defined objective outcome indicated by a quantifiable score with a depressive symptom measurement tool, and, symptomatic full remission should be always achieved as the primary goal of treatment, since it is the optimal outcome in depression [13]. Meanwhile, the findings in this sturdy suggested that enhancement of processing speed function by e.g., cognitive rehabilitation may be useful to achieve normalization of functioning as an important component of remission [14] when symptomatic full remission is failed to achieve.

Another important finding in the present study is that the mean score of Symbol Coding Task was less than -.1(>1 SD below the normative mean) in the patients with current episode of MDD, and even in the remitted patients. The finding suggested an MDD-associated deficit in processing speed indeed existed in acute depression, and even after remission, and thus processing speed impairment seems to be at least to a degree trait-related, just like executive function [4]. Meanwhile, correlations between Symbol Coding Task and depressive scores in the patients seem to support the *state effects* hypothesis described by Sarapas et al. [15]. All together, processing speed impairment observed in this study in remitted patients might be due to the influence of antidepressants [16]/ benzodiazepines [17], although significantly correlations were not present between Symbol Coding Task scores and antidepressants or benzodiazepines. Therefore, a further longitudinal study using remitted patients without medication might be necessary to explain the reasons of processing speed impairment in remitted patients observed in this study.

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