

Effects of mental distress on cognitive functioning in patients admitted for cardiac rehabilitation after acute coronary events



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Introduction

Impaired cognition increases mortality in CAD patients, even in cases of mild impairment [1]. Thus, it is important to investigate and determine factors associated with cognitive functioning in this particular population. Our recent findings indicate that patient-oriented outcomes including health related quality of life [2] and fatigue [3] are associated with mental distress factors such as depression and anxiety. The question of how mental distress might be specifically associated with cognitive functioning received less of attention.

The aim of our study was to evaluate an association of cognitive functioning with mental distress in CAD patients.

Methods

This study was conducted over a 3-year period examining CAD patients two weeks after acute myocardial infarction or unstable angina attending cardiac rehabilitation program. 539 patients participated in the study; 386 (72%) men and 153 (28%) women with a mean age of 58 years (SD = 9). Participants were evaluated for heart functional class, following the guidelines provided by the New York Heart Association. Mini Mental State Examination (MMSE) was used to assess global cognitive functioning. Digit Span Test and Digit Symbol Test were used to assess auditory attention, mental flexibility, psychomotor performance and incidental learning. Trail Making Test A and B was used to measure perceptual speed, task switching and executive control. Mental distress factors were evaluated using the Beck Depression Inventory-II (BDI-II) to measure depressive symptoms, the Spielberger State-Trait Anxiety Inventory (STAI) to measure state anxiety (STAI-S) and trait anxiety (STAI-T), and Type-D Scale (DS-14) to measure Type-D personality characteristics.

Table 1: Baseline characteristics of study patients.

Education, n (%)	
Up to 8 y	54 (10.0)
High School	260(48.2)
College/university degree	225(41.7)
NYHA class, n (%)	
I	40(7.4)
II	391(72.5)
III	108(20.0)
Beck Depression Inventory-II, n (%)	
Depression≥11	244(45.3)
Spielberger State Anxiety Inventory, n(%)	
Severe State anxiety≥45	167(31.0)
Spielberger Trait Anxiety Inventory, n(%)	
Severe Trait anxiety≥45	32(5.9)
Digit Span Test, mean± SD	
Forward recall of digits	6±2
Backward recall of digits	5±2
Digit Symbol Test, mean± SD	
Raw score	33±10
Pairs recalled correctly	14±8
Digit Symbol Test time (sec)	195±70
Trail Making Test, mean± SD	
Test A Time (sec)	45±21
Test B Time (sec)	120±59
B-A Test Time (sec)	78±51
Mini Mental State Exam, mean± SD	
Mild cognitive impairment, n(%)	46(8.5)

Results

In univariate regression analysis almost all mental distress, socio-demographic and clinical characteristics were significantly associated with different cognitive functions. After adjusting for gender, age, education, New York Heart Association functional class, MMSE scores remained associated with DS-14 ($\beta=-.144$, $p<.01$); Digit Span Test Backward recall of digits, with STAI-S ($\beta=-.120$, $p<.01$). Digit symbol test raw scores were associated with BDI-II ($\beta=-.115$, $p<.01$), as well as with STAI-S ($\beta=-.084$, $p=.03$). Similarly, time which individuals took to complete the Digit Symbol Test was associated with BDI-II ($\beta=.145$, $p<.01$), and STAI-S ($\beta=.110$, $p<.01$). Significant associations remained between Trail Making Test A scores and STAI-S scores ($\beta=.113$, $p<.01$) as well as between Trail Making Test B scores and STAI-S scores ($\beta=.103$, $p=.04$), while Trail Making Test B-A scores remained associated with STAI-T scores ($\beta=-.119$, $p<.03$).

Table 2. Associations of cognitive test scores with mental distress factors in study patients

		BDI-II	STAI-S	STAI-T	DS-14
MMSE	Unadjusted	-.141(.001)	-.095(.029)	.098(.024)	-.174(.000)
	Adjusted*				-.144(.001)
Forward recall of digits	Unadjusted	-.117(.007)	-.096(.026)	.089(.040)	
	Adjusted*				
Backward recall of digits	Unadjusted	-.117(.007)	-.122(.005)		
	Adjusted*		-.120(.004)		
Raw score	Unadjusted	-.197(.000)	-.108(.013)		-.092(.032)
	Adjusted*	-.115(.005)	-.084(.027)		
Pairs recalled correctly	Unadjusted				
	Adjusted*				
Time (sec)	Unadjusted	.237(.000)	.144(.001)		.103(.017)
	Adjusted*	.145(.000)	.110(.003)		
Test A Time (sec)	Unadjusted	.210(.000)	.165(.000)		.123(.004)
	Adjusted*		.113(.004)		
Test B Time (sec)	Unadjusted	.172(.001)	.136(.010)	-.143(.007)	.110(.036)
	Adjusted*		.103(.041)		
B-A Test Time (sec)	Unadjusted	.131(.013)	.112(.034)	-.143(.007)	
	Adjusted*			-.119(.028)	

* - adjusted for gender, age, education, NYHA class. Values are presented as β (p value).

Conclusions

In non-demented CAD patients two weeks after acute cardiac events cognitive functioning is associated with mental distress independently from cardiac functional class, gender, age and education. Specifically, Type-D personality is associated with worse global cognitive functioning. The presence of symptoms of depression and higher levels of situational anxiety negatively affects test completion time and psychomotor performance. Higher levels of situational anxiety also results in decrease of perceptual speed, mental flexibility and task switching while higher levels of trait anxiety improves executive control.

References

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