

Psychometric properties of instruments to assess cognitive function in Brazilian and Danish patients with metastatic cancer

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Background and aims

Cognitive dysfunction is subjective and sparsely assessed in patients with cancer. This study aimed at analyzing the performance of Brazilian and Danish patients with metastatic cancer on four neuropsychological tests in order to investigate risk factors and the cut-off points of tests for cognitive dysfunction.

Methods

- Sample: 258 adult patients and 204 healthy controls (BR: 178 patients/128 controls; DK: 80 patients/76 controls) with schooling ≥ 6 years.
- Period: Jul 2010 - Nov 2015.
- Neuropsychological assessment: Continuous Reaction Time (CRT), Finger Tapping Test (FTT), Digit Span Test (DST), and Trail Making Test-part B (TMTB)
- Other variables: age, schooling, Karnofsky Performance Scale (KPS), pain, sleep, anxiety, depression, income, rest, and Mini Mental State Examination (MMSE).
- Analysis: criterion validity and predictive value (sensitivity and specificity). Correlation coefficients (Spearman, Kendall and point-biserial), multiple regression models and ROC AUC.

Results

- Criterion validity: significant weak correlations between patients' cognitive performance and age, schooling, KPS, pain, anxiety, depression, income, and MMSE (Table 2).
- Comparisons between groups: significant differences on cognitive performance between countries associated with income, depression, anxiety and age (Figure 1).
- Predictive value: tests were at most poor to differentiate patients and controls (ROC curves ≤ 0.69) and at most fair to predict MMSE score ≤ 26 (ROC AUC ≤ 0.74).

Conclusions

Cognitive performance of patients with metastatic cancer was related to sociodemographic and clinical variables, despite weak correlations. Income, age, depression and anxiety had different effects when comparing the nationalities. Further studies are necessary to confirm and understand these remarkable differences and to determine the tests cut-offs to these populations.

Table 1. Sample characteristics.

Variables	Patient		Control			
	N	%	N	%		
Total	258	55.8	204	44.2		
Sex						
Female	151	58.5	145	71.1		
Marital status						
cohabitation	164	64.1	137	67.8		
alone	92	35.9	65	32.2		
Income €						
< 26.700	192	76.8	120	60.0		
26.700 -66.700	41	16.4	50	25.0		
> 66.700	17	6.8	30	15.0		
Rested						
No	80	31.3	74	36.5		
Yes	176	68.8	129	63.5		
Variables	N	Mean	SD	N	Mean	SD
Age	258	53.80	11.23	204	48.66	15.21
Schooling	254	11.26	3.42	197	12.28	3.29
KPS	257	82.80	12.34			
Pain	257	1.52	2.37	128	0.70	1.61
Hours of sleep	257	6.53	1.83	204	6.11	1.73
Anxiety	257	6.72	4.14	184	6.70	4.08
Depression	257	5.47	3.83	184	4.54	3.64
MMSE	257	27.64	2.01	204	28.68	1.06

Figure 1: Comparisons between groups (Brazilian patient+control vs. Danish patient+control).

Brazilian group

- Income of at least 66.700 euros was associated with better performance on the CRT ($P \leq 0.018$), score reduction between 46.229 and 74.537 ms.
- Worse depression was slightly associated with worse performance on the DST backward ($P = 0.029$), each 1 point added on depression score reduced 0.146 points on the DST backward.

Danish group

- Worse anxiety was associated with worse performance on the DST backward ($P = 0.007$), each 1 point added on anxiety score reduced 0.146 points on the DST backward.
- Higher age was associated with worse performance of TMTB in terms of mistakes ($P = 0.021$), each 1 year added on age increased 2.026 mistakes on TMTB.

Table 2. Significant correlations (Brazilian +Danish patients)

Tests	Age		Schooling		Income		KPS		Pain		Anxiety		Depression		MMSE	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
CRT 10%	-0.203	0.001	-0.180	0.004	-0.178	0.001	0.134	0.033					0.181	0.004	-0.178	0.005
CRT 50%	-0.194	0.002	-0.198	0.002	-0.185	< 0.001							0.216	0.001	-0.208	0.001
CRT 90%	-0.145	0.022	-0.184	0.004	-0.178	0.001					0.133	0.036	0.210	0.001	-0.206	0.001
FTT dominant															0.185	0.003
FTT non-dom											-0.139	0.026			0.162	0.010
FTT difference					0.123	0.016			0.167	0.007					0.135	0.031
DST forward			0.250	< 0.001									-0.208	0.001	0.157	0.012
DST backward			0.288	< 0.001	0.149	0.006							-0.166	0.008	0.355	< 0.001
TMTB	0.187	0.003	-0.411	< 0.001	-0.156	0.003					0.149	0.018	0.161	0.011	-0.389	< 0.001
TMTB mistakes															-0.140	0.027