The Digital Clock Drawing Test (dCDT) - II: Face Size and Pen Speed in Dementia and Mild Cognitive Impairment

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OBJECTIVE

The current research used the Digital Clock Drawing Test (dCDT) to assess command and copy clock (1) face size based on horizontal and vertical diameters and (2) pen speed in millimeters drawn per second (mm/ sec) among healthy controls (HC), Alzheimer's disease (AD), subcortical Vascular Dementia (VaD), amnesic (aMCI) and vascular mild cognitive impairment (vMCI). Based on prior research patients with vascular disease were expected to produce smaller clock face circles (micrographia) drawn more slowly (bradyphrenia).

PARTICIPANTS

Participants

Included dementia patients with AD (n= 55), VaD (n= 37), amnesic MCI (aMCI=70), vascular MCI (vMCI= 27), and a health control group (HC= 58). **MMSE:** VaD=AD, but lower than all other groups (p< .01). **Age:** HC younger than other all groups (p< .01); **Education**: AD less educated than HCs (p< .001); **Clock** Stimulus: copy model diameter equaled 52mm.

METHODS

Using procedures suggested by Edith Kaplan, Ph.D., all participants were asked to "draw the face of a clock, put in all the numbers and set the hands for 10 after 11". Upon the conclusion of the command test condition all participants were shown a model of the clock and asked to "copy what you see".

RESULTS

Smaller Copy versus Command Clock Faces

were produced by AD , aMCI, and HC participants

AD= command M=60mm vs. copy M=50mm (p< .001)

aMCI = command M=72mm vs. copy M=58mm (p< .001)

HC = command M=72mm vs. copy M=57mm (p< .001)

Equal Copy versus Command Clock Faces

found for VaD and vMCI participants

VaD= command M=51mm vs. copy M=45mm

vMCI= command M=65mm vs. copy M=54mm

Clock Face Drawing Time

command clock face slower: vMCI vs. AD & HC (p< .032).

copy clock face circle slower: VaD vs. aMCI (p< .042).

Pen Speed/ Clock Face Quadrant :(mm/ sec)

command/ quadrant 1: VaD mm/ sec slower vs. aMCI, vMCI, and HC (p< .016).

command/ quadrants 2,3,4: VaD mm/ sec slower vs. all groups (p< .034).

copy/ all quadrants: VaD mm/ sec slower vs. aMCI all quadrants (p< .011) and slower vs. HC in quarters 1, 3, & 4 (p< .046).

Table 1

Clock Face Horizontal Diameter (mean & standard deviations; mm)			
	command	copy	significance
AD	60.93 (21.65)	51.84 (12.56)	p<. 032
VaD	51.93 (22.23)	46.60 (12.59)	ns
aMCI	71.89 (20.27)	59.18 (14.93)	p< .01
vMCI	65.93 (22.36)	54.02 (15.20)	ns
HC	73.82 (21.27)	59.25 (13.07)	p< .01

Table 2

Total Clock Face Drawing Time (mean & standard deviation; sec)s					
command	AD	VaD	aMCI	vMCI	HC
	3.31 (1.67)	4.07 (1.90)	3.49 (2.51)	4.88 (3.61)	3.02 (1.48)
copy	AD	VaD	aMCI	vMCI	HC
	3.14 (2.08)	3.66 (1.81)	2.58 (1.18)	3.61 (2.78)	3.13 (1.91)

CONCLUSIONS

Mental Set

Vascular patients fail to alter behavior in relation to changing test parameters in clock face drawing suggesting impairment in mental set.

Slowness/ Bradyphrenia

Vascular patients were generally slower overall and in terms of MM/ sec compared to other groups.

These data could provide biomarkers for the clinical expression of vascular and help differentiate patients with clinical important co-morbid vascular disease from other patient groups

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