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OBJECTIVE

The Digital Clock Drawing Test (dCDT) provides an opportunity to assess graphomotor behavior with precision heretofore unobtainable. A precise way to assess drawing speed is to measure the clock drawing time restricted to when patients are actually drawing or putting ink on the page (i.e., ink time). This measure excludes pauses in clock drawing production and may provide a novel measure of bradyphrenia. Ink time or speed for ink on the page in clock drawings to command and copy was assessed for healthy controls (HC), Alzheimer's disease (AD), subcortical Vascular Dementia (VaD), amnesic (aMCI)/ vascular mild cognitive impairment (vMCI) participants. Longer duration of ink time was expected to differentiate patients with vascular disease from other groups.

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).

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

Command Test Condition

Command total ink time was longer in VaD compared to all other groups (p< .002) except for patients with vMCI. Command ink time was also longer for vMCI compared to the HC group (p< .001).

Copy Test Condition

A similar profile was obtained in the copy test condition such that total copy ink time was longer for VaD patients compared to all groups (p< .003) except vMCI patients, Copy ink time was longer for vMCI patients compared to the HC group (p< .050).

Table 1

Patient Demographic Data			
	age	education	mmse
AD	79.10 (5.12)	13.44 (2.75)	22.67 (3.19)
VaD	81.22 (5.02)	12.30 (3.23)	22.41 (2.20)
aMCI	75.27 (8.03)	14.72 (2.42)	27.38 (2.98)
vMCI	78.78 (5.74)	13.59 (2.54)	25.39 (2.98)
HC	56.37 (12.84)	15.65 (3.19)	29.19 (0.94)

Table 2

Total Ink Time on the Page sec)					
command	AD	VaD	aMCI	vMCI	HC
	18.16 (9.11)	25.83 (13.73)	16.45 (8.35)	22.34 (13.26)	13.29 (4.79)
copy	AD	VaD	aMCI	vMCI	HC
	16.56 (7.46)	22.28 (9.95)	13.62 (5.02)	17.89 (10.56)	13.14 (6.13)

CONCLUSIONS

This total ink time provides a precise measure of actual drawing production excluding latencies. Consistent with our hypothesis total ink time is longer in patients with vascular disease compared to other dementia and MCI groups. This measure may provide an biomarker to measure bradyphrenia and identify co-morbid vascular disease in dementia and MCI.