The relationship between clock drawing and cognition in Parkinson's

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Introduction:

The cognitive domains required to successfully draw a clock include executive function, attention and visuospatial function [1]. These domains are affected in those with Parkinson's disease (PD) who have cognitive impairment. Clock drawing (CD) has previously been shown to have a 71% sensitivity and 69% specificity for predicting a diagnosis of dementia in PD in a large cross-sectional study [2]. A recent meta-analysis of CD found all scoring systems are of equal predictive validity, suggesting a "simple is better" approach [1]. Our objective was to investigate CD in PD subjects with and without cognitive impairment.

Methods:

107 subjects completed the Montreal Cognitive Assessment (MoCA) and were classified into normal cognition (PD-NC; MoCA ≥26) and cognitive impairment (PD-CI; MoCA <26). CD was scored using MoCA criteria; a maximum of 3 points, one each for correct contour, clock face and clock hands 3 (*Figure 1*).
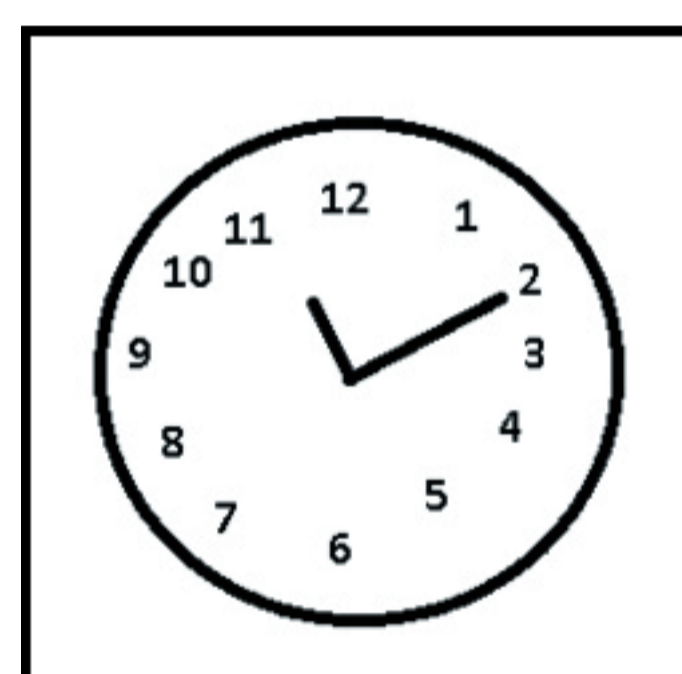

Figure 1: Participants are given the following instruction: "Draw a clock. Put in all the numbers and set the time to 10 past 11".

Results:

PD-CI (n = 57) and PD-NC were matched for all demographics except age (*Table 1*). 35% of PD-CI scored full marks for CD compared to 90% of PD-NC (sensitivity 0.64, specificity 0.9, age adjusted-odds ratio for predicting PD-CI 15.63, 95% CI 5.18 – 47.62, P < 0.001) (*Figure 2*).

	PD-NC (n = 50)	PD-CI (n = 57)	p
Age, years (SD, range)	67.1 (9.0, 44-84)	70.6 (7.5, 47-85)	**0.032**
Gender, M : F	34 : 16	35 : 22	0.546
Handedness, R: L	43 : 7	48 : 9	1.000
Disease duration, years	5.3 (3.8, 0.5 – 16)	6.7 (4.8, 0.5 – 20)	0.128
H&Y stage	2.1	2.2	0.280
LEDD, mg/day	682 (536, 0 – 2836)	669 (474, 0 – 2210)	0.896
MoCA score	27.3 (1.2, 26 – 30)	21.5 (3.5, 12 – 25)	**<0.001**

H&Y = Hoehn and Yahr stage,
LEDD = levodopa equivalent daily dose

Table 1: Demographic details

88% of PD-CI scored a point for contour compared to 100% of PD-NC (P 0.014). 60% of PD-CI scored a point for clock face compared to 100% of PD-NC (P <0.001). 42% of PD-CI and 90% of PD-NC correctly drew clock hands (P <0.001) (*Figure 3*).
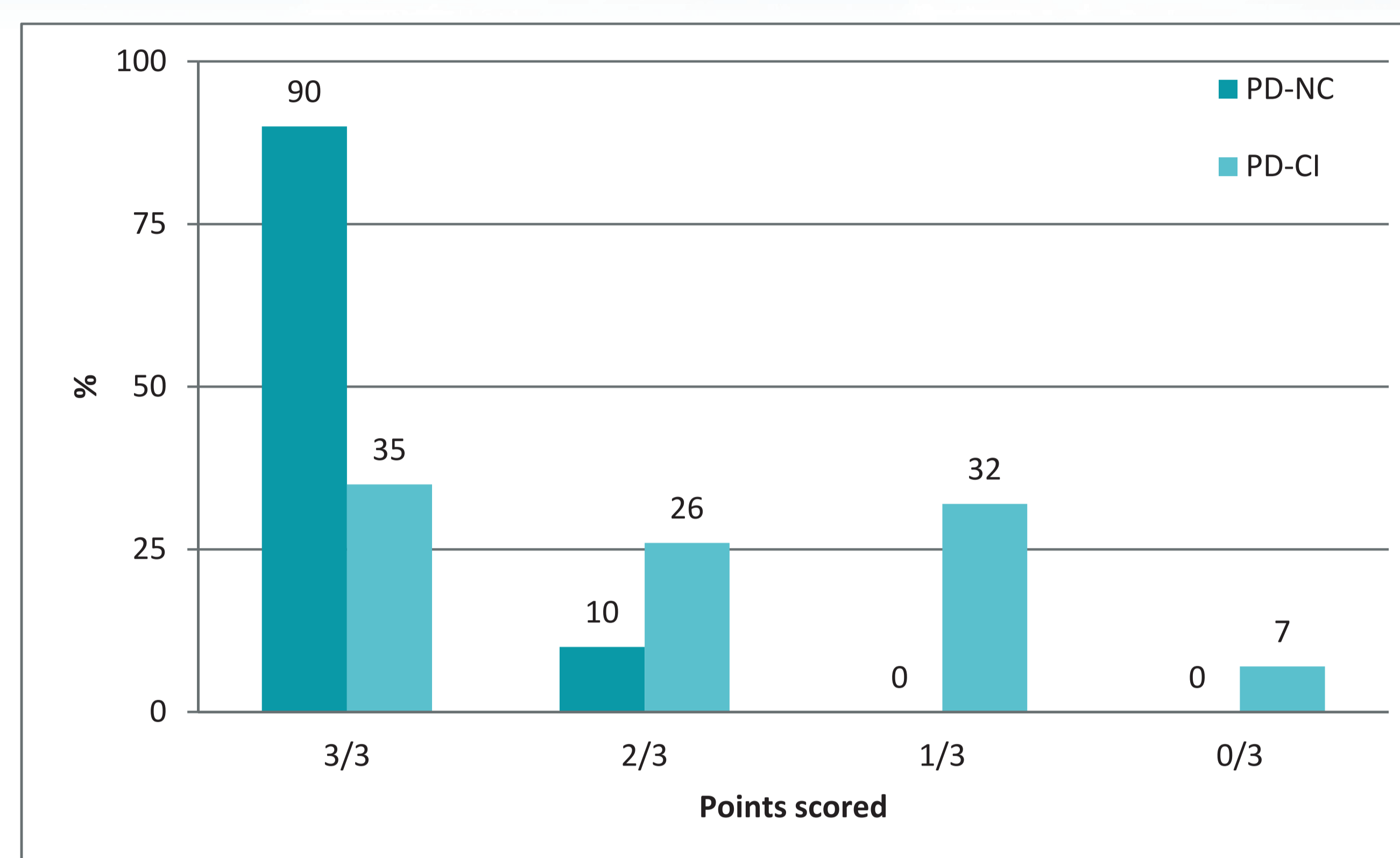

Figure 2: Total number of points scored for clock drawing by the two groups, shown as a percentage. All PD-NC scored at least 2 points.
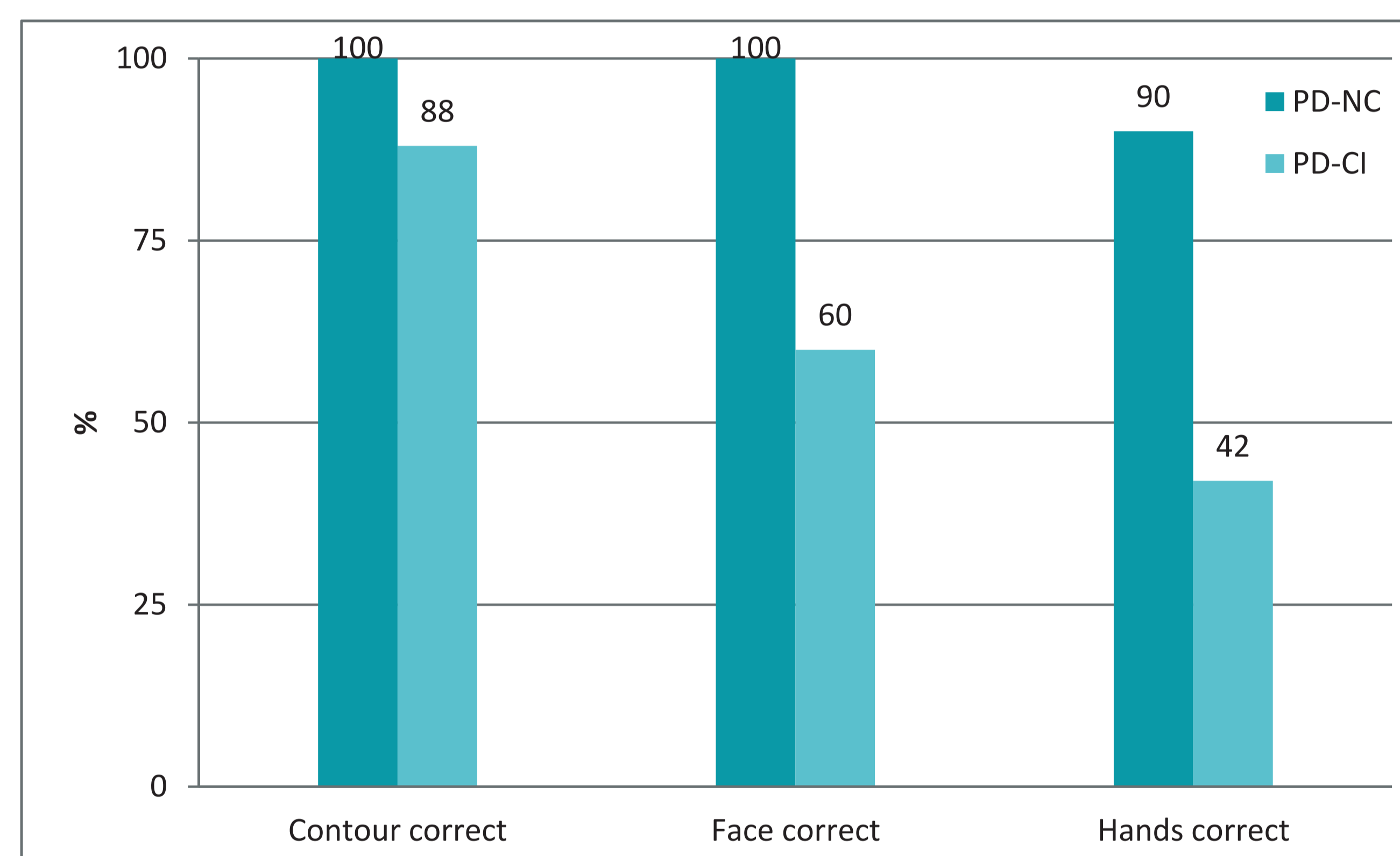

Figure 3: Percentage of participants correctly scoring a point for each components of the clock drawing test. All PD-NC scored points for contour and face in this cohort.

Conclusions:

- **Inability to score maximum points for CD was associated with PD-CI.**

- **Correctly drawing clock hands was the hardest component of CD for both groups.**

- **Incorrect contour or clock face was 100% specific to those with PD-CI in this cohort; if replicated on a larger scale this finding could be a useful screening test for cognitive impairment in those with PD.**

References:

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3. Nasreddine ZS, Phillips NA, Bedirian V, et al. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. J Am Geriatr Soc 2005;**53**(4):695-9.