Original Article

Performance of dialysis patients on the standard and basic Arabic versions of the Montreal Cognitive Assessments

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ABSTRACT

الأهداف: قياس مستوى الأدراك لدى مرضى الغسيل الكلوي السعوديين باستخدام النسخة العربية للتقييم المعرفي المتبع في مونتريال.

المنهجية: عملنا دراسة مقطعية في وحدة الغسيل الكلوي في المدينة الطبية بجامعة الملك سعود بمدينة الرياض في الفترة من ابريل 2019 الى مارس 2020.تم تقييم مستوى الادراك للمرضى البالغين من العمر أكثر من 18 سنة وليس لديهم تاريخ مرضي بالخرف باستخدام التقييم المعرفي المتبع في مونتريال المعياري والأساسي وتم إعادة التقييم على مجموعة فرعية من المرضى.

النتائج: تم استقطاب 83 مشترك، 56 مريض على الغسيل الدموي و27 مريض على الغسيل البريتوني. متوسط العمر 49.99 سنة، متوسط سنوات التعليم 10.29 (5.5). متوسط نتيجة التقييم المعرفي المتبع في مونتريال المعياري 21.03 (5.35)، ومتوسط نتيجة التقييم المعرفي المتبع في مونتريال الأساسي 23.45 (5.14). صغر السن، سنوات التعليم الطويلة والغسيل البريتوني كانت لها ارتباط بشكل كبير بالنتائج المرتفعة في التقييمين. معامل الارتباط 0.81 (95% مجال الثقة 0.65، 0.91) و0.77 (95% مجال الثقة 0.58، 0.89) للتقييم المعرفي المتبع في مونتريال المعياري والأساسي على التوالي. تقييم الوظائف التنفيذية والحسابية كانت اعلى في مجموعة الغسيل البريتوني في التقييم المعرفي المتبع في مونتريال الاساسي. متوسط نتيجة التذكر كانت أعلى في مجموعة الغسيل البريتوني في التقييم المعرفي المتبع في مونتريال المعياري.

الخلاصة: مرضى الغسيل الدموي أكثر عرضة لتأثر الوظائف الإدراكية مقارنة بمرضي الغسيل البريتوني. العمر وعدد سنوات التعليم متغيرات مهمة لها تأثير على الوظائف الإدراكية. نسختي التقييم المعرفي المتبع في مونتريال أداة قياس موثوقة.

Objectives: To assess cognitive performance in Saudi patients on dialysis using Arabic versions of the Montreal Cognitive Assessment (MoCA) and assess the reliability of the scales.

Methods: We performed a cross-sectional study at the dialysis unit of King Saud University Medical City, Riyadh from April 2019 to March 2020. Patients ≥ 18 years of age with no history of dementia underwent cognitive assessment with the standard (MoCA-A) and basic (MoCA-B) Arabic versions, with repeat testing in a subset of participants.

Results: Recruitment included 83 participants, 56 on hemodialysis (HD) and 27 on peritoneal dialysis (PD). The mean±SD for age was 49.99 (15.48), and for years of education was 10.29 (5.5). The mean score for MoCA-A was 21.03±5.35, and for MoCA-B was 23.45±5.14. Younger age, longer years of education and peritoneal dialysis were significantly associated with higher MoCA scores on both versions (p<0.05). The ICC was 0.81 (95% CI 0.65, 0.91) and 0.77 (95% CI 0.58, 0.89) for MoCA-A and MoCA-B, respectively. The performance on the executive and calculation tasks were higher in the PD group on the MoCA-B. The recall mean score was higher in the PD group on the MoCA-A.

Conclusion: The HD patients are at higher risk for cognitive impairment compared to PD patients. Age and education are important variables influencing performance. Both Arabic versions of the MoCA are reliable screening tools.

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Cognitive impairment and dementia are common public health problems that have a huge burden on the healthcare system.[1] Patients with end-stage renal disease (ESRD) requiring dialysis are at risk for cognitive impairment[2-4] which can manifest in the pre-dialysis period.[5] Studies have found the prevalence of various degrees of cognitive impairment to range from 37–80% of patients on hemodialysis,[3,4,6,7] with higher prevalence in the elderly.[3] Cognitive impairments have been found to involve multiple domains but described mainly as executive impairments.[8–11] Dialysis patients have a high burden of vascular disease, and cognitive impairment from cerebrovascular disease is common in patients undergoing either hemodialysis (HD) or peritoneal dialysis (PD).[12] The pathophysiology may be attributed to microinflammation, malnutrition, and uremic metabolites.[12–14]

Detecting cognitive impairments in dialysis patients is imperative. Lee et al[9] found that patients with varying degrees of severity of cognitive impairment are likely to go unnoticed and probably don't voice any concerns.[9] Dialysis patients with cognitive impairment have worse survival than those with intact cognition,[15] as well as a worse quality of life.[16] Cognitive impairment has also been found to be related to depression and difficulty following instructions.[4,15,17]

The Montreal Cognitive Assessment (MoCA)[18] is a well-established tool created to detect cognitive impairment. It is useful in elderly patients; however, its use is now expanding beyond that to different patient groups with different ages.[19–23] Although the Mini Mental State Exam (MMSE) is a time-efficient bedside test for cognitive function,[24] it may not detect cognitive impairments, when mild, in the general population or even in dialysis patients.[9] The MoCA[18] has been previously used to detect impairments in patients with ESRD and on dialysis, and appears to be more sensitive than the MMSE.[9] The MoCA is an easy, quick, and comprehensive tool that can be readily used, compared to other neuropsychological assessments.[18] In addition to the standard MoCA tool, a separate version was designed to detect impairments in those with significantly lower levels of education. This newer tool is known as the MoCA-Basic[25] and has not yet been widely used in dialysis patients.

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There is still insufficient literature evaluating the reliability of the Arabic MoCA versions in Saudi patients on dialysis, as well as in the Saudi population in general. There is still a relatively large number of older individuals with limited education,[26] making it relevant to investigate both versions of the MoCA in this population. Therefore, our main goal was to determine the reliability of both Arabic versions of the MoCA and assess the cognitive performance in dialysis patients with these two versions, which are designed to measure cognition in patients with different levels of education, in addition to determining the effects of demographic variables and comorbidities on the participants' performance.

Methods.

Participants. We recruited participants from the outpatient dialysis unit at King Saud University Medical City, Riyadh, Saudi Arabia from April 2019 to March 2020. The study was cross-sectional in design, and all 147 patients treated at the dialysis unit represented a convenience sample from which to recruit. Any patient on maintenance dialysis with PD or HD between the ages of 18 and 85 attending the unit on a regular basis was eligible for inclusion. We asked each patient who arrived for a dialysis session at the unit to participate. We excluded those with a history of previous central neurological disease or injury, such as ischemic stroke, inflammatory disease of any etiology (demyelination, infectious, or other autoimmune disorders), malignancy, previous parenchymal brain surgery, uncontrolled psychiatric disorders, or receiving certain drugs that could affect the central nervous system (sedatives, anti-cholinergic, opiates). Any patient with a known diagnosis of dementia was also excluded, as were those with significant motor or perceptual impairments that would interfere with the cognitive assessment (blindness, deafness, paralysis of the upper limbs) or might have led to the assignment of one dialysis type over the other. We also collected demographic variables related to gender, age, and years of education. Other collected variables were included in a binary format (present or absent) for associated diseases, including diabetes, hypertension, ischemic heart disease (IHD), dialysis type (HD vs PD), and the duration of dialysis in months "dialysis vintage." We obtained information from the patient, caregiver, and medical records.

Procedure. We performed cognitive assessments using the Arabic version of the standard MoCA (MoCA-A) and the Arabic basic version (MoCA-B).[18,25] These tests are available in Arabic from the MoCA website, and permission to use the tests in research, with minor modification[27] to follow the local Arabic accent,

Table 1 - Baseline characteristics and scores; M±SD; row percentages are provided for the variables: dialysis vintage, diabetes, ischemic heart disease, and hypertension.

Characteristics	Hemodialysis n=56	Peritoneal dialysis n=27	
	n (%), M±SD		
Age	51.41±15.32	47.04±15.7	t (81) =1.21, p=0.23
Gender	F 30 (53.6) M 26 (46.4)	F 7 (25.9) M 20 (74.1)	X^2(1)=5.63, p=0.02
Years of education	9.72±5.9	11.44±4.46	t (80)=-1.34, p=0.18
Dialysis vintage (months)	66.42±74.68	41.04±37.88	t (80)=1.66, p=0.1
Ischemic heart disease	16 (88.9)	2 (11.1)	X^2 (1)=4.8, p=0.028
Diabetes	23 (65.7)	12 (34.4)	X^2 (1)=0.09, p=0.77
Hypertension	46 (64.8)	25 (35.2)	X^2 (1)=1.61, p=0.21
MoCA-A	19.96±5.74,(range 7 – 30)	23.11±3.78, (range 14 – 29)	t (78)=-2.57, p=0.01
MoCA-B	22.44±5.46, (range 9 – 30)	25.56 (3.66), (range 16 – 29)	t (75)=-2.58, p=0.01

MoCA - Montreal Cognitive Assessment

was obtained from http://mocatest.org. Both scales are scored from 0–30, with lower scores indicating worse cognitive function. The basic version was designed to accommodate a population with lower educational achievements, and scores appear to be higher in the basic version compared to the standard.[25,27] The scales assess multiple domains, including executive, visuospatial, memory, language, attention, and orientation. The test was administered in a quiet section of the unit while the patient underwent dialysis or had come for other evaluations; the assessments were carried out within 8–10 minutes. Both versions of the MoCA were applied to the participants, and the test administration was pseudo-randomized so that half of the participants performed the MoCA-A first, while the other half started with the MoCA-B. For reliability analysis, repeat testing was done after 2 to 4 weeks in 18 patients with the MoCA-A and in 18 patients with the MoCA-B. Considering that various cutoffs for impairment have been proposed in the literature,[6,9,25,27–30] and considering the absence of validated cutoffs in the Saudi population, it was determined to analyze the total MoCA score results as a continuous variable for the primary analysis. To provide the reader with a comparison to other work on the topic, we identified four potential cutoffs, determined by reviewing the literature, at 26, 24, 22, and 20 out of 30 for both scales,[6,27,30,31] and the prevalence of impairment according to each cutoff was estimated. The study was approved by the internal review board at the College of Medicine, King Saud University, Riyadh, Saudi Arabia, and all patients provided informed consent.

Analysis. We performed exploratory statistics to obtain baseline results from variables with t-tests and chi-squared tests conducted to explore statistical significances between continuous and categorical variables, respectively. Age, years of education, dialysis vintage, and the MoCA scores were continuous variables, while the remaining were entered as binary variables. The MoCA test subcomponent scores were also estimated. We performed univariate regression to explore for an association of any of the participant variables or comorbidities with the MoCA score as the dependent variable. Significant variables in the univariate regression were then included in a multivariate regression, with the respective MoCA score as the dependent variable. Pearson's test for correlation was performed to assess the relationship between the 2 versions of the MoCA and between the initial and repeat assessment to aid in reliability assessment. Cronbach's alpha was used to measure the correlations and reliability of the subcomponents of the Arabic scales. We conducted a comparison with the repeat test means and an estimation of the intraclass correlation coefficients after obtaining repeated test scores. Stata 15 software was used for the analysis.

Results. Out of the 147 dialysis patients, 83 met the criteria for inclusion. The mean±SD for age was 49.99±15.48 years (range 18–83) and the mean (SD) for years of education was 10.29±5.5 (range 0–23); baseline characteristics are demonstrated in **Table 1**. The MoCA-A was completed by 80 participants, the MoCA-B was completed by 77, and both versions were completed by 74. The mean score of the MoCA-A was 21.03±5.35 (range 7–30), with a median of 22.5. The mean MoCA-B score was 23.45±5.14 (range 9–30), with a median of 25. The higher score on the MoCA-B

Table 2 - Univariate and multivariate regression for both versions of the MoCA scale.

Regression	MoCA-A			MoCA-B		
	Coef. (SE)	t-score, *p*-value	95% C.I.	Coef. (SE)	t-score, p value	95% C.I.
Univariate						
age	-0.18 (0.03)	-5.49, < 0.0001	-0.25, -0.12	-0.19 (0.03)	-6.43, <0.0001	-0.25, -0.13
Years of education	0.61 (0.08)	7.28, < 0.0001	0.45, 0.78	0.57 (0.08)	6.72, <0.0001	0.4, 0.74
Dialysis Vintage	0.004 (0.01)	0.49, 0.624	-0.01, 0.02	0.01(0.01)	1.19, 0.24	-0.01, 0.03
Male gender	2.23 (1.19)	1.88, 0.064	-0.13, 4.59	1.96 (1.17)	1.68, 0.1	-0.37, 4.29
IHD	-1.75 (1.46)	-1.2, 0.23	-4.65, 1.15	-2.39 (1.46)	-1.63, 0.11	-5.3, 0.53
DM	-3.03 (1.17)	-2.58, 0.01	-5.37, -0.7	-3.08 (1.14)	-2.69, 0.009	-5.35, -0.8
HTN	-3.4 (1.64)	-2.07, 0.04	-6.67, -0.13	-3.41 (1.57)	-2.16, 0.034	-6.55, -0.27
Peritoneal Dialysis	3.15 (1.22)	2.58, 0.01	0.72, 5.58	3.12 (1.21)	2.58, 0.012	0.71, 5.52
Multivariate						
Age	-0.1 (0.03)	-3.28, 0.002	-0.16, -0.04	-0.12 (0.03)	-4.19, <0.0001	-0.18, -0.06
Years of education	0.47 (0.09)	5.5, <0.0001	0.3, 0.64	0.39 (0.08)	4.75, <0.0001	0.23, 0.55
DM	-0.12 (0.93)	-0.13, 0.9	-1.98, 1.74	-0.37 (0.89)	-0.42, 0.67	-2.15, 1.39
HTN	-2.21 (1.21)	-1.82, 0.07	-4.62, 0.21	-1.98, (1.14)	-1.73, 0.09	-4.3, 0.3
Peritoneal Dialysis	2.23 (0.91)	2.46, 0.02	0.42, 4.04	1.97 (0.89)	2.22, 0.03	0.21, 3.73

DM- Diabetes Mellitus, HTN - Hypertension, IHD - Ischemic Heart Disease, MoCA - Montreal Cognitive Assessment, SE - Standard Error, CI - Confidence Interval

in comparison to MoCA-A was statistically significant: t (155)=-2.9, p=0.004.

There was a large correlation between the 2 MoCA scales for the whole cohort (r=0.84). Cronbach's alpha for the 7 subcomponents of MoCA-A was 0.71, and for the 9 subcomponents of MoCA-B it was 0.76, indicating good internal consistency for both versions of the test. The combination of the subcomponents of both versions yielded a Cronbach's alpha of 0.85. The repeated MoCA-A obtained in 18 participants had a mean±SD of 20.79±6.46, (range 5–30), and also had a large correlation with the initial assessment r=0.88. The mean was also not significantly different between the initial and repeat assessments: t (97)=0.17, p=0.87. The repeated MoCA-B obtained from 18 participants had a mean±SD of 23.89±5.27, range 13–30, with a similarly large correlation with the first measurement 0.79, and no statistically significant different result, t (94)=-0.33, p=0.74, from the initial measurement. We calculated the intraclass correlations for both versions of the scales after repeating the assessment and estimated them at 0.81 (95% CI 0.65, 0.91) and 0.77 (95% CI 0.58, 0.89) for the MoCA-A and MoCA-B, respectively, indicating good test–retest reliability of both test versions.

Univariate and multivariate regression is demonstrated in **Table 2**. The statistically significant variables of age, years of education, diabetes, hypertension, and dialysis type were carried on to multivariate regression, where only age, years of education, and dialysis type remained significant variables influencing both versions of the MoCA scale. Both models explained more than half of the variation in the scales. For the MoCA-A, the regression model was statistically significant, F (5, 73) =18.11, p<0.0001, R^2=0.55; for the MoCA-B, the regression model was similarly significant, F (5, 70) = 18.77, p<0.0001, R^2=0.57.

Finally, we estimated the individual scores obtained from the subcomponents of each MoCA scale. **Table 3** demonstrates the mean scores for each subcomponent and the proportion of those who obtained a full score on each subcomponent. The proportion of participants with a complete score on the executive and calculation tasks were higher in the PD group on the MoCA-B scale, as were their mean scores. Whereas, the recall mean score was higher in the PD group on the MoCA-A scale (**Table 3**). Different cutoff values were set for the MoCA-A and MoCA-B, respectively, and the prevalence of cognitive impairment according to each cutoff is demonstrated in **Figure 1**.

Discussion. Here, we have demonstrated that both the standard Arabic and basic versions of the MoCA are reliable measures of cognition in a group of Arabic-speaking patients with end-stage renal disease undergoing dialysis. The scores are higher in the basic version and among participants undergoing PD.

The MoCA-B was designed to assess cognition in patients with limited levels of education,[25] making it a suitable assessment tool in our sample, which consisted

Table 3 - Results of each subcomponent from both MoCA scales, mean scores, and proportion of participants with a full score are displayed. N represents total participants who completed the task, n represents the number of participants who obtained a full score on a particular task, and SD: standard deviation.

	HD			PD			*P*-value	HD		PD		*P*-value
	N	mean	sd	N	mean	sd		n	proportion	n	proportion	
MoCA-B												
Executive	55	0.47	0.5	27	0.74	0.45	0.02*	26	0.47	20	0.74	0.02*
Recall	55	2.71	1.71	27	3.44	1.4	0.56	9	0.16	6	0.22	0.51
Fluency	55	1.2	0.1	27	1.44	0.13	0.15	21	0.38	15	0.56	0.12
Orientation	52	5.6	0.11	27	5.78	0.1	0.27	38	0.73	22	0.81	0.43
Calculation	55	2.02	1.05	27	2.56	0.85	0.02*	25	0.45	20	0.74	0.01*
Abstraction	55	2.22	1.1	27	2.56	0.8	0.16	33	0.6	19	0.7	0.38
Visuospatial	55	2.2	1.15	27	2.19	1	0.95	33	0.6	13	0.48	0.43
Naming	55	3.73	0.62	27	3.93	0.27	0.12	45	0.82	25	0.93	0.13
Attention	55	2.18	1.07	25	2.44	0.77	0.28	28	0.51	14	0.56	0.68
MoCA-A												
Visual/executive	54	2.8	1.67	27	3.44	1.55	0.12	12	0.22	8	0.3	0.43
Naming	55	2.85	0.4	27	2.96	0.19	0.19	48	0.87	26	0.96	0.21
Recall	55	2.35	1.77	27	3.52	1.42	0.004*	8	0.15	7	0.26	0.23
Attention	55	3.87	1.96	27	4.33	1.33	0.27	14	0.25	7	0.26	0.92
Language	55	1.6	0.83	27	1.78	0.75	0.35	8	0.15	4	0.15	1
Abstract	54	1.19	0.73	27	1.37	0.69	0.28	20	0.37	13	0.48	0.34
Orientation	55	5.36	0.95	27	5.7	0.54	0.9	34	0.62	20	0.74	0.28

MoCA - Montreal Cognitive Assessment, HD - Hemodialysis, PD - Peritoneal Dialysis

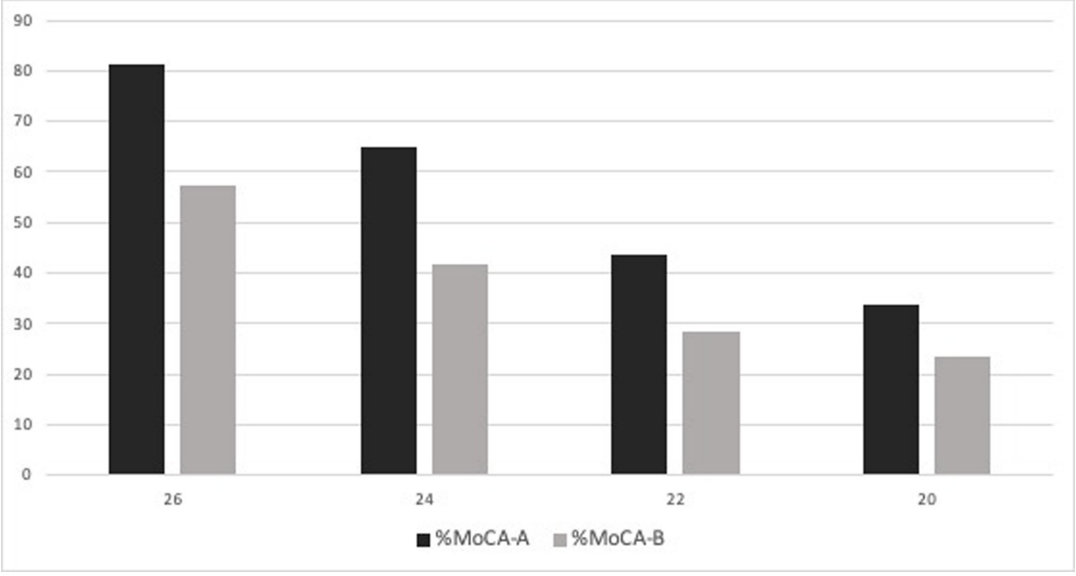

Figure 1 - Percent classified as cognitively impaired according to different cutoffs on the X-axis with both versions of the Montreal Cognitive Assessment (MoCA).

of patients with varying levels of education; the higher scores on the MoCA-B were therefore not unexpected. Also, concurrently running an assessment with the two versions allowed us to demonstrate their high correlation, which suggests that both Arabic versions are reasonable and reliable tools for evaluating the cognitive status of patients undergoing dialysis. Notably, the reliability coefficients were good in the current study,

with no differences in the means after repeat testing and large correlations between the attempts, indicating that it is a useful instrument in this type of population. The range of prevalence of cognitive impairment as measured by the multiple cutoffs here was 23.38% to 81.25%; this range fell within that found by multiple studies from different regions and demonstrates the effect a specific cutoff might have on prevalence.[6,7,29,32] A large proportion of the MoCA scores appear to be lower than that determined by the normal cutoff of 26. The original MoCA was established with the inclusion of participants who were evaluated with various detailed neuropsychological assessments[18] to obtain this cutoff value; this may partially explain why lower scores are also found in similar community-based studies.[27,30,33] Different cutoffs have been determined in the West, even when the sample was obtained from within the same country but varied by race and ethnicity.[33] Cutoffs may even vary by disease conditions;[34] more specifically, the MoCA still needs standardization for patients with chronic renal disease.[6] The use of cutoffs from other populations is generally not recommended, given the influence unique cultural backgrounds may have on patients when undergoing such assessments.[30]

The mechanisms of cognitive decline in renal failure and dialysis patients are related to vascular factors rather than a primary neurodegenerative disorder.[15,35] Diabetes and hypertension, in addition to other metabolic factors, were both associated with cognitive impairment in kidney failure patients; this included those on and not on dialysis, as well as renal transplant patients.[36] Diabetes, hypertension, and gender were not significantly associated with the scores in our sample; other studies have not found significant differences between genders with the MoCA.[34,37] It is clear that age and years of education heavily influence the MoCA scores, and this has been repeatedly demonstrated in the literature.[15,18,27,34,37] Generally, and not specifically to dialysis patients, diabetics might have a faster rate of cognitive decline;[38] however, strong associations have not always been reported in patients with kidney disease.[5,39] The current literature also suggests that hypertension in general may have an association with cognitive impairment, with a possible protective role from antihypertensives.[40] In our sample, no strong association emerged for these variables with any of the MoCA scales in the multivariate analysis, and similarly, the literature has not consistently revealed an association.[39] Yet, the fact that the nature of cognitive impairment is likelier to be of a vascular etiology[12] is consistent with the notion that vascular risk factors play a major role. Nonetheless, in a dialysis population where these risk factors are common, age and education still appear to be more strongly associated with cognitive impairment.[15,18,27,34,37]

Participants on PD participants displayed higher scores on both versions of the scale even after correcting for other variables that were balanced between the two groups. Patients on dialysis have been found previously to have a 2-to-3-fold increase of cognitive impairment for PD and HD respectively.[37] Neumann et al[11] demonstrated that 30% of HD patients had cognitive impairment while it was present in about 15% of PD patients.[11] One possibility for the difference between the different dialysis types is related to the dynamic blood pressure shifts that occur in hemodialysis. Fluctuations and drops of blood pressure, as well as post-dialysis low blood pressures, are suggested to be related to brain injury and cognitive impairment. Larger drops in blood flow to the brain associate with progression of white matter disease on neuroimaging.[14,39] Other factors considered to play a role in cognitive impairment related to patients on PD are hyponatremia, relative overhydration and cerebral microhemorrhages related to frequent anticoagulant use.[14,41,42] These pathological events lead to subcortical cognitive deficits, such as executive dysfunction, which appeared to be more evident in HD patients on the MoCA-B test in comparison to PD patients.[14]

The executive component of the MoCA-A, namely the trail-B, is included with visuospatial assessment and clock drawing. These multiple assessments might partially explain why performance might appear better in the MoCA-B. Additionally, the executive component is a simpler version of the trail-B in the latter scale and therefore resulted in appreciable differences, given its narrow score range. It is not surprising to find frequent impairments in trail tests, as this seems to be quite difficult for participants, as demonstrated in earlier studies, who have lower educational achievements.[30] It is also likely that the timing of the delayed recall in version A is responsible for some difficulties with recall; it occurs much later in the assessment than in version B, and participants engage in other subcomponent tasks, in between registration and recall steps, that have language components that may intrude into the delayed recall. In support of this, memory domain deficits were one of the deficit types most frequently found in dialysis patients, which likely resulted from impairments in retrieval.[9]

Among limitations to consider, is the smaller number of patients undergoing PD. Patients were recruited from a single center which narrows the demographic

spectrum. Also, since intact cognition is important for patients undergoing PD due to the management required by the patient or care giver at home, the possibility of selection bias exists where the prescribing nephrologist might have been more selective in prescribing PD to certain patients. This should be considered even if the education years, age, dialysis vintage and other variables were balanced between groups. Prospective cohort studies that include factors responsible for dialysis type selection would be required to elucidate this point further. What needs further exploration, however, is identifying appropriate cutoffs in patients undergoing dialysis, which will require future research with larger numbers.

In conclusion, the Arabic versions of the MoCA can be reliably used to measure cognition in dialysis patients. Patients undergoing HD appear to be at a higher risk for cognitive decline compared to those undergoing PD, with age and education representing important variables influencing performance. Given the ubiquitous nature of cognitive impairment in patients receiving dialysis and the ease of administering the MoCA scales, treating physicians should have a low threshold to screen for impairments. Both Arabic versions of the MoCA can be used reliably as screening instruments for cognitive impairment in this population. The choice of which version should be used depends on the patient's level of education. This will help identify cognitive impairments early or detect deterioration of cognition over time in order to better care for patients receiving dialysis.

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