

Assessment Of Cognitive Impairment In Maintenance Hemodialysis Patients Using Saint Louis University Mental Status Exam

Muthamizh M¹, Daniel V²

¹(Nephrology Department, SRM Medical College Hospital and Research Centre, India)

²(Nephrology Department, Sri Ramachandra Institute of Higher Education and Research, India)

Abstract:

Background: cognitive impairment and dementia are frequently seen in the end stage renal disease (ESRD) population who were on maintenance hemodialysis. It negatively affects daily functioning ability, poorly affects health-related quality of life, and non-adherence to hemodialysis therapy. Saint louis university mental status exam (slums) can be a better cognitive impairment detecting tool than the mmse.as per our knowledge, no studies were done using the slums tool for the maintenance hemodialysis (MHD) population to analyze cognitive impairment.

Materials and methods: in this cross-sectional study, 160 patients were included who were on MHD. Patients were grouped based on their age, period of hemodialysis, and co-morbid conditions. Then the cognitive status of each patient was analyzed using the slums.

Results: we observed that the patients on maintenance hemodialysis (MHD) for 2-4 years (48.8%) have the highest prevalence of cognitive impairment, especially dementia than the patients on MHD less than a year. We observed that the patients doing thrice weekly hemodialysis (HD) are more prevalence to get cognitive impairment than the patients doing twice weekly hd. We also observed that among the elder group >60 years are having higher prevalence of dementia about 58.1% than the other age groups doing hd.

Conclusion: patients undergoing hemodialysis experience a transient decline of cognitive function with respect to dialysis vintage, frequency of hd and elder age group had been noted. Slums is a simple and an alternative tool to analyse the cognitive impairment in patients on maintenance hemodialysis.

Key words: cognitive impairment, Maintenance Hemodialysis (MHD), SLUMS, ESRD

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I. Introduction

Cognitive impairment is frequently seen in those with severe chronic kidney disease (ckd) and end stage renal disease (esrd)¹. A state of chronic and cumulative dysfunction known as cognitive impairment is marked by deficits in memory as well as one or more other domains, such as language, orientation, reasoning, attention, or executive functioning—the part of the brain required for organizing and arranging activities. The cognitive impairment must be severe enough to impede with everyday activities and independence, and it must indicate a deterioration from the patient's baseline level of cognitive function². In addition to dialysis induced ischemic cerebrovascular lesions, which are a risk factor for cognitive impairment, direct neuronal damage caused by a buildup of uremic toxins in esrd is another potential mechanism³.self-management is an essential factor for the patients on maintenance hemodialysis to live independently as much as they handle themselves with their cognitive function⁴. Cognitive impairment negatively affects daily functioning ability, poorly affects health-related quality of life, and non-adherence to hemodialysis therapy in esrd population⁵. Cognitive impairment among maintenance hemodialysis patients is associated with an approximately two-fold increased risk of both mortality and dialysis withdrawal⁶. Various tools were used to analyze the cognitive function in maintenance hemodialysis population like mini mental state examination (MMSE), the modified mini mental state examination, the montreal cognitive assessment⁷. Saint louis university mental status exam (slums) can be a better cognitive impairment detecting tool than mmse⁸.as per our knowledge no studies were done using slums tool for maintenance hemodialysis population to analyze cognitive impairment.

Thus, we present our cross-sectional research that uses the (slums) to evaluate cognitive impairment in maintenance hemodialysis patients.

II. Material And Methods

This cross-sectional observational study was conducted on patients of department of nephrology at sriramachandra institute of higher education and research, chennai, tamilnadu from march 2020 to june 2020. A total 300 adult subjects (both male and females) of aged ≥ 18, years were for in this study.

Study design:cross-sectional study

Study location: this study was conducted in department of nephrology at sriramachandra institute of higher education and research, porur, chennai.

Study duration:march 2020 to june 2020.

Sample size: 160 patients.

Selection of participants: study participants selected randomly based on the inclusion criteria were age > 18 years with dialysis vintage not less than 3 months and on maintenance hemodialysis therapy irrespective of their dialysis weekly frequency were included and all other criteria like dialysis vintage < 3 months, acute kidney injury (aki), participants on peritoneal dialysis and not willing to give informed consent were excluded.

Methods of measurement: the slums is short screening test which covers the patient’s attention, concentration, memory, orientation, visuocnstructional skills, conceptual thinking, calculation and executive function with the scoring which ranges scores (0-30) in this 25 – 30 is considered as normal, 20-24 is mild impairment and 1-19 is dementia.

Data collection and processing: participants are included in this study after obtaining informed consent and based on their inclusion and exclusion criteria and were grouped based on their age, vintage of hemodialysis, hemodialysis frequency, co-morbid conditions. Then the cognitive status of each participant was analysed by using slu mental status exam (slums).

Statistical method:the results of the study were analyzed using spss software version 25. The data was expressed in percentage, mean & standard deviation. P value <0.05 was considered as statistically significant.

III. Result

Table 1: sociodemographic characteristics of the study population (n=160)

| Variables | Sub variable | No of participants | Percentage % |
|--------------------------------|-----------------|--------------------|--------------|
| Age in years | 18-40 | 26 | 16.3 |
| | 40-60 | 72 | 45 |
| | >60 | 62 | 38.8 |
| Gender | Male | 101 | 63.1 |
| | Female | 59 | 36.9 |
| Diabetes mellitus | Present | 39 | 24.4 |
| | Absent | 121 | 75.6 |
| Hypertension | Present | 152 | 95 |
| | Absent | 8 | 5 |
| Cardiovascular disease | Present | 49 | 30.6 |
| | Absent | 111 | 69.4 |
| Dialysis vintage (years) | <1 | 11 | 6.9 |
| | 1-2 | 70 | 43.8 |
| | 2-4 | 78 | 48.8 |
| | >4 | 1 | 0.6 |
| Frequency of dialysis (weekly) | Twice | 116 | 72.5 |
| | Thrice | 44 | 27.5 |
| Slums | Normal | 40 | 25 |
| | Mild impairment | 73 | 45.6 |
| | Dementia | 47 | 29.4 |

Demographic variables (table 1):

A total of 160 maintenance hemodialysis participants were assessed for cognitive functional status by using slums. The mean age of participants was 53.5 years with higher participation (63.1%) of males. About 45% of the participants were belonged to the 40-60 years age group. With respect to the comorbid conditions 39(15%) were having diabetes mellitus, 152(48%) were having hypertension, 49(11%) were having cardiovascular disease, among them 39(15%) are having both diabetes mellitus and hypertension and 30 (11%) are having diabetes mellitus, hypertension and cardiovascular disease. Among 160 participants 78 (48.8%) were doing dialysis for 2-4 years and 72.5 % participants were on twice weekly maintenance hemodialysis. With respect to slums score 45.6% of participants having mild cognitive impairment.

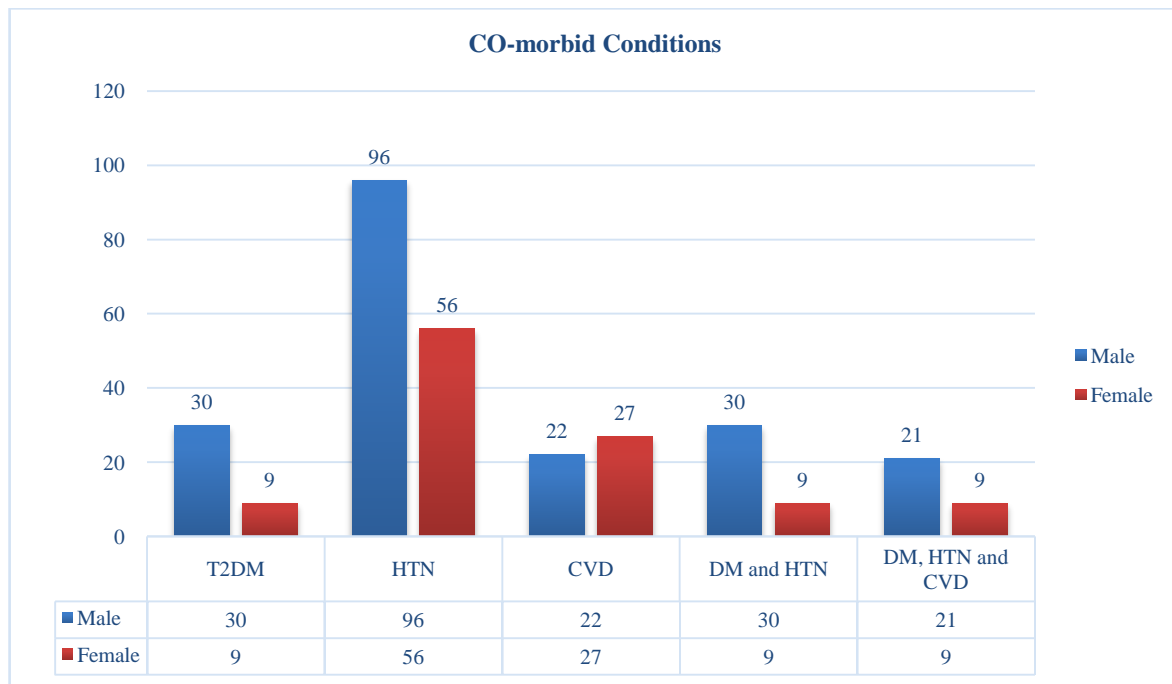


Figure 1: distribution of co-morbid conditions

The above figure 1 shows the distribution table based on co-morbid conditions, out of 160 patients 39(15%) were having diabetes mellitus, 152(48%) were having hypertension, 49(11%) were having cardiovascular disease, 39(15%) were having both diabetes mellitus and hypertension and 30(11%) were having diabetes mellitus, hypertension and cardiovascular disease.

| S. No | Variables | Slums | | | P-value |
|-------|--------------------|--------|-----------------|----------|---------|
| | | Normal | Mild impairment | Dementia | |
| 1 | Age | | | | |
| | 18-40 years | 65.40% | 26.90% | 7.70% | 0.00* |
| | 40-60 years | 31.90% | 55.60% | 12.50% | |
| | >60 years | 0.00% | 41.90% | 58.10% | |
| 2 | Hypertension | 23.70% | 46.70% | 29.60% | 0.29 |
| 3 | Cvd | 24.50% | 46.90% | 28.60% | 0.97 |
| 4 | Dm | 25.60% | 51.30% | 23.10% | 0.58 |
| 5 | Dialysis frequency | | | | |
| | Twice | 31.90% | 50.90% | 17.20% | 0.00* |
| | Thrice | 6.80% | 31.80% | 61.40% | |
| 6 | Dialysis vintage | | | | |
| | < 1 year | 81.80% | 9.10% | 9.10% | 0.00* |
| | 1-2 years | 37.10% | 50.00% | 12.90% | |
| | 2-4 years | 6.40% | 46.20% | 47.40% | |
| | >4 years | 0.00% | 100.00% | 0.00% | |

* statistically significant (p <0.05)

Statistical analysis revealed that variables like age, dialysis frequency and dialysis vintage were significantly associated with slums with p value (<0.05) table 2.

IV. Discussion

Cognitive impairment is quite common in esrd population on maintenance hemodialysis (mhd) and it was caused by various factors which was unknown to predict the correct cause⁹. In this esrdmhd population depression also plays a major role in cognitive dysfunction and their poor compliance with hemodialysis therapy⁷. Various tools were used to analyze the cognitive function in maintenance hemodialysis population like mini mental state examination (mmse), the modified mini mental state examination, the montreal cognitive assessment moca⁷. Slums can be a better cognitive impairment detecting tool than mmse⁸ and similar validity to moca test¹⁰. As per our knowledge no studies were done using slums tool for maintenance hemodialysis population to analyze cognitive impairment.

In this study we observed that the patients doing hd for more than 2-4 years 47.4% are having highest prevalence of getting cognitive impairment especially dementia than the patients doing dialysis less than a year and we also observed that the elder people >60 years are having higher prevalence of getting cognitive impairment about 58.1% than the other age groups doing hd. This finding was in accordance with the study on cognitive impairment of patients with chronic renal disease on hemodialysis and its relationship with sociodemographic and clinical characteristics by gabrieladutragesualdo et al¹, who showed that older age, longer hemodialysis vintage presented with greater cognitive impairment.

The possible cause of cognitive impairment in maintenance hd patients are frequent changes in cerebral blood flow during the dialysis therapy and the uremic toxins accumulation with chronic hd patients and also aging in individuals plays in important role like the study done by mark duncanfindlay et al¹¹. There was a decline in cerebral blood flow which correlating with intradialytic cognitive dysfunction. Progressive cerebrovascular disease occurred in those continuing dialysis, but not in transplanted patients¹¹. We also observed that there was a lack of significant association between the slums and the variables like genders. Diabetic dialysis patients, hypertensive dialysis patients.

Our study does have some limitations. This was a single center cross sectional study that enrolled only a limited number of patients with no follow-up. More studies enrolling a larger number of patients are needed that could clarify the underlying findings.

V. Conclusion

The prevalence of cognitive impairment was higher in maintenance hemodialysis population with increasing dialysis vintage and more time on hd therapy. Elder population on maintenance hemodialysis are having higher level of cognitive impairment than the other younger age groups on hd therapy. A longer multicentric prospective cohort study with more study participants might draw more valid information¹².slums can be an alternative tool to analyse the cognitive impairment in patients on maintenance hemodialysis.

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