ORIGINAL RESEARCH PAPER

Nephrology

A STUDY OF COGNITIVE FUNCTION IN DIFFERENT STAGES OF CHRONIC KIDNEY DISEASE

KEY WORDS: Chronic kidney disease, Cognitive function, Haemodialysis, Dementia.

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ABSTRACT

Background: Chronic kidney disease (CKD) is a growing public health problem. The incidence of kidney failure is rising in all age groups but particularly in older adults. Individuals in all stages of CKD are at higher risk for development of cognitive impairment and this may be a major determinant in their quality of life. Furthermore, cognitive impairment is associated with an increased risk of death in dialysis patients. Main objective is to study cognitive function in various stages of CKD.
Methods: In our study 200 CKD patients were taken, who are admitted in DR PSIMS &RF in last 1 year and they were diagnosed and classified into different stages of CKD based on EGFR by MDRD formula. cognitive function assessment done by using MMSE (mini mental state examination) scoring system.
Results: Out of 200 CKD patients 38 are CKD1, 45 are CKD II, 35 are CKD III, 33 patients are CKD IV, 28 are CKD V, 34 belongs to MHD (maintenance on haemodialysis) group. Significant P value(<0.001) observed in CKD V and MHD group patients
Conclusions: The present study emphasizes that no significant cognitive impairment in CKD stage 1- 4, but some significant cognitive impairment in CKD stage V and MHD group

INTRODUCTION

Chronic kidney disease (CKD) is a public health problem. The incidence of Renal failure is increasing in all age groups. A major determinant of the quality of life in the elderly is the level of cognitive function.

Advancing age and a heavy burden of cardiovascular risk factors among chronic kidney disease (CKD) and haemodialysis (HD) patients has focused attention on cerebrovascular morbidity in this population. Dementia prevalence in the HD population has been reported to be 30% and is frequently under recognized.

Patients with CKD have a high prevalence of sub cortical white matter lesions on neuro imaging and a high incidence rate for stroke, White matter lesions result from sub cortical small vessel disease and have been independently associated with severity of kidney disease

The life expectancy of individuals with Chronic Kidney Disease (CKD) on haemodialysis has increased ,however, with over years in treatment, there is impairment of cognitive function that affect adherence to therapy and dialysis

In this review we discuss the definition of dementia and cognitive impairment.

Definition of Dementia and Cognitive Impairment:

Cognitive impairment is defined as a new deficit in at least two areas of cognitive functioning. These may include disturbances in memory (learning or recalling new information), executive functioning (e.g., planning reasoning),

Attention or speed of information processing(e.g., concentration, rapidity of assimilating or analyzing information), perceptual motor abilities (e.g., integrating visual, tactile, or auditory information with motor activities), or language (e.g., word-finding difficulties, reduced fluency).

Mild cognitive impairment is the term given to patients with cognitive impairment that is detectable by clinical criteria but does not produce impairment in daily functioning.

Individuals with advanced-stage kidney disease have twice the prevalence of cognitive impairment and dementia of the general population

Impact of Cognitive Impairment on Outcomes:

Diagnosis of cognitive impairment is important as cognitive impairment with an increased risk of death in dialysis patients.

Furthermore, in the general population those with mild cognitive impairment are 5 to 10 times more likely to develop dementia. Cognitive impairment may impact decision making as well as the ability to adhere to dialysis recommendations.

Main objective is to study cognitive function in various stages of CKD

AIMS AND OBJECTIVES

Assessment of cognitive function in different stages of CKD

CKD staging by EGFR with MDRD formula and cognitive assessment by MMSE scale(mini mental status examination).

MATERIALS AND METHODS

This is a prospective, cross sectional study carried out at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation during july 2016 to june 2017 200 CKD patients staged by EGFR by MDRD formula included in the study. The following data were used from the clinical records:

- Age
- sex
- Blood urea and Sr .creatinine,
- EGFR by MDRD formula.
- Cognition Assessment by MMSE scale(mini mental state examination)

Inclusion criteria: Patients with CKD stage I to V and MHD (maintenance on haemodialysis group were included in this study.

Exclusion criteria: Established neurological deficits like CVA, parkinsons, alzhiemers disease have been excluded from this study.

STATISTICAL ANALYSIS:

Data was entered in Microsoft excel spread sheet and analysed statistically using standard statistical software. Student 't' values was applied for significance. Significance of 'P' value was below 0.05.

RESULTS

Table 1 showing Age distribution in CKD. 32% of CKD cases seen in 30-40 yrs of age group. *P value: 0.09 (Not significant)

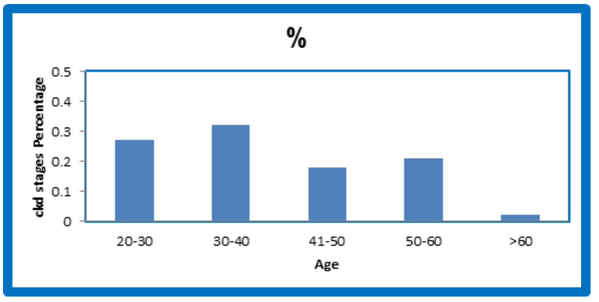


Table 2 showing female populations 61% and male population 39% of distribution CKD *P = 0.34 (Not Significant)

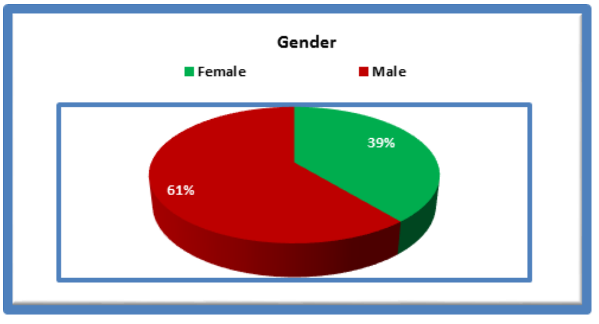


Table3 shows Diabetic population are more chance to develop CKD when compared to HTN population. In our study population 86% of diabetics and 61% of Hypertensive's are association with CKD * P value =0.62 (Not significant)

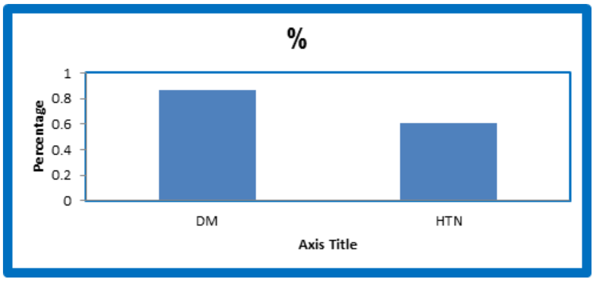


Table 4. Risk factors association with CKD. *P value (smoking group) = 0.99 (Not significant) *P value(alcohol group) = 0.41(Not significant). CKD association with smoking is 40.5% and alcohol 39.5%

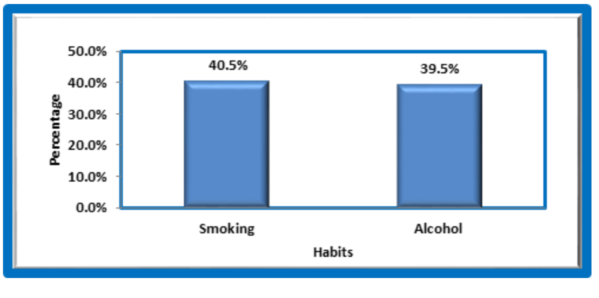


Table 5 : This table showing significant association between cognitive impairment and blood urea levels. *P = 0.001 (Significant)

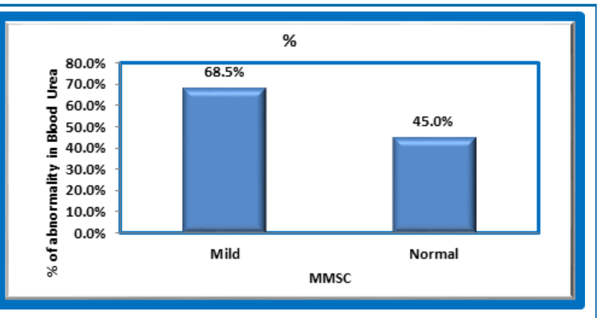
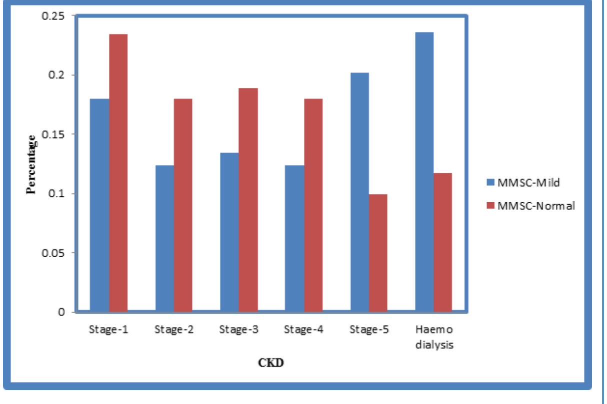


Table 6: Cognitive functions in Different stages of CKD. *P value (CKD stage V) = 0.05(significant) P value for MHD group = 0.02 (significant)

This Table shows Mild cognitive impairment present in 20.2% population of CKD stage V and 23.6% of MHD populations in our study. Significant P value seen in stage V and MHD group.



DISCUSSION:

A total of 200 patients of CKD based on EGFR has been staged and cognition assessment done by MMSE scoring system. According to our study there was significant decline in patients cognition as stage of CKD progresses and percentage of patients having cognition impairment also increases as CKD progresses.

Patients on MHD also shows a significant decline cognitive impairment. .Multiple risk factors which leads to chronic renal impairment has been included In the study.

In our study 32% of CKD cases seen in 30-40 yrs. of age group . Distribution of CKD in female populations 61% and male population 39% present. Association with smoking is 40.5% and alcohol is 39.5% .

Table 3 shows 61% of patients with HTN as risk factor and 86.5% have DM as a risk factor for renal impairment.

Table 5 shows significant association between cognitive impairment and blood urea levels.(p value = 0.001)

Table 7 shows Mild cognitive impairment present in 20.2% population of CKD stage V and 23.6% of MHD populations in our study. Significant P value seen in stage V and MHD group. P value CKD stage V = 0.05(significant), P value for MHD group = 0.02 (significant).

Although the exact pathomechanisms of cognitive impairment in CKD are still not completely clear, mixed cerebrovascular disease including overt ischemic or hemorrhagic stroke,as well as subclinical alterations like cerebral microbleeds ,white matter lesions, and atrophy, has been suggested to play an important role.

In patients receiving hemodialysis, additional mechanisms contributing to cerebrovascular disease have been put forward including rapid changes in blood pressure, microembolization and dialysis disequilibrium.

In a recent review, van Sandwijk et al. developed a comprehensive model of pathophysiolocial pathways contributing to cognitive impairment in CKD.

Sehgal et al and Franken field et al reported diabetes, followed by hypertension, accounted for most cases of CKD, indicating that diabetes may be the main cause of kidney failure not only in developed nations, but also in developing countries .

According to Murray et al, patients on haemodialysis are 3.54 times more likely to have cognitive impairment than healthy individuals of the same age.

Considering gender differences, other authors have also reported higher scores among male subjects. In our study also there was a male predominance of 61%

Haemodialysis and the intense catabolism characteristically seen in CKD may contribute to and maximize the aging of the brain. Hypothesis shows the cognitive impairment in ckd on HD may be related relatively increased accumulation of A beta amyloid, hence yet to be proved
Birmelé et al, studied a population of 300 individuals on HD and correlated greater numbers of signs of depression and co morbidities with lower mental test scores.

CONCLUSION:
Our study shows a significant impairment of cognition as stages of chronic kidney disease progresses.

Cognitive impairment in CKD is still widely neglected in clinical diagnostics and therapy despite its increasing prevalence in ageing populations.

The prevalence of cognitive impairment in CKD is high and increases with increasing CKD severity. Adequate screening procedures like MMSE able to detect early signs of cognitive impairment will have to be established and pathomechanisms of cognitive impairment will further have to be clarified, e.g., by brain imaging, blood and urinary assessments.

Current clinical recommendations that largely focus on the control of CKD and its cardiovascular co morbidities should more systematically evaluate cognitive deficits and adapt patient counselling to cognitive function.

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