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DEPRESSION AND COGNITIVE FUNCTION IMPAIRMENT IN PATIENTS UNDERGOING HEMODIALYSIS

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ABSTRACT

The main objectives of this study were the prevalence of depression and cognitive function impairments in patients undergoing haemodialysis. An observational study performed on 60 patients with CKD stage IV and V undergoing haemodialysis. Depressive symptomatology, defined by a Center for Epidemiological Studies Depression Scale (CES-D) and cognitive function measured by Mini Mental State Examination (MMSE) questionnaire. We found that there is a high prevalence of depression in End Stage Renal Diseases (ESRD) patients receiving hemodialysis, particularly those taking it for a longer duration. The prevalence of depression was higher in the 50–60 age group and was found to be positively correlated with age in general**.** From our study, it was found that more depressive symptoms were found in patients with lower education as compared to patients with graduation or above. The positive correlation between duration of dialysis both depression and cognitive function.

Key words: Depression, Cognitive function, Haemodialysis, ESRD, CKD.

INTRODUCTION

End stage renal disease occurs when the kidney are no longer able to function at a level that is necessary for day-to-day life. It usually occurs when chronic kidney failure has progressed to the point where kidney function is less than 10% of normal function. When healthy, the kidneys maintain the body's internal equilibrium of water and minerals (sodium, potassium, chloride, calcium, phosphorus, magnesium, and sulfate). Those acidic metabolism end products that the body can't get rid of via respiration are also excreted through the kidneys. The kidneys also function as a part of the endocrine system producing erythropoietin and calcitriol. Erythropoietin is involved in the production of red blood cells and calcitriol plays a role in bone formation [1]. Hemodialysis is a method for removing waste product such as potassium and urea, and excess water from blood. Dialysis is an imperfect treatment to replace kidney function because it does not correct the endocrine functions of the kidney [2].

Chronic kidney disease (CKD) and end - stage renal disease (ESRD) have become worldwide public health problems. India gets 1.5 lake patients with kidney failures every year and a majority of them die within five years due to the acute shortage of dialysis units in the country [3]. Many of these individuals are on long-term hemodialysis and suffer from relatively poor physical health. These conditions increase patient morbidity and mortality risks and put major economic strain on the health-care systems [4]. Patients with ESRD on dialysis experience a broad range of symptoms some with potentially negative effect on functioning and well being of patient. Dialysis affects the quality of life leading to time limitation in activities and high level of disability and impairment in functioning statues and psychological aspects [5].

Numerous studies have documented that quality of life in patients undergoing dialysis therapy is significantly impaired [6]. Poor mental health which includes depressive symptoms and depression is a major

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health problem and most frequent group of psychological problem in hemodialysis patients [7]. Recent study reported that among hemodialysis patients those with depressive symptoms were high risk of death and high risk of hospitalization and had high rates of dialysis withdrawal than those without depressive symptoms [8].

MATERIALS AND METHODS

An observational study performed on 60 patients with CKD stage IV and V undergoing hemodialysis two or three times in a week and CKD stage I to III without hemodialysis at HCG Medisurge Hospital, Ahmedabad and LJ Haria Rotary Hospital, Vapi in 2012. Sociodemographic and clinical data, including a review of medical records collected for all patients enrolled in the study. The data collection had been done by using Case Report Form (CRF). The CRF had been designed to provide detailed information such as name, age, sex, blood pressure, family history duration of dialysis, complications and co morbid diseases. It also includes record of biochemical parameters such as serum creatinine, BUN, Serum electrolytes, CBC report, and other reports whichever were available.

Inclusion criteria

- Age between 18-65 years old.
- Patients undergoing hemodialysis for at least 3 months.
- Patient willing to provide informed consent.
- Patient having chronic co-morbid condition like cardiovascular disorder, kidney stone, and diabetes-mellitus can also be enrolled.

Exclusion criteria

- Female subjects who are pregnant.
- Patients having a history of psychiatric disorder or cognitive function impairment prior to start of hemodialysis.
- Patients participating in any other clinical study.
- Patients unable to read and write.
- Patients having terminal condition like cancer or any other diseases leading to impaired CNS function.

Instruments used for assessment of Depression and Cognitive function

Depression screening performed by using the Center for Epidemiological Studies Depression Scale (CES-D). The CES-D is a validated self-reporting Questionnaire composed of 20 questions and maximum score is 60. If CES-D score is 16 or higher indicates patients suffering from depressive symptoms [9].

Mini mental state examination (MMSE) which is used to systematically asses mental status. It is based on 11 questions that test five areas of cognitive function. The five sections of the test are divided as follows: orientation, registration, attention and calculation. The maximum score is 30 and if a score is 23 or lower, it indicates cognitive impairment [10].

Ethics

The study was performed in accordance with the ethical standards of the **ICMR and Good Clinical Practice guidelines**. Approval for study had been obtained from the human ethics committee at the HCG Medisurge Hospital. All the patients received verbal and written information and they had been obtained informed consent before their inclusion in the study.

Data Analysis

All data was analyzed by using software such as MS excel, prism graph pad version 5.0. Similarly, Characteristics of participants with and without depression were also compared. Correlation coefficient was used to evaluate the correlation between depressive symptoms and cognitive performance with cognitive outcomes being the raw scores on cognitive tests.

Table 1. Baseline demographics details

Characteristics	Hemodialysis	Without Hemodialysis
Age (mean, SD)	50.19 ± 11.09	46.7 ± 10.80
Male	29	6
Female	21	4
Age Group distribution		
< 65	8	0
60-50	22	4
50-40	11	2
40-30	5	3
30-20	4	1
< 20		0
Stages of Disease		
CKD stage 4 to 5	50	
CKD stage 1 to 3		10

Table 2. Characteristics of patients with and without depression

	Total	Not depressed (CES-D < 16)	Depressed (CES-D ≥ 16)	P value
All participants	50	13	37	
Age (years)	49.39 ± 11.09	46.92 ± 9.72	51.29 ± 11.43	0.9
Male	29 (58%)	7 (24%)	22 (44%)	
Education (%)				0.3
10^{th}	24 (48 %)	4 (16 %)	20 (83 %)	
12^{th}	5 (10 %)	1 (20 %)	4 (80 %)	
Graduation	21 (42 %)	8 (38 %)	13 (62 %)	
Family History				0.4
Hypertension	14 (28 %)	4 (28 %)	10 (71 %)	
Diabetes	19 (38 %)	5 (26 %)	14 (73 %)	
Others	8 (16 %)	2 (25 %)	6 (75 %)	
Primary causes of ESRD (%)				0.9
Diabetes	21 (42 %)	4 (19 %)	17 (80 %)	
Hypertension	29 (58 %)	7 (24 %)	22 (75%)	
TB	6 (12 %)	0	6 (100%)	
Kidney stone	12 (24 %)	5 (41 %)	7 (58 %)	
Past habits				0.4
Smoking	17 (34 %)	4 (23 %)	13 (76 %)	
Drinking	11 (22 %)	1 (9 %)	10 (90 %)	
Hb (%)	9.87 ± 1.39	11.5 ± 1.49	9.24 ± 1.50	0.8
Serum creatinine	10.62 ± 2.88	10.48 ± 2.0	9.80 ± 2.28	0.9
MMSE score	22.8 ± 4.67	24.16 ± 4.54	22.36 ± 4.69	0.9

Fig 1. CES-D score in patients treated with hemodialysis

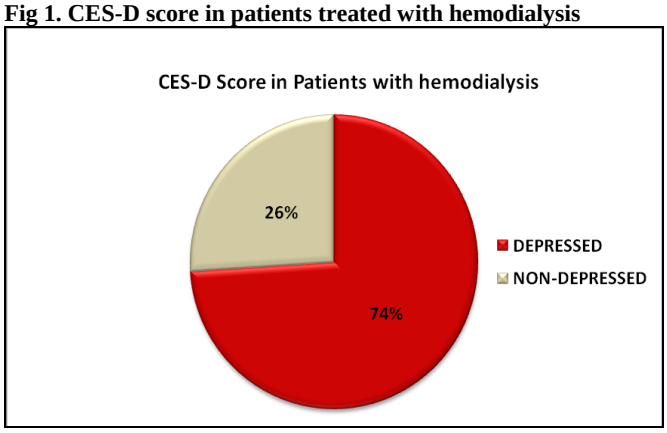


Fig 2. MMSE score in patients treated with hemodialysis.

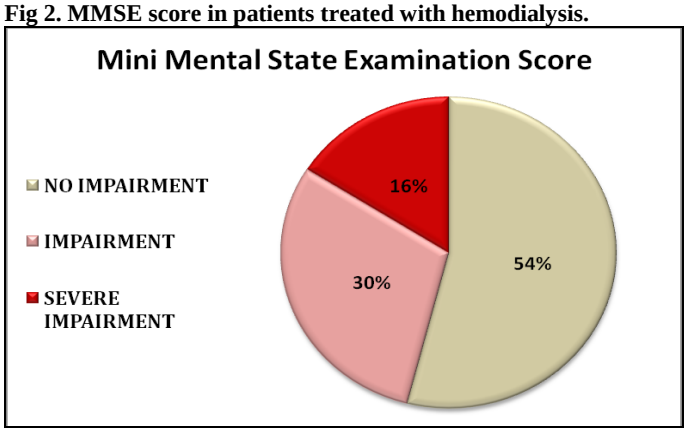


Fig 3. Correlation between CES-D score and MMSE score

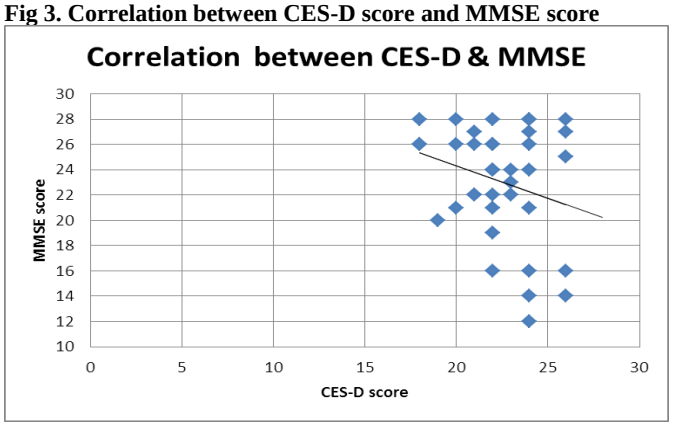
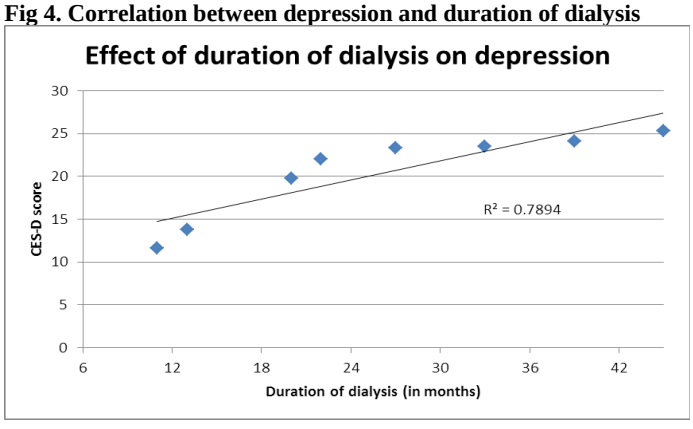


Fig 4. Correlation between depression and duration of dialysis



RESULT

There were 60 participants enrolled in this study, 50 participants of CKD 4 to 5 stage treat with hemodialysis and 10 participants of CKD 1 to 3 stage treat without hemodialysis**.** We found that 37 out of 50 patients (74%) had a burden of depressive symptoms**.** Expectedly, the prevalence of depression was higher in the 50–60 age groups and was found to be positively correlated with age in general**.** From our study, it was found that more depressive symptoms were found in patients with lower education as compared to patients with graduation or above. The positive correlation between duration of dialysis both depression and cognitive function. Diabetes and hypertension are primary causes of ESRD and diabetes patients were more depressed than hypertension patients.

DISCUSSION

Similar to prior observations, our study also confirms a high prevalence of depressive symptoms in hemodialysis patients. Depression in hemodialysis patients may be similar to depression occurring in older adults, both in etiology and presentation.[11] Recent studies have also shown that depressive disorders are risk factors for increased medical morbidity and death in end-stage renal disease (ESRD) patients. Despite these statistics, depression is under-recognized in dialysis patients and therefore, undertreated.

In our study, we found that 37 out of 50 patients (74%) had a burden of depressive symptoms. It was also found that patients having good family support and care were less prone to depression. This would be expected in most cases of depression irrespective of cause. Also, the prevalence of depression was seen to be lower as level of education improved. We also found that there is positive correlation between depression and duration of dialysis. Patients undergoing dialysis for a longer duration exhibited a higher CES-D score, indicating more severe depression. Additionally, these patients may be affected by the growing despair due to lack of improvement in medical condition over a period of time. Probably, that is why these patients were also found to have more cognitive impairment.

Chronic illness, less friends & family support, cost of hemodialysis, polypharmacy (multiple medication), less physical activity, and restrictions in food may be causes of depression in dialysis patients. In our study, on analyzing patients with depression (based on CES-D score) with reference to cognitive function impairment (based on MMSE score) it was found that number of patients with cognitive impairment was higher. The linear forecast trend line also indicates that as CES-D score increases, MMSE score decreases. However, the slope is not very high and hence it can be concluded that cognitive function impairment has mild positive relation with depression. Further study with more number of patients is required to establish correlation between depression and cognitive function impairment. Our study has several strengths as well. We collected patient's detailed medical records such as past medical history, family history, complication after receive dialysis, duration of dialysis, past habits, medication, education levels, and other co morbid diseases that facilitated the identification of specifically patients characteristics and primary causes of ESRD.

CONCLUSION

From the present study, it can be concluded that there is a high prevalence of depression in ESRD patients receiving hemodialysis, particularly those taking it for a longer duration. Expectedly, the prevalence of depression was higher in the 50–60 age group and was found to be positively correlated with age in general. It was found that patients with higher depression scores had poor cognitive function particularly in attention, listening and answering, when compared to non-depressed patients (CES-D<16). This data suggests a mild positive correlation between cognitive function and depression.

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