Assessment of Depression and Anxiety in Chronic Kidney Disease: A Cross Sectional Observation Study

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Background: Depression and anxiety are the most common psychiatric condition in Chronic Kidney Disease (CKD) patients. However, most of the studies evaluated patients in terminal stage of the disease and research assessing patients under pre-dialysis treatment are scarce. This article aims to evaluate the spectrum of anxiety and depression among CKD patients of stage 3-5 and 5D. Materials and methods: We evaluated 104 CKD patients (CKD stages 3- 5D) in a hospital based cross sectional observation study at department of Nephrology, SSKM Hospital & IPGMER, Kolkata during February, 2015 to December, 2016. Information on socio-demographic and clinical characteristics were collected for each patient preparing a detailed questionnaire. Symptoms of anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS), Beck's Depression Inventory and Hamilton Anxiety Rating Scale (HAM-A). Results: Among CKD patients 82 (78.84%) patients had some form of depression and 80 (76.92%) were suffering from clinical anxiety. Almost 21.15% of the patients perceived that they are living in the condition of poor social support, the rest i.e. 78.84% perceived it to be good and they get help from relatives and neighbours in case of need. Depression and anxiety were significantly associated with perceived social support, monthly income, duration of dialysis and creatinine level. Female had higher prevalence of developing depression (OR = 1.934; 95% CI: 0.825–4.284) and anxiety (OR = 1.648; 95% CI: 0.823–4.255) among CKD patients. Patients from nuclear family had significantly higher prevalence of developing depression. The odds of developing depression in patients with poor social support were 9.277 times higher (OR = 9.277; 95% CI: 1.673–70.356). Monthly income was highly associated with higher prevalence of developing depression (OR = 1.937; 95% CI: 1.022–3.283) and anxiety (OR = 1.736, 95% CI: 0.821–2.937). The odds of developing depression and anxiety with duration of dialysis among CKD patients were 2.328 times (95% CI: 1.106-3.349) and 3.232 times (95% CI: 1.628-7.283) higher. Creatinine level were associated with higher prevalence of developing depression (OR = 1.934; 95% CI: 1.092–2.845) and anxiety (OR = 2013; 95% CI: 1.134–3.744). Conclusion: Depression and anxiety were associated with some clinical and socio-demographic variables viz. perceived social support, monthly income, duration of dialysis, type of family and creatinine level.

Keywords: Chronic kidney disease, depression, anxiety

Patients with chronic diseases are at a higher risk for psychological distress [1]. On the other hand, symptoms of chronic disease are deteriorated in the presence of co-morbid anxiety or depressive disorders [2,3]. Psychological symptoms not only have a substantial negative impact on the quality of life [4], but also on the course and outcome of the chronic disorders [5] as well as on mortality, morbidity, and service utilization [6-8]. The mental distress also plays a role in increasing noncompliance with medical treatment recommendations [9].

Chronic kidney disease (CKD) is considered a public health problem worldwide and it affects an estimated 10% of the global population. CKD

is a progressive and irreversible destruction of renal function and determined by the presence of kidney injury, the level of renal function, assessed according to the glomerular filtration rate. Following the criteria proposed by the National Kidney Foundation, 2002, the CKD is divided into five stages, classified according to the degree of the patient's renal function. Until the fourth stage of the disease, the so-called "conservative treatment" is recommended. In more advanced stages, called end-stage renal disease (ESRD), i.e., when the kidneys can no longer maintain homeostasis of the body, the patient will depend on one of the modalities of renal replacement therapy (RRT): dialysis or kidney transplant. Remarkable advances in the understanding and treatment of ESRD have been achieved over the last 20 years. However, most of the investigations have focused on medical factors, many of which are fixed features. Over recent years, there has been increasing attention given to the individual characteristics of patients with an emphasis placed on understanding the effects the patients' social situation, perceptions and responses to the illness, their physicians and healthcare providers, their spouses and families, and their socioeconomic status have on outcomes. Although this area of "psycho nephrology" [10] has been a subject of research for many years, recent work in patients with [11,12] and without renal disease [13] has advanced our understanding of the interaction of psychological factors with medical outcomes.

Depression and anxiety are characterized as one of the most assessed psychological aspects regarding studies on patients with renal failure; however, there is a difficulty in recognizing its true extent in this population. This is due to methodological variations among studies (such as the diversity of instruments applied, which does not allow a comparison of results) and the difficulty of diagnosis generated by similarity of somatic symptoms present in depression and uremic symptoms, which leads to an increased number of false-positive cases.

Psychiatric disorder is largely under-diagnosed in CKD populations [14]. The evaluation of depression and anxiety in patients during early stages of CKD becomes important, since its influence on quality of life and mortality rates is demonstrated by the literature. On the psychological level, starting dialysis requires a complex emotional and cognitive-behavioral adaptation from patients. Profound experience of role transitions is common among people in this period. People whose kidney functions decline fast or who are not aware of their illness until its final stage become suddenly "severely ill." Autonomous adults who used to exercise control over their lives become dependent on healthcare professionals and on their own family members. Those used to maintain households may become unemployed.

These show the importance and necessity of finding the scientific and practical ways in order to deal properly with psychological problems, especially depression and anxiety in dialysis and management of the disease. However, most of the studies evaluating patients in terminal stage of the disease and research assessing patients under pre-dialysis treatment are scarce. In this study, we select CKD patients of stage 3-5 and 5D and have assessed the spectrum of anxiety and depression in these patients. Symptoms of anxiety and depression are assessed using the Hospital Anxiety and Depression Scale (HADS), Beck's Depression Inventory (BDI) and Hamilton Anxiety Rating Scale (HAM-A).

Materials and Methods

A hospital based cross sectional observation study was conducted among the chronic kidney disease patients attending MRU ward, Nephrology OPD and Transplantation Clinic of department of Nephrology, at SSKM Hospital & IPGMER, Kolkata. The study was conducted for the period of February, 2015 to December, 2016. Ethical clearance was taken from the Institutes Ethical committee before conducting the study. A sample size of 104 chronic kidney disease (CKD) patients was included in the study for analysis. Consecutive and purposive sampling was done to include the subjects into the study. All patients according to inclusive and exclusive criteria were included for interview and subsequent analysis and interpretation. Patients of chronic kidney disease (CKD stages 3- 5D) who gave written informed consent were included in the study.

Exclusion Criteria: Person who did not give consent, suffering from any concomitant disease

Table-1: Etiology of chronic kidney disease (CKD) by age group (n=104)

Age group (years)	Native Kidney Disease					
	DN	HTN	Obstructive uropathy	CGN	Others (unknown)	Total
20 – 29	1	2	1	2	6	12
30 – 39	3	5	0	2	7	16
40 – 49	11	4	1	3	6	25
50 +	23	14	4	2	7	50
Total	38	25	6	9	26	104

Table-2: Stages of chronic kidney disease (CKD) by age group (n=104)

Age group (years)	Stage of CKD				
	III	IV	V ND	VD	Total
20 – 29	0	4	3	5	12
30 – 39	1	3	4	9	17
40 – 49	2	6	8	9	25
50 +	1	15	19	15	50
Total	4	28	34	38	104

or infection, or have past or concomitant history of psychiatric illness, or have history of any psychiatric medication intake, or patients not willing to be included in the study were excluded from the study.

All the information including socio-demographic and medical were collected preparing a detailed questionnaire. Demographic information including age, gender, marital status, level of education, employment status, household income, familial background (rural/urban), and family system (i.e. joint or nuclear) were collected for each patients. Medical information including basic clinical information about approximate onset and duration of CKD and end stage renal disease (ESRD), duration of dialysis, current medication (immunosuppressant group and steroid), blood report of renal functions (serum creatinine), report of blood sugar and blood pressure were also collected. Medical information related to renal function and co-morbid conditions were gathered from medical records. Symptoms of anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS), Beck's Depression Inventory and Hamilton Anxiety Rating Scale (HAM-A).

Results

A total of 104 CKD patients were selected and assessed for presence or absence and severity of depression, and anxiety. Among CKD patients 76 (73.07%) were male, 50 (47.6%) patients were of age more than 50 years, 70 (67.30%) patients were live in joint family, 94 (90.38%) patients lived with spouse. Most common etiology of CKD found to be diabetic nephropathy (n=38, 36.53%), followed by unknown cause (n=26, 25%). Patients with CKD stage-5D were 38 (36.53%) in number followed by stage-5ND and stage-4. Among patients, 65.38% had primary or elementary level education, 19.23% had secondary level and 15.38% had qualification of graduate or more. Among patients almost 80% were self-employed like farmer, cultivator, clay worker, carpenter, tailor etc. and either housewife or student. Almost 21.15% of the patients perceived that they are living in the condition of poor social support, the rest i.e. 78.84% perceived it to be good and they get help from relatives and neighbours in case of need.

Among CKD patients 82 (78.84%) patients had some form of depression and 80 (76.92%) were suffering from clinical anxiety.

Table-3: Comparison in CKD patients with and without depression in term of socio-demographic and clinical variables

Variables	CKD with depression (N=82)	CKD without depression (N=22)	OR (95% CI)	P-value
Age	46.80±14.22	49.59±11.35		0.339
Gender				
Male	58	18	1	0.298
Female	24	4	1.86 (0.57, 6.08)	
Perceived social support				
Good	55	27	1	0.008
Poor	21	1	10.31 (1.32, 80.75)	
Type of family				
Nuclear	25	9	2.48 (1.01, 6.06)	0.011
Joint	37	33	1	
Marital Status				
Unmarried	8	2	1	0.925
Married	74	20	0.93 (0.18, 4.70)	
Residence				0.665
Rural	34	8	1	
Urban	48	14	0.81 (0.30, 2.14)	
Occupation				
Service	4	1	1	0.550
Business	6	2	0.75 (0.05, 11.31)	
Self-employed	40	14	0.71 (0.07, 6.94)	
No occupation	32	5	2.00 (0.19, 21.62)	
Education level	6.44±3.52	7.23±4.53		0.470
Monthly income (INR)	5557.32±4650.39	8409.09±1074.6		0.000
Duration of CKD	17.56±14.80	20.23±17.78		0.525
Duration of dialysis	2.88±4.46	1.00±2.26		0.008
Hemoglobin	8.88±1.67	9.52±1.78		0.139
Creatinine	6.28±3.51	4.65±2.18		0.009
Albumin	3.28±0.29	3.39±0.59		0.219
Presence of anxiety				
Absent	13	11	1	
Present	9	71	9.32 (3.23,26.94)	0.000

Table-4: Comparison in CKD patients with and without anxiety in term of socio-demographic and clinical variables

Variables	CKD with anxiety (N=80)	CKD without anxiety (N=24)	OR (95% CI)	p-value
Age	45.90±13.43	52.38±13.51		0.041
Gender				0.346
Male	62	14	1	
Female	25	3	1.88 (0.50, 7.12)	
Perceived social support				
Good	58	24	1	0.006
Poor	21	1	8.69 (1.11, 68.30)	
Type of family				0.542
Nuclear	28	6	1.38 (0.49, 3.93)	
Joint	54	16	1	
Marital Status				0.643
Unmarried	7	3	1	
Married	72	22	1.40 (0.33, 5.89)	
Residence				0.817
Rural	31	11	1	
Urban	47	15	1.11 (0.45, 2.74)	
Education level	6.74±3.87	7.38±5.22		0.582
Monthly income (INR)	5377.50 ± 4453.045	8770.83 ± 1056.705		0.000
Duration of CKD	17.93±14.903	18.79±17.38		0.811
Duration of dialysis	3.16±5.497	0.21±1.021		0.000
Hemoglobin	8.84±1.77	9.60±1.34		0.029
Creatinine	6.38±3.18	4.52±2.48		0.004
Albumin	3.27±0.321	3.41±0.514		0.110

Table-3 shows the comparison between two groups of CKD patients (with or without depression) in terms of socio-demographic and clinical variables. Statistically significant difference (p-value<0.05) has been found between two groups in respect of perceived social support, type of family, family monthly income, duration of dialysis and creatinine level. No statistically significant difference has been found between groups in respect of age, gender, marital status, type of residence, education level, duration of CKD, hemoglobin and albumin level. Table 1 showed poor social support had more than tenth odds (Odds Ratio (OR): 10.31, 95% Confidence Interval (CI): 1.32, 80.75) to have depression. Patients from nuclear family had higher prevalence of developing depression (OR: 2.48, 95% CI: 1.01, 6.06). Female showed almost twice odds (OR: 1.86, 95% CI: 0.57, 6.08) of developing depression. Table-5 shows the comparison between two groups of CKD patients (with or without anxiety) in terms of socio-demographic and clinical variables. Statistically significant difference has been found between groups in respect of social support, family monthly income, duration of dialysis and creatinine value. Female patients had higher odds of having anxiety (OR: 1.88, 95% CI: 0.50,

Table-5: Outcome of Multivariate logistic regression: Depression & Anxiety

Parameter	OR	SE	95% CI
Depression			
Gender	1.934	0.125	(0.825, 4.284)
Perceived social support	9.277	1.343	(1.673,70.356)
Type of family	2.649	0.948	(1.384,6.421)
Monthly income	1.937	0.742	(1.022,3.283)
Duration of dialysis	2.328	0.869	(1.106,3.349)
Creatinine level	1.934	0.624	(1.092,2.845)
Anxiety			
Gender	1.648	0.127	(0.823,4.255)
Perceived social support	8.931	1.482	(1.831,52.421)
Monthly income	1.736	0.739	(0.821,2.937)
Duration of dialysis	3.232	1.387	(1.628,7.283)
Creatinine level	2.013	0.558	(1.134,3.744)

7.12) than male. Patients perceived poor social support showed more than 8 times odds (OR: 8.69, 95% CI: 1.11, 68.30) of developing anxiety

The risk factors of developing depression and anxiety were identified using the preliminary analysis. The variables that were found to be significantly associated with depression and anxiety were further considered for multivariate analysis. Gender, perceived social support, type of family, family monthly income, duration of dialysis and creatinine level were associated with depression and anxiety of CKD patients. A multivariate logistic analysis was performed using these variables as covariates for depression and anxiety separately. The results of multivariate logistic analysis of depression are reported in Table 5. Odds ratios together with their corresponding standard errors and 95% CIs are presented. The results indicate that female had higher prevalence of developing depression (OR = 1.934; 95% CI: 0.825–4.284) and anxiety (OR = 1.648; 95% CI: 0.823–4.255) among CKD patients. Patients from nuclear family had significantly higher prevalence of developing depression. The odds of developing depression in patients with poor social support were 9.277 times higher (OR = 9.277; 95% CI: 1.673–70.356). Monthly income was highly associated with higher prevalence of developing depression (OR = 1.937; 95% CI: 1.022–3.283) and anxiety

(OR = 1.736, 95% CI: 0.821–2.937). The odds of developing depression and anxiety with duration of dialysis among CKD patients were 2.328 times (95% CI: 1.106-3.349) and 3.232 times (95% CI: 1.628-7.283) higher. Creatinine level were associated with higher prevalence of developing depression (OR = 1.934; 95% CI: 1.092–2.845) and anxiety (OR = 2013; 95% CI: 1.134–3.744).

Discussion

Psychosocial issues are an understudied yet important concern in the overall health of CKD patients. Past studies demonstrated that patients receiving maintenance dialysis experience a multitude of physical and emotional symptoms, a particularly high prevalence of depression, anxiety and significant impairments in QOL [15]. Few studies suggested that patients with advanced CKD who are not dependent on chronic renal replacement therapy experience a comparable overall burden of depression and anxiety. Therefore, there is a need to investigate the occurrence and prevalence of depression and anxiety in CKD particularly in developing countries where there are limited resources for both physical and mental health care. Depressive and anxiety disorders are the most common mental health problems in the CKD population [16]. The present study analyzed the occurrence of depression and anxiety in CKD

(stage 3-5D) and found some positive findings. The assessment of depression is complicated by the considerable overlap of depressive and uremic symptoms [17].

It has been found in this study that 82 (78.84%) patients out of total CKD population were suffering from clinical depression. Among CKD population 37 (35.57%) were only mildly depressed, 39 (37.50%) patients were moderately depressed and 6 (5.76%) were severely depressed as determined by BDI score. The prevalence of depression in CKD patients have varied widely in different studies, in different population using different assessment tools. Prevalence rate is high as 30% have been reported in some studies [19]. The largest study so far has been the Dialysis Outcomes and Practice Patterns Study that assessed the symptoms of depression with >9,000 participants from 12 countries [20] which reported about 43% of patients had scores indicating depression. In one cross sectional study in DMIMS university, Acharya Vinobha Bhave Rural Hospital located in central India, a tertiary hospital, the prevalence of depression among CKD patients was 96.66% while for control group was 5% (p-value<0.000).

The study also found the contribution of demographic factors in influencing the occurrence of depression among CKD patients. The studies on the relationship between age and the psychological impact of CKD generally concluded that younger age is associated with more mental distress than older age [21]. Elderly patients usually compare themselves to their peers who often suffer from other chronic illnesses, and the onset of CKD may be an acceptable life event at this stage of their lives [22]. However, our study found no statistically significant difference found in respect to age in depressed and non depressed group among CKD patients.

Female gender, unemployment, low income, and living alone are risk factors for depression both in the general and CKD populations [23]. Dialysis patients often have to give up their jobs. Gender has been found as a predictor of depression. Most studies associated female gender to increased level of depression [24].

Regarding gender as a contributory factor in causation of depression attributed it to low self-esteem among females that added to their depression [25]. Our study showed that among CKD patients, 76.31% among males & 85.72% among females have depressions and female had higher prevalence of developing depression (OR = 1.934; 95% CI: 0.825–4.284) and anxiety (OR = 1.648; 95% CI: 0.823–4.255) among CKD patients.

Marital stability, satisfaction, and perceptions of hostility have been associated with differential health outcomes in the general population [26]. In our study, among CKD patients; 80% of patients who are single have some form of depression as compared to 78.73% of patients who are in a relationship and the difference is not statistically significant. Previous findings suggest that recipients currently living 'in a relationship' tend to be less depressed than single. Tsunoda et. al found that living alone is the best single predictor of future depression, and recipients living alone were more likely to be depressed as those living with others [27]. These finding are in consistency with previous research reflecting that marital status is a significant predictor of depression. However, no significant association was found in this study in CKD in relation to education level reached by the patients.

Literature revealed a higher percentage of depressed patients among those who were unemployed and those without monthly income [23]. CKD brings a series of losses to the patient and requires some adaptation, including the difficulty of integration into the labour market, due to the physical condition caused by the decease and the dynamics of dialysis treatment. But in our study we did not find any significant association of depression and anxiety with family income.

Anemia is the most common complication of CKD. According to existing data from the U.S. (National Health and Nutrition Examination Survey), the incidence of anaemia in patients of 3rd Stage of CKD is 5.2%, in patients of 4th stage is 44.1%, and in end -stage renal disease patients is universal. Anemia appears clinically as fatigue and/or depression, and key components of quality of life of patients, such as motor activity, sleep, morbidity, social

activity, emotional relationships, anxiety, depression and mental satisfaction are being influenced favorably by correcting anemia [28]. In this study no significant difference found in respect to Hemoglobin level among depressed and non depressed CKD population. Some study suggests that depression influences the nutritional status, indicated by albumin levels [29] and poor nutritional status may mediate the relation between depression and mortality in end-stage renal disease (ESRD). We found no significant association of albumin level with depression and anxiety among CKD patients.

Because sample size must be taken into consideration, failure to have found a statistically significant association between depression and certain clinical variables, such as hemoglobin level, and serum albumin does not mean that an association would not exist if a larger sample were included.

Some study has found a slightly higher percentage of depressive symptoms among patients undergoing haemodialysis compared to patients under conservative treatment of CKD (41.6% vs. 37.3%) [30]. In our study we have found that duration of dialysis among CKD patients were significantly elevated for patients with depression (OR: 2.328, 95% CI: 1.106-3.349) and anxiety (OR: 3.232, 95% CI: 1.628-7.283).

Social support refers to a social network's provision of psychological and material resources intended to benefit an individual's ability to cope with stress. Social support and integration are now acknowledged as important factors in adjustment to chronic and acute illness [31]. Indices of social support correlated with level of depressive symptoms, perception of illness effects, and satisfaction with life in some studies [32]. In our CKD population we have found perceived social support was significantly associated with depression and patients had odds of developing depression with poor social support was 9.277 (95% CI: 1.673–70.356).

Among 82 CKD patients with depression coexistence of anxiety was found in 71 (78.75%) patients and the association was found to be statistically significant (p-value < 0.001). Thirty five (36.08%) patients were found to be suffering

from significant level of anxiety as rated by HAM-A. Those suffering from anxiety were found more depressed (40%) as compared to those who were not suffering from anxiety in whom only 12.9% were seen to be suffering from clinical depression. The relation was found to statistically significant.

In comparison to depression, anxiety disorders have received little clinical attention in the CKD population. In one study in Pakistan in CKD patients, 42.69% had anxiety disorder out of which 47.36% had mild anxiety (HADS 5-9), 28.94% had moderate anxiety (HADS 9-14) and 23.68% had severe anxiety (HADS >15) [34]. In our study we have found that 76.92% of CKD patients were suffering from some form of anxiety.

Several studies reported female patients being more anxious in comparison to males. This finding is also in agreement with several studies indicating that women present a higher prevalence of trait anxiety [35]. In this study, 75% of male and 82.14% of female patients with CKD were suffering from anxiety, but this difference was not statistically significant.

Some studies on the relationship between age and the psychological impact of CKD generally concluded that younger age is associated with more mental distress than older age [21]. In our study, symptoms of anxiety in CKD patient have been noticed to be highly prevalent in average age at 46 years in comparison to without anxiety at average age of 52 years and the difference was found to be statistically significant (p-value < 0.05).

Anxiety has been examined to a lesser degree compared to depression; however, it can be assumed that it also further deteriorates according to the condition of CKD patients [36]. In our study, 75.75% patients on conservative management and 78.94% of patients on hemodialysis showed various levels of anxiety. Also prevalence of anxiety was significantly higher in patients with longer duration of HD (p-value < 0.000).

Socioeconomic status has been shown to have a significant impact on the incidence and treatment of CKD ESRD. Norris and Agodoa [37] have developed a model highlighting how

socioeconomic factors such as low income, poor education, residence in low-income areas, and poor access to health care are strong predictors of the development of ESRD. In our study anxiety was statistically higher in low income group in comparison to higher income group (p-value < 0.01).

Regarding the effect of socioeconomic status, patients in the lower range face many problems, including poorer mental and general health and lower social well-being, whereas higher economic and educational level is associated with higher health-related QoL [38]. Concerning marital status, being married is related to better physical well-being as well as emotional health [39]. No significant statistical co relation was found in this study in relating type of family, religion, type of residence (rural/urban), and occupation as predictor of anxiety in CKD group. Also no statistically significant difference found among anxious and non anxious group in relation to education level, duration of CKD, hemoglobin and albumin level in CKD patients.

In our study perceived social support was significantly associated with anxiety and patients had odds of developing anxiety with poor social support at 8.931 (95% CI: 1.831–52.421). Creatinine was significantly higher for CKD patients suffering from anxiety with odds of 2.013 (95% CI: 1.134, 3.744).

It has been found in our study that in CKD group; combined depression and anxiety was associated with each other in statistically significant number of patients.

Conclusion

Modern medical technology can effectively extend the survival rate of patients with chronic diseases. However, the physical and mental distress that results from disease symptoms and their treatment may induce negative mood in the patient and can influence quality of life. In our study, we have found significant prevalence of depression and anxiety in various stages of CKD patients. We have also found significant association between many socio demographic and clinical parameters and psychiatric co-morbidity. This study has probably emphasized the fact that healthcare providers should consider these findings as a reference for designing a standard rehabilitation program for CKD patients. Ensuring that mental health services are available to patients with CKD may be important first step to help them better psychologically adapt to their disease and possibly as important as improving the survival rate of patients with this chronic and life threatening disease.

To conclude, we must say that further long term, multi-centric, studies involving large patient group are necessary in this field. Assessment of pharmacological and cognitive behavioral therapy is of utmost importance. Our study in that sense is a short of eye opener work, especially in this part of India.

Conflict of interest: The authors declare no conflict of interest, as this research was undertaken solely for scientific purposes.

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