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Prevalence of Depression in Pre-Dialytic Chronic Kidney Disease Patients Attending at a Tertiary Care Hospital in Bangladesh

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Abstract

Background: Depression is a common and serious medical illness around the world. It occurs more frequently in patients with chronic illness than in the general population. It is a common psychiatric problem in patients with chronic kidney disease (CKD). **Objective:** To assess the level of depression in pre-dialytic CKD patients attending at a tertiary care hospital in Bangladesh. **Methodology:** This cross sectional study was conducted at Department of Nephrology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from January 2020 to June 2020. A total of 100 pre-dialytic CKD patients were selected by convenience sampling technique and their level of depression was assessed by Zung Self-Rating Depression Scale (ZSDS). Data were collected by existing questionnaire with face to face interview and analyzed by statistical test. **Results:** The mean age of the participants was 49.70 ± 11.80 years. Among them 64% were male, 95% were muslim, 98% were married, 65% were completed secondary/above higher secondary level education, 65% were unemployed and 55% were lived in urban area. It was observed that 65% participants were economically dependent to their family, only 6% were engaged in regular exercise, 14% had family history of depression, 8% were

smoker and 12% were alcohol/drug abuser. According to the Zung Self-Rating Depression Scale (ZSDS) we found 29% participants were mildly depressed, 39% participants were moderately depressed and 18% participants were severely depressed. Prevalence of depression was 86% in pre-dialytic CKD patients. Of them, 7% was in CKD stage-I, 17.4% was in CKD stage-II, 19.8% was in CKD stage-III, 22.1% was in CKD stage-IV and 33.7% was in CKD stage-V. **Conclusion:** Depression is highly prevalent in pre-dialytic CKD patients and more frequent in the advanced stages of CKD.

Keywords

Chronic Kidney Disease (CKD), Depression, Zung Self-Rating Depression Scale (ZSDS)

1. Introduction

Depression is a mental state that affects the mental functioning and thinking process of an individual, greatly diminishing one's social roles and productivity [1]. Symptoms of depression include: depressed mood most of the time, loss of interest in most of the activities, loss of pleasure for most of the time. Other symptoms of depression include: significant weight loss or gain, insomnia/hypersomnia, fatigue, psychomotor agitation or retardation, feeling worthless, excessive guilt, inability to concentrate, thought of death and suicidal tendency [2]. Depression is a disorder of major public health importance, in terms of suffering, dysfunction, morbidity and economic burden [2]. Depression affects people of all ages in all countries. The World Health Organization estimates that depression will become the second most important cause of disability after ischemic heart disease worldwide by 2030 [3].

The neurobiological approaches to etiology of depression postulate that there may be alteration in monoamines receptors as well as in the concentration or the turnover of the amines [4]. There may be a disorder of the hypothalamic center controlling the endocrine system found in patients with depression [4]. Depression occurs more frequently in patients with chronic illness than in the general population [5]. Recent clinical research showed a higher prevalence of depression in the chronic disease patients. The rates vary between the various diagnoses but have been estimated to be 10% - 40% [5] [6]. This prevalence rate is 2 to 8 times higher than that in general population [6]. Therefore, understanding the relationship between depression and chronic disease patients is important to assess and manage approaches that are vital in chronic medical illness.

Chronic kidney disease (CKD) is a global health problem equally affecting the people of developed countries as well as developing countries [7]. CKD causes enormous economic losses, and also triggers major challenges in regards to health. CKD patients had an 83% higher rate of all-causes of mortality [7]. The worldwide prevalence of chronic kidney disease is 7% - 10% [8] [9] [10]. CKD is

the high-stress illness because of the chronicity of the disease and its long-term treatment. People with various stages of CKD experience a high burden of somatic symptoms, impaired quality of life and role impairment that may predispose them to increased risks of depression [11]. Due to the irreversible nature and poorer prognostic outcomes, psychiatric disorders especially depression are common among patients with CKD [7]. The reported prevalence of depression in CKD ranges between 20% and 30% compared with 2% to 4% in the general population [7] [12]. Recently, a study demonstrated that depression in pre-dialytic CKD patients was linked to a 86% higher risk of adverse events including death, early dialysis initiation or hospitalization risk; suggesting that depression is a matter of great concern during the routine care of CKD patients [13]. But there is scarce evidence to assess the depression among pre-dialytic CKD patients in Bangladesh. Therefore this study was aimed to evaluate the level of depression in pre-dialytic CKD patients attending at a tertiary care hospital in Bangladesh.

2. Methodology

This prospective cross sectional study was conducted at Department of Nephrology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from January 2020 to June 2020. A total of one hundred (100) pre-dialytic chronic kidney disease (CKD) patients were selected as study population following selection criteria by using convenience sampling technique. Sample size was estimated by using, $n = z^2 (p \times q)/d^2$ formula; where allowable error 5% with 95% confidence level. Assuming 8.7% prevalence of depression in chronic disease patients [12], the required sample size was 246. Because it was a single centre study and time constraints, a total of 100 patients were studied. After ethical approval of the study, due permission was taken from the respective authority for data collection. CKD patients attending at the out-patient department of Nephrology, BSMMU were approached for participation in this study. All necessary information was explained to the participants regarding the nature, purpose and objectives of the study along with their rights to the study and asked them to participate in this study. Adult (age > 18 years) chronic kidney disease (CKD stage-I to stage-V) patients of both sexes were included in this study. CKD patients on maintenance haemodialysis (MHD), renal transplant patients, severe physically ill participants and participants having any types of malignancy along with CKD were excluded from the study. In this study each patient's estimated glomerular filtration rate (e-GFR) was calculated by Cockcoft-Gault (CG) formula, then according to the e-GFR patients were assigned in different stages of CKD using *KDIGO, 2012 guideline.

2.1. Definition of Chronic Kidney Disease (CKD)

According to *KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease, CKD is defined as abnormalities of

kidney structure or function, present for >3 months.

2.2. Stages of Chronic Kidney Disease (CKD)

*KDIGO suggested the following stages of CKD.

- Stage 1: normal e-GFR ≥ 90 mL/minute per 1.73 m^2.
- Stage 2: e-GFR between 60 to 89 mL/minute per 1.73 m^2 (mildly decreased renal function).
- Stage 3a: e-GFR between 45 to 59 mL/minute per 1.73 m^2 (Mild to moderately decreased renal function).
- Stage 3b: e-GFR between 30 to 44 mL/minute per 1.73 m^2 (Moderate to severely decreased renal function).
- Stage 4: e-GFR between 15 to 29 mL/minute per 1.73 m^2 (Severely decreased renal function).
- Stage 5: e-GFR of <15 mL/minute per 1.73 m^2 (Kidney failure).

[*KDIGO = Kidney Disease Improving Global Outcomes].

2.3. Data Collection Tool

Two (2) questionnaires were used for data collection. These were Socio-Demographic Data Assessment Questionnaire and Zung Self-Rating Depression Scale (ZSDS).

The Socio-Demographic Data Assessment Questionnaire was used to collect the participant's personal information including: age, gender, marital status, religion, educational qualification, employment status, place of residence, personal history, disease related information etc.

The Zung Self-Rating Depression Scale (ZSDS) was designed by W. W. Zung to assess the level of depression. The ZSDS is widely validated a short self-administered survey to quantify the depressed status of a patient. There are 20-weighted items on the scale that rate the four common characteristics of depression: the pervasive effect, the physiological equivalents, other disturbances and psychomotor activities. There are ten positively worded and ten negatively worded questions. Each question is scored on a scale of 1 - 4 (a little of the time, some of the time, good part of the time, most of the time). The ZSDS scores range from 20 - 80 and the cut off for defining depression is 50. The score of 50 - 59 indicates mild depression, score 60 - 69 is indicative of moderate depression while score ≥ 70 is severe depression [14]. The ZSDS questionnaire was translated into Bangla language for patients who did not understand English. This Bangla translation was evaluated by a team comprises of practicing psychiatrist and an expert in English literature whose native language is Bangla.

2.4. Data Collection Procedure

Informed written consent was taken from each participant prior to enrollment in the study. Data were collected on questionnaires by face-to-face interview.

Each participant was requested to response particular questions of the questionnaires. Then screening of the questionnaires to check the completeness of each question was done.

2.5. Data Analysis

Data cleaning validation and analysis was performed using the Statistical Package for Social Science (SPSS) version 26.0 software. Categorical data were presented as frequency/percentage and continuous variable was expressed as mean ± SD (standard deviation). The statistics used to analyze the data were descriptive statistics and Chi-square test was performed. The level of significance was set at 0.05 and a p value < 0.05 was considered as significant.

3. Results

A total of one hundred (100) pre-dialytic chronic kidney disease (CKD) patients participated in this study (Table 1). Their age ranged from 24 to 70 years and mean (±SD) age was 49.70 ± 11.80 years. The majority (64%) of the participants were male and most (95%) of the participants were Muslim. A large percentage (98%) of the participants was married. Almost one-third of the study participants (31%) had secondary level education and another one-third (34%) had higher secondary and above level education. The data also revealed that 65% of the study participants were unemployed and among the employed (35%) participants 40% were service-holder, 14.3% were businessmen, 45.7% were engaged in other occupations. Regarding the place of residence, more than half (55%) of the participants were lived in urban areas.

It was observed that 65% participants were economically dependent to their family, only 6% were engaged in regular exercise, 14% had family history of depression, 8% were smoker and 12% were alcohol/drug abuser (Table 2).

According to *KDIGO 2012 Guideline, among total 100 pre-dialytic CKD patients; 8 were in CKD stage-I, 18 were in CKD stage-II, 24 were in CKD stage-III, 21 were in CKD stage-IV and 29 were in CKD stage-V (Table 3).

On the basis of Zung Self-Rating Depression Scale (ZSDS) we found 29% participants were mildly depressed, 39% participants were moderately depressed, 18% participants were severely depressed and 14% participants had no depression. The mean Zung score of the study participants was 58.9 (±9.54) (Table 4).

There was no significant association between the severity of depression in pre-dialytic CKD patients with different socio-demographic parameters like—age group, gender, religious belief, marital status, level of educational, employment status and place of residence ($p > 0.05$) (Table 5).

No significant association was observed between depression in pre-dialytic CKD patients with their personal characteristics like-economic dependency, regular exercise, family history of depression, smoking habit and alcohol/drug abuse ($p > 0.05$) (Table 6).

In this study depression was observed in 86 pre-dialytic CKD patients among

Table 1. Basic data of the study patients (N = 100).

Variables	Frequency	Percentage (%)
Age group (years)		
20 - 30	7	7.0
31 - 40	24	24.0
4 1- 50	23	23.0
51 - 60	33	33.0
61 - 70	13	13.0
Mean ± SD	49.70 ± 11.80	
Range	(24 - 70) years	
Gender		
Male	64	64.0
Female	36	36.0
Male:Female ratio	1.8:1	
Religion		
Muslim	95	95.0
Hindu	5	5.0
Marital status		
Married	98	98.0
Unmarried	1	1.0
Widow	1	1.0
Educational status		
Illiterate	18	18.0
Primary	17	17.0
Secondary	31	31.0
Higher secondary and above	34	34.0
Employment status		
Employed	35	35.0
Service	14	40.0
Business	5	14.3
Others	16	45.7
Unemployed	65	65.0
Place of residence		
Urban	55	55.0
Rural	45	45.0

Table 2. Distribution of the study patients by personal characteristics (N = 100).

Variables	Frequency	Percentage (%)
Economically dependent	65	65.0
Regular exercise	6	6.0
Family history of depression	14	14.0
Smoking habit	8	8.0
Alcohol/drug abuse	12	12.0

Table 3. Distribution of the study patients by CKD stages (N = 100).

CKD stage	Frequency	Percentage (%)
Stage-I	8	8.0
Stage-II	18	18.0
Stage-III	24	24.0
Stage-IV	21	21.0
Stage-V	29	29.0
Total	100	100.0

Table 4. Distribution of the study patients by severity of depression (N = 100).

Severity of depression	Frequency	Percentage (%)
Normal (20 - 49)	14	14.0
Mildly depressed (50 - 59)	29	29.0
Moderately depressed (60 - 69)	39	39.0
Severely depressed (>70)	18	18.0
Total	100	100.0
Mean Zung score (±SD)	58.9 ± 9.54	

total 100 pre-dialytic CKD patients. Therefore depression was prevalent in 86% pre-dialytic CKD patients. Of them 7.0% was in CKD stage-I, 17.4% was in CKD stage-II, 19.8% was in CKD stage-III, 22.1% was in CKD stage-IV and 33.7.0% was in CKD stage-V respectively. It has been observed that depression was significantly more frequent in the advanced stages of CKD (p = 0.032) (**Table 7**).

4. Discussion

Depression is becoming a very important issue in modern society. It is more frequent in patients with chronic illnesses than in the general population. Due to the irreversible nature and poorer prognostic outcomes, depression is frequently common among patients with chronic kidney disease (CKD). The current study aimed to identify the depression of pre-dialytic CKD patients at a tertiary care hospital in Bangladesh. A total of 100 pre-dialytic CKD patients were enrolled in this study. Their age ranged from 24 to 70 years, with the mean age of 49.70 ± 11.80 years. A couple of similar studies found the mean age of CKD patients was 43.6 ± 15.1 years [15] and 46.55 ± 12.09 years [16], which were consistent with this current study. Although, our finding was inconsistent with the study carried out in Taiwan which revealed that the mean age of participants' was 65.70 ± 12.37 years [17]. The majority (64%) of the participants were male and this finding was consistent with related previous studies as reported that male participants were 61.9% [15], 69.6% [18] and 52% [19]. Most of our participants (98%) were married, in accordance Chiang *et al*. [17] found 93% married in their study population. While Uzzal, *et al*. [18] found 7.9% married subjects suffering depression in their 275 study population, that finding was different from our study.

Table 5. Association of depression of pre-dialytic CKD patients with different socio-demographic parameters (N = 100).

Variables	Depression		p-value
	Present (n = 86) No. (%)	Absent (n = 14) No. (%)	
Age group (years)			
20 - 30	5 (5.8%)	2 (14.3%)	
31 - 40	22 (25.6%)	2 (14.3%)	
41 - 50	18 (20.9%)	5 (35.7%)	0.471
51 - 60	29 (33.7%)	4 (28.6%)	
61 - 70	12 (14.0%)	1 (7.1%)	
Gender			
Male	57 (66.3%)	7 (50.0%)	0.239
Female	29 (33.7%)	7 (50.0%)	
Male: Female ratio	1.9:1	1:1	
Religion			
Muslim	82 (95.3%)	13 (92.9%)	0.692
Hindu	4 (4.7%)	1 (7.1%)	
Marital status			
Married	84 (97.7%)	14 (100.0%)	
Unmarried	1 (1.2%)	0 (0.0%)	0.847
Widow	1 (1.2%)	0 (0.0%)	
Level of educational			
Illiterate	14 (16.3%)	4 (28.6%)	
Primary	15 (17.4%)	2 (14.3%)	0.582
Secondary	26 (30.2%)	5 (35.7%)	
Higher secondary above	31 (36.0%)	3 (21.4%)	
Employment status			
Employed	29 (33.7%)	6 (42.9%)	0.506
Unemployed	57 (66.0%)	8 (57.1%)	
Place of residence			
Urban	48 (55.8%)	7 (50.0%)	0.685
Rural	38 (44.2%)	7 (50.0%)	

Chi-square test was used to analyze data.

In our study more than half (65%) of the study participants had secondary/higher secondary and above level education, in this series one third (33.2%) of the study patients were illiterate and half (50.3%) of them had education up to secondary school level as showed by Uzzal *et al.* [18]; while Chiang et al. [17] observed 74.8% had a low level of education in their study population. The data of our study also reveals that almost two-third (65%) of the participants were unemployed. In this context, Uzzal, *et al.* [18] reported that about three-fourth of their study patients (72.2%) were unemployed. More than half (55%) of our

Table 6. Association of depression in pre-dialytic CKD patients with their personal characteristics (N = 100).

Variables	Depression		p-value
	Present (n = 86) No. (%)	Absent (n = 14) No. (%)	
Economic dependency			
Dependent	55 (64.0%)	10 (71.4%)	0.587
Independent	31 (36.0%)	4 (28.6%)	
Regular exercise			
Yes	5 (5.8%)	1 (7.1%)	0.846
No	81 (94.2%)	13 (92.9%)	
Family history of depression			
Yes	14 (16.3%)	0 (0.0%)	0.104
No	72 (83.7%)	14 (100.0%)	
Smoking habit			
Yes	8 (9.3%)	0 (0.0%)	0.234
No	78 (90.7%)	14 (100.0%)	
Alcohol/drug abuse			
Yes	9 (10.5%)	3 (21.4%)	0.242
No	77 (89.5%)	11 (78.6%)	

Chi-square test was used to analyze data.

Table 7. Association of depression of pre-dialytic CKD patients with CKD stages (N = 100).

CKD stage	Depression		p-value
	Present (n = 86) No. (%)	Absent (n = 14) No. (%)	
Stage-I	6 (7.0%)	2 (14.3%)	0.032[s]
Stage-II	15 (17.4%)	3 (21.4%)	
Stage-III	17 (19.8%)	7 (50.0%)	
Stage-IV	19 (22.1%)	2 (14.3%)	
Stage-V	29 (33.7%)	0 (0.0%)	
Total	86 (100.0%)	14 (100.0%)	

Chi-square test was used to analyze data, s = significant.

study participants lived in urban area, in accordance Uzzal *et al.* [18] observed that most of their study patients (64.9%) lived in urban area.

Several studies around the world have been performed to determine the validity and optimal cut-off scores for depression using different screening tools. In this study the level of depression was assessed by the Zung self rating depression scale (ZSDS). In present study the mean Zung score of the study participants was 58.9 (±9.54), depression was observed in 86% pre-dialytic CKD patients and we

found that depression was more frequent in the advanced stages of CKD. These findings were consistent with similar previous studies [16] [18] [20] [21]. The possible reason for more depression in pre-dialytic CKD patients may be due to the emotional reaction to the disease and inability to afford treatment expenditure. Our data revealed that, 29% participants have mild depression, 39% have moderate depression, 18% have severe depression and only 14% have no depression among total100 study participants. Similar previous study showed that; mild depression was 32.3%, moderate depression was 50.0% and severe depression was 8.6% among total 266 CKD patients [16]. Another related study reported that mild, moderate and severe depression among 226 CKD patients were 28.3%, 25.6% and 7.96% respectively [21]. The results of the current study were partially supported by the findings of these previous studies.

Different studies across the world on depression in CKD patients showed different results regarding socio-demographic variables. In this study total score of the ZSDS was not associated with different variables of socio-demographic characteristics in pre-dialytic CKD patients. These findings were not comparable with previous studies and possible explanation could be the ethnic diversity [17] [19] [22]. On the other hand, in present study we didn't find any association between depression in CKD patients with their economic dependency, regular exercise, family history of depression, smoking habit and alcohol/drug abuse. These results were consistent with a similar previous study [18].

This study demonstrated that depression is frequently prevalent in pre-dialytic CKD patients. This could be due to a lot of contributory factors which may range from emotional reaction to the diagnosis of disease to the treatment modalities, as well as losses experienced in terms of health and finances of the patient. An early diagnosis and proper treatment of depression in pre-dialytic CKD patients could improve their quality of life.

5. Conclusion

This study concluded that depression is highly prevalent in pre-dialytic CKD patients and more frequent in the advanced stages of CKD. The findings of this study might be helpful for professionals to evaluate the pre-dialytic CKD patients in psychological background.

Recommendations

A population based multi-center study with large sample size should be done for better evaluation of depression in pre-dialytic CKD patients.

Limitations of the Study

It was a single center study with a relatively small sample size.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Questionnaire (English Version)

Research Title: Prevalence of Depression in Pre-Dialytic Chronic Kidney Disease Patients Attending at a Tertiary Care Hospital in Bangladesh.

These questionnaires are to identify the prevalence of depression among pre-dialytic chronic kidney disease patients. There are two parts of the questionnaire, including.

1) Part I: Socio-Demographic, Personal history & Disease Related Questionnaire.

2) Part II: Zung-Self Rating Depression Scale (ZSDS).

PART-1:

Date & time ID NO

Instructions

This questionnaire aims to obtain information about current general data consist of socio-demographic data, personal history and disease related information. Researcher will fillup the data by interviewing the participant individually. The participant is ensured that all information will be kept confidential and will be used only for research purpose. There will be no name use in this questionnaire.

a. Socio-demographic characteristics of participant

Please tick (√) the relevant number for any option chosen and written in the space providing for the answers.

1. Age ……...(years)

2. Gender 1. Male 2. Female

3. Religion 1. Muslim 2. Hindu 3. Christian 4. Buddhists

4. Marital status 1. Married 2. Unmarried 3. Divorced 4. widows

5. Educational level 1. Illiterate 2. Primary 3. Secondary 4. Higher Secondary and above

6. Employment status 1. Employed 2. Unemployed

7. Occupation (If employed) 1. Service 2. Business 3. Student 4. Others

8. Place of Residence 1. Urban 2. Rural

b. Personal history:

1. Economically dependence to others 1. Dependent 2. Independent

2. Regular exercise 1. Yes 2. No

3. Smoking habit 1. Yes 2. No

4. Drug abuser 1. Yes 2. No

c. Disease related information:

1. Family history of depression 1. Yes 2. No

2. CKD-Stages 1. Stage-I 2. Stage-II 3. Stage-III 4. Stage-IV 5. Stage-V

PART-II: Zung Self-Rating Depression Scale (ZSDS)

For each item below, please place a check mark (√) in the column which best describes how often you felt or behaved this way during the past several days.

Place check mark (√) in correct column.	A little of the time	Some of the time	Good part of the time	Most of the time
I feel down-hearted and blue.				
Morning is when I feel the best.				
I have crying spells or feel like it.				
I have trouble sleeping at night.				
I eat as much as I used to.				
I still enjoy sex.				
I notice that I am losing weight.				
I have trouble with constipation.				
My heart beats faster than usual.				
I get tired for no reason.				
My mind is as clear as it used to be.				
I find it easy to do the things I used to.				
I am restless and can't keep still.				
I feel hopeful about the future.				
I am more irritable than usual.				
I find it easy to make decisions.				
I feel that I am useful and needed.				
My life is pretty full.				
I feel that others would be better off if I were dead.				
I still enjoy the things I used to do.				