A Study of Evaluating the Psychological Consequences of Treatment Burden in Anaemic CKD Patients Undergoing Haemodialysis

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Abstract:

Backgrounds: Chronic kidney disease (CKD) represents a major non-communicable disease and is associated with substantial global health and economic burden. Anemia is a frequent and unavoidable complication observed in patients with CKD. The present study aimed to examine the psychological impact of treatment burden among anemic patients undergoing hemodialysis, in relation to gender, age, duration of illness, and associated co-morbid conditions. A total of 50 anemic patients receiving hemodialysis, aged between 30 and 70 years, were enrolled based on predefined inclusion and exclusion criteria from various hospitals located in and around district Ropar, Punjab. Treatment burden was evaluated using the Treatment Burden Questionnaire (TBQ). Health-related quality of life was assessed using the validated KDQOL-36™ questionnaire. The findings indicated a high prevalence of anemia, which progressively increased with declining renal function and was more pronounced among dialysis patients. Most participants reported low to moderate levels of treatment burden, with higher burden observed in patients undergoing dialysis. A strong inverse correlation was identified between treatment burden and health-related quality of life. The study concludes that treatment burden among CKD patients should be reduced through effective and comprehensive CKD management strategies.

Keywords: Psychological Impact. Treatment Burden. Anemia Patients. Hemodialysis.

Introduction

Chronic kidney disease (CKD) is a major non-communicable condition and contributes substantially to global economic and health-related burden. The worldwide prevalence of CKD is estimated at 13.4%, with nearly 4.9–7.1 million individuals suffering from end-stage renal disease (ESRD) who require renal replacement therapy [1]. CKD has emerged as a significant global public health concern, as the incidence and prevalence of ESRD have risen steadily over the past three decades.

Anemia is a frequent and unavoidable complication associated with CKD [2]. According to the World Health Organization (WHO), anemia is defined as a hemoglobin concentration of <13 g/dl in men and <12 g/dl in women of reproductive age [3]. Patients with CKD are approximately twice as likely to develop anemia compared to individuals without renal disease, and the prevalence of anemia increases as estimated glomerular filtration rate (eGFR) declines [4]. A strong relationship exists between reduced glomerular filtration and the occurrence of anemia. Anemia generally manifests when GFR decreases to approximately 0.5 mL/s or 0.75 mL/s, particularly in individuals with diabetic nephropathy [5]. It has been reported that nearly 80.5% of CKD patients experience anemia.[4] Studies conducted in South Ethiopia have demonstrated a high prevalence of anemia, with greater severity observed in advanced stages of CKD and among patients undergoing dialysis [6].

The pathogenesis of anemia in CKD is multifactorial. A progressive reduction in endogenous erythropoietin (EPO) production plays a crucial role in the development of anemia [7]. Additional contributing factors include absolute iron deficiency due to blood loss or impaired iron absorption, ineffective utilization of iron stores caused by elevated hepcidin levels, decreased bone marrow responsiveness to EPO, shortened red blood cell lifespan, systemic inflammation related to CKD and associated co-morbidities, and deficiencies of vitamin B12 or folic acid [8]. Early identification and proper management of anemia have been shown to decrease cardiovascular co-morbidities, enhance overall quality of life (QoL), and reduce mortality rates among CKD patients [9,10].

Treatment burden has recently gained attention as an important aspect of chronic disease management [11]. It is defined as the workload placed on patients by healthcare systems and the impact of this workload on their quality of life [12]. Treatment burden primarily encompasses the physical and psychological discomfort associated with ongoing medical care. The level of burden may differ depending on the type and intensity of treatment received [13]. Evidence suggests that increased treatment burden is associated with poor treatment adherence, unfavorable clinical outcomes, lower patient satisfaction with care, gender differences [14],reduced QoL, and higher rates of hospitalization and mortality [15]. CKD is often accompanied by multiple co-morbidities and complications, leading to polypharmacy and complex self-management regimens, which impose considerable treatment-related burden on patients [16].

Despite growing evidence regarding anemia prevalence and psychological morbidity in CKD patients, limited research has specifically explored the psychological impact of treatment burden among anemic patients undergoing hemodialysis, particularly in resource-constrained regions such as Punjab [17,18]. Therefore, the present study was undertaken to investigate the psychological impact of treatment burden in anemia patients receiving hemodialysis, with reference to gender, age, disease duration, and associated co-morbidities.

Materials and Methods

Samples

The present investigation was designed as a hospital-based, cross-sectional analytical study. A total of 50 purposively selected anemic patients undergoing maintenance hemodialysis, aged between 30 and 70 years, were recruited from Dasmesh Healthcare & Hospital, Rupnagar, Punjab, India. The sample size was determined using G*Power software.

The inclusion criteria comprised patients within the age group of 30–70 years who had been receiving maintenance hemodialysis for a minimum duration of six months, diagnosed with CKD stage III–V, identified as anemic, and clinically stable at the time of assessment.

Patients were excluded if they had acute kidney injury (AKI), were younger than 30 years or older than 70 years, had received blood transfusions within the preceding six months, or had previously undergone renal transplantation.

Before data collection, the objectives and procedures of the study were clearly explained to all participants, and written informed consent was obtained from each subject. The study protocol received approval from the Institutional Ethics Committee prior to its commencement.

Methodology

The participants were interviewed only after completion of their dialysis session and when they were in a comfortable and stable condition. A structured and pre-designed proforma was utilized to record sociodemographic characteristics, background information, clinical details, and relevant investigation findings.

Psychiatric co-morbidities were evaluated using the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). Diagnostic categorization of psychiatric disorders was made according to the International Classification of Diseases, 10th Revision (ICD-10) Diagnostic Criteria for Research (DCR). The severity of depressive symptoms was assessed with the Hamilton Depression Rating Scale (HAM-D). Treatment-related burden among the participants was measured using the Treatment Burden Questionnaire (TBQ).

Statistical Analysis

Descriptive statistics, including percentages, were computed for all study variables using the Statistical Package for the Social Sciences (SPSS) version 21.0 (IBM Corp., USA). Parametric variables were evaluated using paired and unpaired *t*-tests as appropriate. The Chi-square test was employed to determine the association between psychological morbidity and treatment burden among anemic patients undergoing hemodialysis. A probability level of 5% ($p < 0.05$) was considered statistically significant.

of illness.

Results

Table 1 presents the gender-wise distribution of anemic chronic kidney disease (CKD) patients undergoing hemodialysis. Out of the total 50 patients included in the study, males constituted a higher proportion, accounting for 34 patients (68.00%), whereas females comprised 16 patients (32.00%).

Table 2 summarizes the demographic characteristics with respect to age and educational status. The majority of patients (27; 54.00%) belonged to the 41–60 years age group. This was followed by 14 patients (28.00%) in the 21–40 years category, 5 patients (10.00%) aged ≤20 years, and 4 patients (8.00%) aged above 60 years. Regarding educational background, the largest proportion of patients were illiterate (20; 40.00%). Patients who had completed secondary education constituted 10 (20.00%), higher secondary 7 (14.00%), primary education 8 (16.00%), and graduates represented 5 (10.00%).

Table 3 depicts the demographic distribution according to occupation, marital status, and monthly income. A substantial proportion of patients were unemployed (35; 70.00%). Homemakers accounted for 7 patients (14.00%), students 3 (6.00%), unskilled workers 2 (4.00%), and both self-employed and skilled workers 1 each (2.00% respectively). In terms of marital status, 31 patients (62.00%) were married, while 19 (38.00%) were unmarried. With respect to monthly income, the largest group of patients (23; 46.00%) had an income between Rs. 6000–10,000. This was followed by 12 patients (24.00%) earning Rs. 10,001–15,000, 9 (18.00%) earning less than Rs. 6000, and 6 (12.00%) in the Rs. 15,001–20,000 income category.

Table 4 outlines the distribution of comorbid physical disorders, psychiatric comorbidities, and duration of CKD. Among physical illnesses, diabetes mellitus was the most prevalent comorbidity, observed in 25 patients (50.00%), followed by hypertension in 22 (44.00%) and thyroid disorders in 5 (10.00%). Regarding psychiatric comorbidity, adjustment disorder was noted in 22 patients (44.00%), depressive disorder in 19 (38.00%), generalized anxiety disorder in 4 (8.00%), mixed anxiety and depression in 3 (6.00%), and mental and behavioral disorders due to harmful alcohol use in 2 patients (4.00%). Concerning the duration of CKD, 22 patients (44.00%) had a disease duration of 0–6 months, 16 (32.00%) between 7–12 months, and 12 (24.00%) had a duration exceeding 12 months.

Table 5 shows the characteristics related to duration and frequency of dialysis, as well as funding for treatment. The majority of patients (26; 52.00%) had been undergoing dialysis for more than three months. This was followed by 14 patients (28.00%) receiving dialysis for 1–3 months, and 10 patients (20.00%) for less than one month. Regarding frequency, 32 patients (64.00%) underwent dialysis three times per week, while 18 (36.00%) received dialysis twice weekly. All patients (100.00%) were non-sponsored and bore the treatment expenses themselves.

Table 6 presents the Hamilton Depression Rating Scale (HAM-D) scores among CKD patients undergoing dialysis. Nearly half of the patients (24; 48.00%) were identified as having a psychiatric disorder. Based on HAM-D scoring, 24 patients (48.00%) fell within the normal range (0–7), 15 (30.00%) had mild depression (8–13), 7 (14.00%) had moderate depression (14–18), 3 (6.00%) had severe depression (19–22), and 1 (2.00%) had very severe depression (>22). Among those diagnosed with psychiatric illness, the majority were within the mild to moderate severity range.

Table 7 demonstrates the association between treatment burden and psychiatric illness. Among patients with psychiatric illness, most (58.33%) reported a high treatment burden, followed by moderate burden (29.17%) and low burden (12.50%). In contrast, among patients without psychiatric illness, the majority (55.00%) experienced low treatment burden. Statistical analysis revealed a highly significant association between treatment burden and psychiatric illness ($\chi^2 = 12.876$, $p = 0.002$).

Table 8 shows the association between sex, education, and occupation with psychiatric illness. No statistically significant association was found between gender and psychiatric illness ($p > 0.05$). However, a highly significant association was observed between educational status and psychiatric illness ($\chi^2 = 9.864$, $p = 0.002$), with a greater proportion of psychiatric morbidity among educated patients. Additionally, a statistically significant association was noted between occupation and psychiatric illness ($\chi^2 = 4.102$, $p = 0.043$), indicating higher psychiatric morbidity among employed individuals compared to unemployed patients.

Table 1: Gender-wise distribution of anemic CKD patients undergoing hemodialysis

Patients	**Absolute No.**	**Percentage**
Male	34	68.00
Female	16	32.00
Total	50	100.00

Table 2: Demographic characteristics of Age and Education in anemic CKD patients undergoing hemodialysis

Characteristics	**Number of cases (%)**
Age (Years)	
≤20	5 (10.00)
21-40	14 (28.00)
41-60	27 (54.00)
>60	4 (8.00)
Education	
Illiterate	20 (40.00)
Primary	8 (16.00)
Secondary	10 (20.00)
Higher secondary	7 (14.00)
Graduate	5 (10.00)

Table 3: Demographic characteristics of Occupation, Marital Status and Monthly Income

Characteristic	**Number of cases (%)**
Occupation	
Homemaker	7 (14.00)
Student	3 (6.00)
Self-employed	1 (2.00)
Skilled	1 (2.00)

Unskilled	2 (4.00)
Unemployed	35 (70.00)
Marital Status	
Married	31 (62.00)
Unmarried	19 (38.00)
Monthly Income (Rs)	
<5000	9 (18.00)
5001-10,000	23 (46.00)
10,001-15,000	12 (24.00)
15,001-20,000	6 (12.00)

Table 4: Comorbid Physical Disorders, Psychiatric Comorbidity and Duration of CKD

Characteristic	**Number of cases (%)**
Comorbid Physical Disorders	
Hypertension	22 (44.00)
Diabetes mellitus	25 (50.00)
Thyroid disorders	5 (10.00)
Psychiatric Comorbidity	
Depression	19 (38.00)
Adjustment disorder	22 (44.00)
Generalized anxiety disorder	4 (8.00)
Mixed anxiety and depression	3 (6.00)
Alcohol-related mental/behavioral disorder	2 (4.00)
Duration of CKD (months)	
0–6	22 (44.00)
7–12	16 (32.00)
>12	12 (24.00)

Table 5: Duration of Dialysis, Frequency of Dialysis and Funding for Treatment

Characteristic	**Number of cases (%)**

Duration of Dialysis (months)	
<1	10 (20.00)
1–3	14 (28.00)
>3	26 (52.00)
Frequency of Dialysis (per week)	
Two	18 (36.00)
Three	32 (64.00)
Funding for Treatment	
Sponsored	0 (0.00)
Non-sponsored	50 (100.00)

Table 6: Hamilton Depression Scale scores of CKD patients undergoing dialysis (n = 50)

HAM-D Score	**Total CKD Patients, n (%)**	**With Psychiatric Disorder, n (%)**	**No Psychiatric Disorder, n (%)**
0–7 (Normal)	24 (48.00)	4 (16.67)	20 (83.33)
8–13 (Mild)	15 (30.00)	9 (60.00)	6 (40.00)
14–18 (Moderate)	7 (14.00)	5 (35.71)	2 (28.57)
19–22 (Severe)	3 (6.00)	1 (33.33)	2 (66.67)
>22 (Very Severe)	1 (2.00)	1 (100.00)	0
Total	50 (100.00)	20 (100.00)	30 (100.00)

Table 7: Association between Treatment Burden and Psychiatric Illness (n = 50)

TBQ Category	**Psychiatric Illness Present, n (%)**	**Psychiatric Illness Absent, n (%)**
Low Burden	4 (12.50)	16 (55.17)
Moderate Burden	7 (29.17)	9 (31.03)

High Burden	14 (58.33)	4 (13.79)
χ^2	**12.876**	**p = 0.002 (HS)**

Table 8: Association between Sex, Education, and Occupation with Psychiatric Illness

Variable	Psychiatric Illness Present, n (%)	Psychiatric Illness Absent, n (%)	Total, n (%)	χ^2	p
Sex					
Male	16 (47.05)	18 (52.95)	34 (68.00)	0.412	0.121 (NS)
Female	6 (37.50)	10 (62.50)	16 (32.00)		
Education					
Illiterate	5 (25.00)	15 (75.00)	20 (40.00)	9.864	0.002 (HS)
Educated	17 (58.62)	12 (41.38)	29 (58.00)		
Occupation					
Employed	9 (64.29)	5 (35.71)	14 (28.00)	4.102	0.043 (S)
Unemployed	13 (37.14)	22 (62.86)	35 (72.00)		

DISCUSSION

The primary aim of this study was to examine the psychological impact of treatment burden among anemic CKD patients undergoing hemodialysis, and its relationship with gender, age, duration of illness, and associated co-morbidities. In recent years, the concept of treatment burden has gained increasing recognition due to its significant influence on patient well-being and treatment outcomes (19,20,21,22). The results of the present study were categorized into three main areas: sociodemographic characteristics of the patients, details of their psychological health status, and the association between psychological illness and treatment burden. Analysis of gender distribution revealed that CKD was more prevalent among males compared to females,

which is consistent with findings reported in previous Indian research. Age distribution showed that the majority of patients (90.0%) were below 60 years, and a considerable proportion (36.0%) were younger than 40 years. This trend may be attributed to delayed diagnosis of kidney disease, late referral to specialized care, and inadequate implementation of preventive strategies.

Sociodemographic profile

The literacy rate among the study participants was found to be 58%, which is lower than the national literacy average of 74%. This difference may be due to the hospital predominantly serving patients from low-income rural backgrounds, where educational levels are generally lower. Furthermore, a high unemployment rate (72.0%) was observed among anemic CKD patients undergoing hemodialysis, indicating the substantial physical, emotional, and economic challenges faced by these individuals (23,24,25). Most of the participants (60.0%) were married, which can be explained by the inclusion of patients aged above 21 years in the study sample. In India, marriage typically occurs at a relatively young age, with approximately 95% of women married by 25 years and 95% of men by 32 years. Compared to many other developing countries, India continues to have a lower average age at marriage, which is reflected in the marital status distribution observed in this study.

Illness details in anemic CKD patients undergoing hemodialysis: Analysis of illness-related characteristics among anemic CKD patients undergoing hemodialysis revealed that nearly 80% of participants had been diagnosed with CKD within the past 15 months. Among them, 20.0% had been diagnosed less than 5 months earlier, while only 20.4% had been living with CKD for more than 15 months. Regarding dialysis duration, 50.0% of patients had been receiving dialysis for more than 3 months, 30.0% for 1–3 months, and 20.0% for less than 1 month. The majority of patients (approximately 92%) had associated comorbidities, particularly hypertension and diabetes mellitus, which are well-established risk factors for the development and progression of renal failure (26,27, 36). Improper management of these conditions in their early stages may accelerate kidney damage. Furthermore, the need for lifelong treatment of CKD along with the management of diabetes and hypertension significantly increases the physical, emotional, and financial burden on patients, ultimately affecting their overall health outcomes (21,22,25).

The frequency of dialysis showed that 66.0% of patients underwent dialysis three times per week, likely reflecting the recent initiation of dialysis and the severity of their condition. It was also observed that all patients (100.0%) bore their treatment expenses independently, indicating a substantial financial burden (21,22). Psychological assessment using the HAM-D scale revealed that 44% of patients experienced some degree of depression, which is consistent with previous studies reporting a depression prevalence of 30%–40% among hemodialysis patients (26,27,28). CKD, particularly in its advanced stages such as ESRD, contributes significantly to global healthcare costs and patient burden (29,30,31). In the present study, 60.87% of patients were categorized under high treatment burden, demonstrating a strong association between treatment burden and psychological illness (21,22). Furthermore, analysis of the relationship between psychiatric illness and sociodemographic factors showed a highly significant association with education level ($p<0.001$) and a statistically significant association with occupation ($p<0.05$), indicating that socioeconomic factors play an important role in the psychological well-being of CKD patients undergoing hemodialysis (32,33,34,35).

Conclusion

Based on the results of the present study, it can be concluded that psychiatric comorbidities are highly prevalent among anemic CKD patients undergoing hemodialysis. These psychological complications were more frequently observed in male patients, particularly those in the 41–60 years age group. Adjustment disorder was identified as the most common psychiatric condition, followed by depression. Patients who had recently initiated dialysis were found to be more vulnerable to developing psychiatric disturbances, likely due to the sudden lifestyle changes and treatment demands. Additionally, the study established a strong association between psychological complications and increased treatment burden, indicating that mental health plays a crucial role in influencing the overall disease burden and treatment outcomes in anemic CKD patients on hemodialysis.

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Conflicts of interest

There are no conflicts of interest.

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