

SOCIOECONOMIC FACTORS AFFECTING TREATMENT COMPLIANCE IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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ABSTRACT

Background: Chronic Kidney Disease (CKD) is a long-term condition and needs to be kept under control with medication, dialysis, diet, and frequent health checks to avoid the disease worsening and causing complications. Socio-economic factors such as low income, low educational level, unemployment, low social support, and limited availability of healthcare may adversely affect treatment adherence among CKD patients.

Objectives: This study aims to determine the socioeconomic factors that influence adherence to treatment of patients with chronic kidney disease and to determine the correlation between these factors and treatment adherence.

Methodology: This was a cross-sectional observational study in the nephrology department of a tertiary care hospital for a period of 6 months. The number of patients who were enrolled was 100, with CKD stage 3–5, and were taken by non-probability consecutive sampling. Admission was made by patients over 18 years old who have been treated for at least six months. The information on demographic profile, income, education, job status, social support, and treatment adherence was gathered through a structured questionnaire. Medication compliance, dialysis attendance, dietary restriction, and follow-up visits were evaluated. Data were analyzed statistically using SPSS version 26 with a significant p-value < 0.05.

Results: The mean age of participants was 52.6 ± 13.4 years, with 58% males and 42% females. Good treatment compliance was observed in 62% of patients, while 38% showed poor adherence. Higher-income patients demonstrated significantly better compliance compared to low-income patients (78% vs. 44%, $p=0.002$). Patients with secondary or higher education had improved adherence compared to illiterate participants (74% vs. 41%, $p=0.004$). Rural residence, unemployment, and poor family support were significantly associated with reduced treatment compliance ($p<0.05$).

Conclusion: Treatment adherence is strongly influenced by the socioeconomic factors in CKD patients. Fostering greater access to healthcare, patient education, and financial aid could lead to better adherence and clinical results.

Keywords: Chronic Kidney Disease; Socioeconomic Factors; Treatment Compliance; Dialysis Adherence.

Introduction

Chronic Kidney Disease (CKD) is an irreversible and progressive loss of renal function that is seen in millions of individuals globally and is a significant public health problem. The disease carries a high morbidity and mortality, is associated with significant health care costs, and is linked to a decreased quality of life. Diabetes mellitus, hypertension, glomerulonephritis, and other chronic systemic diseases are common causes of CKD. As kidney function decreases, patients need lifelong medical management, lifestyle modification, dietary restrictions, regular laboratory monitoring, and, in extreme cases, dialysis or

renal replacement therapy. Treatment compliance is critical for slowing disease progression and minimizing the risk of complications like cardiovascular disease, anemia, electrolyte disturbances, and end-stage renal disease [1,2]. Treatment adherence in the context of CKD would be the adherence to prescription medications, dietary advice, dialysis times, fluid management, and follow-up visits. Non-compliance may result in deterioration of renal function, hospitalization, high healthcare costs, and poor survival. Although nephrology care has improved, treatment adherence is very common, especially in low and middle-income countries where there are not always adequate health care resources [3,4]. Socio-economic factors are highly relevant to patients' health-related behaviours and treatment adherence in CKD. Patients' income level makes a huge difference in their ability to afford drugs, transportation to health care centers, and regular dialysis treatment. Patients with financial problems might not take medications or do as much dialysis as they need, or may not get follow-up consults, because it's too expensive. Management of CKD is a difficult burden in countries with low health insurance coverage and high out-of-pocket expenditure on health care [5,6]. Educational status and health literacy are also important determinants of treatment compliance. Less well-educated patients may lack an understanding of the disease's course, the need for regular treatment, dietary limitations, and the timing and schedule of medications. There are additional factors that may lead to non-compliance, such as a misunderstanding about the management of CKD and communication problems between the person and their healthcare providers. On the other hand, patients who are better educated are more aware and have good self-management skills [7,8]. Other factors influencing adherence patterns include employment status and social support. Psychological strain and reliance may be worse with job loss or falling earnings, which can also impact motivation for ongoing care. Family support is crucial for keeping patients on schedule for their medication, dialysis appointments, and dietary guidelines. Those who are without emotional and social support are more likely to show poor adherence and have worse clinical outcomes [9]. Other socio-economic factors include geographical access and health facilities. Patients who live in rural areas may have transportation issues, long distances, and poor nephrology services. These barriers can lead to delayed diagnoses, inconsistent attendance to treatment, and inadequate monitoring of disease. In Pakistan and other developing countries, these are more serious because they lack the specialized renal care centers and healthcare facilities [10]. A comprehensive knowledge of the socioeconomic barriers to treatment adherence is crucial to the design of effective interventions and policies in health services. Barriers identified can be used to create patient education initiatives, counseling programs, financial support programs, and community support programs for healthcare providers. Hence, the present study was aimed at evaluating the socioeconomic factors influencing the treatment compliance of patients with chronic kidney disease, and to determine the effects these factors have on adherence to treatment.

Study Objectives

To assess the socioeconomic determinants of treatment adherence in patients with chronic kidney disease (CKD) and explore relationships between income, education, social support, employment, and treatment adherence.

Materials and Methods

Study Design & Setting

This is a cross-sectional study that was done for six months at the Department of Nephrology, Institute of Kidney Diseases, Peshawar from Jan 2024 to June 2024.

Participants

A total of 100 patients with chronic kidney disease (stage 3–5) attending nephrology outpatient clinics and dialysis units were included in the study. Patients were selected for the treatment course, which lasted at least six months, and consented to the study after signing an informed consent form, both as adults, both male and female. Those who were unable to communicate effectively or were too ill to participate in a critical conversation were excluded from the study.

Sample Size Calculation

The sample size of 100 patients was found by using the WHO sample size estimation formula, which takes into consideration the expected prevalence of treatment non-compliance of 50%, 95% confidence interval, and available study duration. Eligible participants were consecutively sampled using a non-probability sampling technique in the nephrology department during the study period.

Inclusion Criteria

- Patients aged ≥ 18 years
- Diagnosed CKD stage 3–5 patients
- Had at least six months of treatment for an illness
- Patients who are willing to take part in the study

Exclusion Criteria

- Acute kidney injury patients
- Patients who are seriously ill or unconscious
- Persons with serious mental illness
- Patients who refuse consent or have incomplete records.
- The diagnostic approach and treatment plan.

Diagnostic and management strategy.

The diagnosis of CKD was made based on clinical history and laboratory data and estimated glomerular filtration rate (eGFR). Medication adherence and compliance with treatment, attendance at dialysis, dietary restrictions, and visits with nephrology specialists were measured using structured questionnaires.

Statistical Analysis

Data were typed in and analyzed with SPSS version 26. Data obtained from quantitative variables, like ages, were expressed as mean $\pm$ standard deviation, while data obtained from qualitative variables were expressed as frequencies and percentages. The association between the socioeconomic factors and treatment compliance was evaluated by chi-square tests, and a p-value < 0.05 was considered statistically significant.

Results

A total of 100 patients with chronic kidney disease participated in the study. The mean age of participants was 52.6 ± 13.4 years. Among the enrolled patients, 58% were male and 42% were female. Most participants belonged to low socioeconomic status, with 54% reporting low monthly income and 44% being unemployed. Rural residence was observed in 60% of patients. Overall, good treatment compliance was observed in 62% of participants, while 38% demonstrated poor adherence to prescribed therapy. Medication adherence was significantly higher among patients with higher income levels compared to low-income groups (78% vs. 44%, $p=0.002$). Similarly, patients with secondary or higher education showed better compliance than illiterate patients (74% vs. 41%, $p=0.004$). Family support showed a strong positive association with treatment adherence. Patients receiving adequate social support demonstrated improved dialysis attendance and medication compliance compared to socially isolated individuals ($p=0.006$). Rural residence was significantly associated with poor compliance due to transportation difficulties and limited healthcare access ($p=0.018$). Dietary restriction adherence remained low in nearly half of the participants because of financial limitations and poor nutritional awareness. Unemployed patients also exhibited significantly reduced treatment compliance compared to employed participants ($p=0.021$). These findings suggest that socioeconomic determinants substantially affect adherence behaviors among CKD patients.

Table 1. Demographic Characteristics of CKD Patients (n=100)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	58	58.0
Female	42	42.0
Age Group (Years)		
18–40	24	24.0
41–60	46	46.0
>60	30	30.0
Residence		
Rural	60	60.0
Urban	40	40.0

Table 1 demonstrates the demographic distribution of CKD patients according to gender, age groups, and residential status included in the study.

Table 2. Socioeconomic Characteristics of Participants

Variable	Frequency (n)	Percentage (%)
Monthly Income Status		
Low Income	54	54.0
Middle Income	32	32.0
High Income	14	14.0
Educational Status		
Illiterate	28	28.0
Primary Education	34	34.0
Secondary/Higher Education	38	38.0
Employment Status		
Employed	56	56.0
Unemployed	44	44.0

Table 2 presents the socioeconomic profile of study participants, including income level, educational status, and employment condition.

Table 3. Treatment Compliance Among CKD Patients

Compliance Variable	Compliant n (%)	Non-Compliant n (%)
Medication Adherence	68 (68.0)	32 (32.0)
Dialysis Attendance	72 (72.0)	28 (28.0)
Dietary Restrictions	52 (52.0)	48 (48.0)
Follow-up Visits	64 (64.0)	36 (36.0)
Overall Treatment Compliance	62 (62.0)	38 (38.0)

Table 3 illustrates the compliance rates regarding medications, dialysis attendance, dietary restrictions, and follow-up visits among CKD patients.

Table 4. Association Between Socioeconomic Factors and Treatment Compliance

Socioeconomic Factor	Good Compliance (%)	Poor Compliance (%)	p-value
High Income	78.0	22.0	0.002
Low Income	44.0	56.0	0.002

Secondary/Higher Education	74.0	26.0	0.004
Poor Social Support	40.0	60.0	0.006
Rural Residence	46.0	54.0	0.018
Unemployment	42.0	58.0	0.021

Table 4 shows the association between socioeconomic determinants and treatment compliance among CKD patients. Significant associations were observed between low income, poor education, unemployment, rural residence, lack of social support, and reduced adherence to treatment.

Discussion

In the present study, the socioeconomic factors influencing treatment adherence in the CKD population were investigated. The results of this study showed that low income, poor educational status, unemployment, lack of family support, and rural residence were significantly related to poor medication adherence, dialysis attendance, dietary restrictions, and follow-up visits. These findings are similar to those of recent international studies that highlight socioeconomic factors and their association with poor outcomes of CKD treatment [11]. In this study, patients' treatment compliance was good in 62% and was poor in 38% of the patients. A study conducted in 2022 to evaluate adherence of dialysis patients found that most of the population had moderate to poor adherence, a finding that shows that non-compliance still exists as one of the major challenges in CKD care [12]. Non-adherence is linked to an increased risk of more rapid disease progression, higher hospitalisation rates and cardiovascular events, and poorer health-related quality of life in patients with CKD. One of the best predictors of treatment compliance in the present study was income level. A significantly higher adherence rate was observed among those with higher monthly incomes than those with low monthly incomes ($p=0.002$). Patients might not be able to afford medications, regular dialysis, and follow-up visits. In a study from 2022, which examined socioeconomic status and outcomes of CKD, low income and poor educational status were also independently associated with adverse clinical outcomes and greater burden of disease [13,14]. The results indicate the need for financial assistance programs and low-cost health care for CKD patients. A significant association between treatment adherence and educational status was also observed [15]. The participants with secondary or higher education showed greater compliance than those who were not literate ($p=0.004$). Education enhances health literacy and helps patients understand the course of a disease, medication regimens, diet guidelines, and the significance of dialysis. A recent study conducted in Pakistan to explore the relationship between health literacy and medication adherence among hemodialysis patients revealed that low educational status was significantly related to poor health literacy and poor adherence behaviors [16]. The same result was obtained in other developing countries, like Lebanon, where an increase in health literacy and financial capacity was associated with better adherence patterns in CKD patients [17]. Adherence was a major factor in this study and was affected by family and social support. Patients with a good family support system showed significantly higher medication and dialysis adherence than patients with a low level of family support ($p=0.006$). Families are central to the long-term care of chronic conditions like CKD, as it often causes psychological stress, anxiety, and dependency. The evidence recently published has demonstrated that emotional support and caregiver support are beneficial for adherence and self-care behaviors in dialysis patients [18]. Educational counseling and structured support interventions are also effective in enhancing patient motivation and treatment adherence. The association between poor compliance and being from a rural area was significant in the current study. Regular health care visits might be limited by transportation challenges, long distances to care, and less nephrology care in rural areas [19]. These findings were echoed in recent research, which showed that geographic access and health care infrastructure can have a significant impact on CKD outcomes and behaviors [20]. Delays in consultations and breakdown of dialysis schedules have a negative impact on disease management in patients residing in underserved areas. Almost half of the participants had poor adherence to their diet. The financial burden, insufficient knowledge of food, and poor nutritional counseling were factors affecting compliance with the renal diet. A recent study on dietary adherence in hemodialysis patients showed that the cost of recommended diets was significantly correlated

with good adherence, as was dietary counseling [21]. This discovery highlights the importance of dietitian intervention-based education and food assistance programs. Study results indicate that socioeconomic factors are significant factors affecting treatment adherence among CKD patients. Adherence and clinical outcomes can be enhanced by multidisciplinary interventions that provide patient education, counseling services, and financial support, and increase the number of nephrology care centers in rural areas. This is a single-center study, and the sample size was small, but the findings offer valuable insights into the socioeconomic challenges faced in the management of Chronic Kidney Disease in a developing healthcare environment. Recent studies have confirmed the need for socioeconomic assessment to be integrated into the routine of treatment for people with CKD to optimize long-term outcomes of treatment [22,23].

Limitations

The study was done at a single tertiary care center on a relatively small number of patients, and results may not be generalizable. Causal relationships were not assessed due to the cross-sectional design. There is also the possibility of recall and reporting bias from self-reported treatment compliance by study participants.

Conclusion

Treatment adherence is highly dependent on socioeconomic factors in patients with chronic kidney disease. Low income, poor education, unemployment, social support problems, and rural living were correlated with low adherence. Greater access to health care, patient education, counseling, and financial support programs can improve the acceptability of the treatment and clinical results of CKD patients.

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Authors' Contributions

Concept & Design of Study: Mazhar Ul Haq, Saad Hanan

Drafting: Kashif Iqbal, Waqas Sardar

Data Collection & Data Analysis: Mazhar Ul Haq, Kashif Iqbal

Critical Review: Mazhar Ul Haq, Saad Hanan, Kashif Iqbal, Waqas Sardar

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