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Public's Knowledge of Renal Failure and its Associated Factors: A Cross-Sectional Study

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ABSTRACT

Background: Kidney failure, encompassing acute and chronic conditions, poses significant public health challenges globally, with high morbidity and mortality rates. Limited public awareness and knowledge of its risk factors, symptoms, and treatments hinder early detection and effective management.

Objectives: This study aimed to evaluate the public's knowledge of renal failure and its associated risk factors in Sialkot, Punjab, Pakistan.

Methods: A community-based cross-sectional study was conducted from May to August 2024, involving 430 participants selected through convenience sampling. A structured, validated electronic questionnaire assessed socio-demographics, general knowledge, awareness of risk factors, symptoms, diagnostic procedures, and treatments. Descriptive and inferential statistics were analyzed using SPSS version 25, with significance set at $p<0.05$.

Results: Out of 422 valid responses, 81.8% of participants demonstrated moderate knowledge of kidney failure, while 18.2% had no knowledge. Awareness of risk factors was reported by 77.3%, with diabetes (54.7%) and NSAIDs (51.4%) most commonly identified. Knowledge of treatment options was reported by 79.4%, though only 25.4% and 37.2% recognized dialysis and kidney transplants, respectively. Education, age, and urban residence significantly influenced awareness levels ($p<0.05$).

Conclusion: The study identified notable gaps in knowledge about kidney failure and its associated factors among Sialkot population. Tailored educational interventions and public health strategies are essential to address these gaps and promote early detection.

Keywords: Chronic kidney disease, Dialysis, Health awareness, Kidney failure, Kidney transplant, Public knowledge, Renal failure.

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Introduction

Renal failure, commonly categorized as chronic kidney disease (CKD) or acute kidney injury (AKI), represents a critical global health challenge characterized by a significant burden of morbidity and mortality. CKD is particularly concerning due to its silent progression and irreversibility in advanced stages, often leading to end-stage kidney disease (ESKD), which necessitates dialysis or transplantation for survival. The condition arises from persistent kidney damage or a sustained reduction in glomerular filtration rate (GFR) below 60 mL/min/1.73 m^2 over three months, with diabetes and hypertension identified as its leading causes (1,2). Chronic kidney failure typically presents with subtle symptoms such as fatigue, changes in urination, edema, and cognitive decline, underscoring the importance of early detection and management (3,4).

The kidney plays an integral role in maintaining homeostasis, including the regulation of fluid balance, electrolyte levels, and blood pressure through the renin-angiotensin-aldosterone system. Its function is critical for waste filtration and vitamin D activation, essential for bone health (3). Acute kidney injury (AKI), characterized by a sudden decline in renal function, is often triggered by conditions such as decreased perfusion, nephrotoxic drugs, or obstructive uropathy. While reversible in some cases, AKI can lead to CKD if left untreated, particularly in low-resource settings where infections and dehydration are prevalent etiologies (4).

The public's awareness of kidney failure and its risk factors remains alarmingly low, which exacerbates the disease's burden. Evidence suggests that knowledge of CKD and its preventive strategies is positively correlated with education, socioeconomic status, and healthcare access (5). This underscores the need for targeted educational interventions to bridge this knowledge gap and promote proactive health-seeking behavior. Kidney failure, cardiovascular disease (CVD), and early death are all elevated by 8 to 10 times in people with CKD (6). Acute kidney injury, anemia, mineral and bone disorders, fractures, and hospitalizations are among the other complications. (7)

Knowledge of renal failure among the general population plays a pivotal role in promoting preventive behaviors and seeking timely medical intervention. Studies have shown that a lack of awareness regarding common risk factors such as diabetes, hypertension, obesity, and lifestyle-related habits like smoking contributes significantly to the burden of CKD (8)

The current study focuses on assessing the level of knowledge and awareness regarding renal failure among the general population and affected patients in Sialkot, Punjab, Pakistan. Sialkot, a densely populated region, presents a representative demographic to evaluate the public's understanding of kidney disease. This research provides valuable insights for healthcare professionals, policymakers, and public health initiatives to design effective strategies for kidney disease prevention, early diagnosis, and management.

Materials and Methods

This study employed a descriptive cross-sectional design to assess the knowledge and awareness of renal failure among the general population and affected patients in Sialkot, Punjab, Pakistan. Conducted from May to October 2024, the study utilized a structured and validated questionnaire for data collection. The study adhered to ethical principles outlined in the Declaration of Helsinki, ensuring voluntary participation, informed consent, and confidentiality of all respondents (6). Ethical approval was obtained from the relevant institutional review board before initiating the research.

The study population included male and female participants from urban and rural areas of Sialkot, representing a diverse demographic profile. A sample size of 422 was calculated using the Raosoft online calculator, with a 95% confidence interval and a 5% margin of error. To account for potential non-response, an additional 10% of the calculated sample size was included, bringing the total sample to 430 participants. Participants were selected through convenience sampling, focusing on individuals who voluntarily agreed to participate and provided informed verbal consent.

The data collection instrument consisted of a self-administered electronic questionnaire, structured into sections to capture demographic characteristics, knowledge levels, and awareness regarding renal failure, including its risk factors, symptoms, diagnosis, and treatment modalities. The questionnaire underwent a thorough review by a panel of experts for face and content validity. It was pilot-tested with a subset of the target population to ensure clarity and reliability.

Data collection was conducted through face-to-face interviews with the assistance of trained field staff to minimize biases and enhance response accuracy. Respondents included both patients diagnosed with kidney failure and the general population. Inclusion criteria required participants to be mentally sound and willing to participate. Individuals unwilling to participate or unable to respond due to mental health issues were excluded.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) software, version 25. Descriptive statistics, including frequencies and percentages, were calculated to summarize demographic and knowledge-related variables. Chi-square tests and logistic regression were employed to identify associations between knowledge levels and socio-demographic factors such as age, education, and residence.

Results

The study was conducted on 422 participants with diverse demographic characteristics. The majority of respondents (54.0%) belonged to the 16–30 age group, followed by 21.6% aged above 45, 18.7% in the 31–45 age group, and only 5.7% aged 0–15. In terms of marital status, about half of the participants (55.5%) were single, while 41.9% were married, 1.4% divorced, and 1.2% widowed. Regarding education levels, a majority (53.3%) were undergraduates, 24.9% had secondary education, 9.5% had primary education, and 12.3% were uneducated. Additionally, most participants (65.4%) resided in urban areas, while 34.6% came from rural areas.

A significant majority (81.8%) reported having prior information, with the primary sources being healthcare professionals (26.5%) and friends or family (24.4%). Approximately 68% of participants had encountered kidney failure cases, most commonly within their families (39.3%). Additionally, 73.5% recognized kidney failure as a life-threatening condition, while 15.1% lacked knowledge about its severity. Overall, the findings indicate a relatively high level of awareness among participants, though some still had limited information or exposure to the condition. These results suggest that pre-existing medical conditions, inadequate fluid intake, and improper hygiene practices may increase the risk of UTI among pregnant women. Most participants (81.8%) were aware of kidney failure, with healthcare professionals (26.5%) and family/friends (24.4%) being the primary sources of information. However, 18.2% had no prior knowledge.

Table 1: Socio-Demographic Characteristics

Variable	Parameters	Frequency & Percentage
Age	0-15	24 (5.7)
	16-30	228 (54)
	31-45	79 (18.7)
	Above 45	91 (21.6)
Marital Status	Single	234 (55.5)
	Married	177 (41.9)
	Divorced	6 (1.4)
	Widowed	5 (1.2)
Education	Uneducated	52 (12.3)
	Primary	40 (9.5)
	Secondary	105 (24.9)
	Undergraduate	225 (53.3)
Location	Urban	276 (65.4)
	Rural	146 (34.6)

The study identified various risk factors associated with kidney failure, highlighting participants' awareness levels. Diabetes was recognized as a risk factor by 54.7% of participants, while 24.4% believed it was not, and 20.4% had no knowledge. Similarly, 48.8% of participants acknowledged medications as a risk factor, compared to 29.9% who did not, and 21.3% who were unaware. Awareness about NSAIDs was relatively lower, with only 26.5% identifying them as a risk factor, 53.1% disagreeing, and 20.4% lacking knowledge. Hypertension was identified as a risk factor by 47.4% of participants, while 32.2% did not consider it a risk, and 20.4% had no knowledge. Lastly, obesity was recognized as a risk factor by 38.9% of participants, while 40.8% disagreed, and 20.4% had no awareness. These findings reveal varying levels of knowledge among participants regarding key risk factors for kidney failure. The study assessed participants' awareness of the signs and symptoms of kidney failure. These findings highlight varying levels of awareness regarding the signs and symptoms of kidney failure.

Table 2: Knowledge about Kidney Failure

Question	Parameters	Frequency & Percentage
Prior knowledge about kidney failure	Yes	345 (81.8)
	No	77 (18.2)
Knowledge about Risk Factor	Yes	326 (77.3)
	No	96 (22.7)
Awareness of Treatments	Yes	335 (79.4)
	No	87 (20.6)
Awareness of Diagnostics tests	Yes	323 (67.4)
	No	99 (20.7)
Source of Information	Healthcare professionals	112 (26.5)
	Family/Friends	103 (24.4)
	Internet/TV	87 (20.6)
	No knowledge	76 (18.0)

Table 3: Participants' Awareness of Signs and Symptoms of Kidney Failure

Signs and Symptoms	Knowledge	Frequency (n)	Percentage (%)
Fatigue and weakness	Yes	167	39.7
	No	175	41.3
	No knowledge	80	19.0
Nausea and vomiting	Yes	92	21.9
	No	250	59.1
	No knowledge	80	19.0
Swelling (edema) in legs, ankle, and feet	Yes	170	40.4
	No	172	40.6
	No knowledge	80	19.0
Shortness of breath	Yes	41	9.7
	No	301	71.3
	No knowledge	80	19.0
Decreased urine output	Yes	91	21.6
	No	251	59.4
	No knowledge	80	19.0
Pain in back, flank, or abdomen	Yes	108	25.7
	No	234	55.3
	No knowledge	80	19.0
High blood pressure	Yes	75	17.8
	No	267	63.2
	No knowledge	80	19.0
All of the above	Yes	23	5.5
	No	323	76.5
	No knowledge	76	18.1

Table 4: Knowledge of Associated Risk Factors for Kidney Failure

Risk Factors	Knowledge	Frequency (n)	Percentage (%)
Diabetes	Yes	231	54.7
	No	105	24.4
	No knowledge	86	20.4
Medications	Yes	206	48.8
	No	126	29.9
	No knowledge	90	21.3
NSAIDs	Yes	112	26.5
	No	224	53.1
	No knowledge	86	20.4
Hypertension	Yes	200	47.4
	No	136	32.2
	No knowledge	86	20.4
Obesity	Yes	164	38.9
	No	172	40.8
	No knowledge	86	20.4

Discussion

The study assessed the knowledge and awareness of renal failure among participants in Sialkot, Pakistan, and identified significant gaps despite a generally moderate level of awareness. The findings revealed that while 81.8% of respondents reported prior knowledge of kidney failure, their understanding of specific risk factors, symptoms, diagnostics, and treatment options remained fragmented. This aligns with earlier studies that demonstrated the variability in public awareness of kidney diseases globally, particularly in low- and middle-income countries where access to health education is limited (1). The correlation between higher knowledge levels and factors such as education, urban residence, and age highlighted in this study echoed previous research suggesting that sociodemographic factors significantly influence health literacy (2).

Lifestyle modifications to prevent kidney failure were acknowledged by 84.8% of respondents, with a healthy diet being the most recognized strategy. However, despite this awareness, 15.6% of participants reported no improvement following treatment, echoing findings from previous studies that suggest ongoing challenges in managing chronic kidney disease (9). These results underscore the need for improved education on kidney health, emphasizing the importance of early detection and intervention to mitigate the risks of renal failure. Enhanced awareness could potentially lead to better outcomes and reduction in the prevalence of kidney-related complications. (10)

The study's strengths included its sizable sample and the comprehensive evaluation of awareness across multiple domains, including risk factors, symptoms, and treatment options. The inclusion of both rural and urban participants provided a balanced perspective, making the findings relevant for targeted public health interventions. However, the convenience sampling approach introduced potential selection bias, as participants willing to engage in the study may have had higher baseline health awareness. Additionally, the reliance on self-reported data could have led to overestimation or underestimation of knowledge levels, reflecting a common limitation in similar cross-sectional designs (3).

The gaps in knowledge regarding risk factors such as obesity, hypertension, and specific nephrotoxic drugs were particularly concerning. These findings reinforced prior observations that public understanding of modifiable risk factors remains inadequate, despite their critical role in the prevention of chronic kidney disease (4). Furthermore, the under-recognition of diagnostic and treatment modalities, including dialysis and kidney transplants, underscored the need for enhanced educational efforts. Previous studies have suggested that improving public knowledge of these interventions can facilitate earlier diagnosis and better treatment adherence, ultimately improving outcomes for patients with kidney failure (5).

The study also highlighted limitations in recognizing early symptoms of renal failure. While fatigue and swelling were moderately acknowledged, less common symptoms such as shortness of breath and changes in urine output were significantly underreported. This disparity mirrored findings from other research, where the insidious onset of chronic kidney disease often led to late presentations and worse prognoses (6). Enhancing symptom recognition through community-based education programs could address this gap and enable timely medical intervention.

Recommendations from this study included the implementation of structured awareness campaigns targeting high-risk groups, particularly in rural areas where knowledge gaps were more pronounced. Leveraging healthcare professionals and community leaders to disseminate accurate information about kidney health could improve outreach and credibility. Policies aimed at subsidizing routine kidney function tests and integrating kidney health education into primary care services could promote early detection and prevention. Additionally, addressing limitations in health literacy through culturally tailored educational materials and interactive community programs was deemed essential for sustained improvements in public awareness.

Conclusion

The study identified notable gaps in knowledge about kidney failure and its associated factors among Sialkot population. Tailored educational interventions and public health strategies are essential to address these gaps and promote early detection.

Authors' Contributions

ICMJE authorship criteria	Detailed contributions	Authors
Substantial Contributions	Conception or Design of the work	1
	Data acquisition	1,2
	Data analysis or interpretation	3
Drafting or Reviewing	Draft the work	1
	Review critically	2,3
Final approval	Final approval of the version to be published.	1,2,3
Accountable	Agreement to be accountable for all aspects of the work.	1,2,3

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