Unveiling the Silent Epidemic Community Perspectives on Kidney Disease Awareness and Prevention

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Abstract

Objective: To evaluate the public's understanding of fundamental aspects related to kidney diseases.

Material and Methods: In this study, we employed a questionnaire-based approach to assess the level of awareness about kidney diseases among the general public in Pakistan. Utilizing snowball sampling methodology facilitated through the popular communication platform WhatsApp, we gathered responses from a diverse range of individuals. Over the course of one and a half months, a total of 428 responses were collected, providing valuable insights into public perceptions and knowledge regarding kidney diseases.

Results: Our analysis of the collected data revealed that the overall understanding of kidney diseases among the surveyed individuals is limited, characterized by rudimentary knowledge at best. Interestingly, our findings also indicated that males exhibited a higher level of knowledge and awareness about kidney diseases compared to females.

Conclusion: The findings of this study underscore the urgent need for comprehensive public education initiatives aimed at raising awareness about kidney diseases in Pakistan. Addressing the gaps in knowledge and understanding among the general population is essential for promoting early detection, preventive measures, and effective management strategies.

Keywords: Kidney Disease, Risk Factors, Prevention.

How to cite: Sabir O, Basit B, Chachar AZK, Butt ZA, Omer A, Zaidi MZ. Unveiling The Silent Epidemic Community Perspectives on Kidney Disease Awareness and Prevention. Esculapio - JSIMS 2025;21(01): 46-52

DOI: https://doi.org/10.51273/esc25.2513219

Introduction

Kidney diseases are becoming widely prevalent across the world. This is understandable given the increasing prevalence of major risk factors. However, screening programs and almost ubiquitous availability of basic investigations for diagnosis of kidney disease across the globe may also have uncovered more than the tip of the iceberg. Suffice to say, the situation is alarming. According to the Global Buren of Disease initiative in 2017, 697·5 million cases of all-stage CKD were recorded, for a global prevalence of 9·1%.[1] The presence of kidney disease may lead to future need for renal replacement therapy. According to one estimate, patients requiring dialysis is expected to be around 5.4 million by 2030.[2] The presence of kidney disease amplifies indirect outcomes. The patients with kidney disease are at a higher risk for cardiovascular diseases and many deaths in kidney patients are actually attributable to cardiovascular events.[1] This intricate interplay underscores the critical importance of raising awareness about kidney diseases among the general public, particularly in regions lacking robust social support and screening programs. The awareness of

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Submission Date: 20-12-2024
1st Revision Date: 11-01-2025
Acceptance Date: 14-03-2025

general public about the kidney diseases, especially in regions of the world lacking social support and screening programs, is expected to be limited. This has been borne out by studies as well.[3] The lack of knowledge about prevention of kidney diseases may be one of the causes of uncontrolled risk factors e.g. diabetes and hypertension. We surmise that better knowledge of kidney diseases may spur patients to control these major risk factors.

In Pakistan, the prevalence of kidney diseases remains uncertain. Estimates come from small scale regional studies at best, providing us with widely varying prevalences (12.5 – 31.2%).[4] This may be in part due to methodological insufficiencies exhibited by these studies, as well as lack of a concerted effort to resolve the question. This inability to define the magnitude of the problem may be a hurdle in forming health policies to counteract the rising tide of kidney disease and to provide education to the general public about these diseases.

Identification of the gaps in the knowledge of general public about health topics is a time-tested approach towards forming better educational activities to fill up those gaps. This endeavor can be undertaken more easily now than ever before. The availability of questionnaire forming software (Microsoft forms, Google forms) and communication platforms (WhatsApp, Facebook, X etc.) makes all of this hard work basically just-a-click. Against this backdrop, the present study aims to evaluate the public's understanding of fundamental aspects related to kidney diseases, with the overarching goal of informing future educational interventions and public health policies.

Material and Methods

This was a questionnaire-based cross-sectional survey of Pakistani residents. After the taken approval from Institutional Review Board Ref: FMH/1603 date 12-02-2025. This Urdu questionnaire was created using Microsoft Forms and convenient snowball sampling was employed through the communication platform WhatsApp for dissemination of the survey. The automated message accompanying the form requested the recipient to not fill the survey if the recipient belonged to or had a medical background (in an attempt to exclude doctors, nurses or paramedical staff to avoid bias) and to avoid filling the form more than once. Informed consent to publish anonymized responses as results was, however, included in the questionnaire. Based on previously determined sample size based on a recent Brazilian study,[5] where hypertension was correctly identified to be a risk factor of chronic kidney disease by 15.1% of the interviewees, we surmised that total number of responders of around 197 will provide sufficient power to our study with a margin of error under 5%. The questionnaire consisted of 13 questions: demographics (5 questions), functions of the kidneys (1 question, multiple answers allowed), risk factors of kidney disease (1 question, multiple answers allowed), symptoms of kidney diseases (1 question, multiple answers allowed), usual tests for kidney diseases (1 question, multiple answers allowed), kidney diet plan (1 question, single answer allowed) and prevention of kidney disease (1 question, multiple answers allowed). One of the questions was to assess the participants' self-perception about his knowledge relating to kidney issues (single answer allowed) and one question was to understand the perception of preferred healthcare expert of the participants for kidney disease (single answer allowed). The survey was disseminated twice with a gap of one month. Our team waited for responses for 15 days after the second launch, hence the duration of the study was 45 days. We received a total of 452 responses. 24 responses had to be excluded because of dual / multiple submissions, thus bringing the total number of responses to 428. We also excluded unanswered questions within each submission from the final analysis. The average time of completion of the questionnaire was 7 minute and 16 seconds. The data was stored in Microsoft Excel 2021 (automatically generated through Microsoft Forms platform, hence data entry errors were avoided) and analyzed using statistical computing software R. The packages employed were: tidyverse and stats. Descriptives were given using means and percentages. For inferentials, we used Fisher Exact Test (considering non normal distribution of our data) to bring out significant relationships between gender, education, income levels, occupation and the answers provided by the responders.

Results

Since our responses exceeded the pre-determined sample size, we calculated margin of error after the responses were calculated. It was found to be 3.84% at 95% confidence level thus providing a robustness to the statistical analysis. The demographics are given in **(Table-1).** Our cohort of responders to the survey was a diverse group but predominantly young to middle aged, university educated, males and females. The knowledge about kidney disease was limited at best **(Table 2).** However certain enlightening trends were noticed based on gender, education and income levels

Table 1: *Cohort Characteristics.*

Variable	Value
N	428
Age (years) (mean (SD))	36.50 (11.82)
Gender (n, %)	Males: 168 (46.7%), Females: 260 (53.3%)
Education	**n (%)**
Religious school education (madrassah)	4 (1.1)
Primary education	12 (3.3)
Matriculation	36 (10.0)
College educated	84 (23.3)
University educated	224 (62.2)
Occupation	**n (%)**
Did not disclose	16 (4.4)
Government employee	32 (8.9)
Housewife	96 (26.7)
Private job	156 (43.3)
Retired	4 (1.1)
Student	36 (10.0)
Unemployed	20 (5.6)
Monthly income	
< 10000	28 (7.8)
10000 - 50000	68 (18.9)
50000 - 100000	52 (14.4)
> 100000	60 (16.7)
Did not disclose	36 (10.0)
Not applicable	116 (32.2)

Significant income-based differences were observed in knowledge about kidney functions. such as waste removal ($p < 0.001$), blood salt control ($p < 0.001$), and blood pressure regulation ($p < 0.001$). Higher-income groups demonstrated better awareness compared to lower-income groups. Misconceptions, such as kidneys being involved in fat production or food digestion, were more prevalent among lower-income participants ($p < 0.001$). Higher-income groups were more likely to recognize diabetes ($p < 0.001$), hypertension ($p = 0.045$), and obesity ($p < 0.001$) as risk factors for kidney disease. Lower-income participants were less likely to identify smoking ($p < 0.001$) and family history ($p = 0.013$) as significant risk factors. Higher-income groups demonstrated better awareness of diagnostic tests, such as urine analysis for protein and blood ($p < 0.001$) and blood tests for urea and creatinine ($p < 0.001$). Higher-income groups were more likely to endorse controlling diabetes ($p < 0.001$) and hypertension ($p < 0.001$) as preventive measures. Lower-income participants were less likely to recognize the benefits of avoiding high-salt diets ($p < 0.001$) and herbal medications ($p = 0.013$). Nephrologists were the preferred choice for consultation across income groups, but higher-income participants were more likely to consult a nephrologist ($p < 0.001$).

Significant educational disparities were observed in knowledge about kidney functions, such as waste removal ($p < 0.001$), blood salt control ($p < 0.001$), and blood pressure regulation ($p < 0.001$). University-educated participants demonstrated better awareness compared to those with no formal education or religious schooling. Higher-educated groups (college and above) were more likely to recognize diabetes ($p < 0.001$), hypertension ($p = 0.001$), and obesity ($p < 0.001$) as risk factors for kidney disease. Participants with no formal education or primary education were less likely to identify smoking ($p < 0.001$) and family history ($p < 0.001$) as significant risk factors. Educational disparities were noted in the recognition of symptoms such as painful urination ($p < 0.001$), nausea/vomiting ($p = 0.151$), and weight loss ($p = 0.007$). University-educated participants were more likely to associate these symptoms with kidney disease. Participants with lower educational attainment were less likely to

identify swelling ($p = 0.017$) and increased frequency of urination ($p < 0.001$) as symptoms. Higher-educated groups demonstrated better awareness of diagnostic tests, such as urine analysis for protein and blood ($p = 0.006$) and blood tests for urea and creatinine ($p = 0.049$). Higher-educated groups were more likely to endorse controlling diabetes ($p = 0.002$) and hypertension ($p = 0.040$) as preventive measures. Participants with lower educational attainment were less likely to recognize the benefits of avoiding high-salt diets ($p = 0.001$) and herbal medications ($p < 0.001$). Nephrologists were the preferred choice for consultation across educational groups, but university-educated participants were more likely to consult a nephrologist ($p < 0.001$).

Table 2: *Gender based differences*

Category	Aspect	Gender Differences (p-value)
Knowledge of Kidney Functions	Waste removal	Males > Females ($p < 0.001$)
	Blood salt control	Males > Females ($p < 0.001$)
	Blood pressure regulation	Males > Females ($p < 0.001$)
Misconceptions	Kidneys involved in fat production/digestion	Females > Males ($p < 0.001$)
Risk Factor Identification	Diabetes	Males > Females ($p < 0.001$)
	Hypertension	Males > Females ($p = 0.003$)
	Obesity	Males > Females ($p < 0.001$)
	Smoking	Females < Males ($p < 0.001$)
	Family history	Females < Males ($p < 0.001$)
Symptom Recognition	Frothy urine	Males > Females ($p = 0.009$)
	Hematuria (blood in urine)	Males > Females ($p = 0.014$)
	Painful urination	Males > Females ($p < 0.001$)
	Weight loss	Females < Males ($p < 0.001$)
	Swelling	Females < Males ($p < 0.001$)
Preventive Measures	Controlling diabetes	Males > Females ($p < 0.001$)
	Controlling hypertension	Males > Females ($p = 0.007$)
	Avoiding high-salt diets	Females < Males ($p < 0.001$)
	Avoiding herbal medications	Females < Males ($p = 0.007$)
Healthcare Preferences	Preferred choice for consultation	Nephrologists preferred across genders
	Consultation with general physician	Males > Females ($p < 0.001$)

Discussion

The importance of our study lies in the fact that health policy makers need to take into account the knowledge voids before formulating education programs for the general public. We believe that we have gained valuable insights into these voids through our endeavor. The questionnaire made for this survey included questions pertaining to different aspects of kidney diseases and was well suited to test the knowledge of general public.

The prevalent knowledge about the functions of the kidney disease was low (Table 3). There was consensus among the responders that kidney removes waste products but the knowledge about the kidneys' role in maintaining electrolytes, hematopoiesis and BP control was insufficient. This is a concerning finding since most of the participants were at least

Table 3: *Survey Responses*

Question	Answered right (n (%))	Answered wrong (n (%))	Don't know (n (%))
1.Functions of the kidney?			
Remove wastes	300 (81.5)	40 (10.9)	28 (7.6)
Control blood salts	200 (54.3)	132 (35.9)	36 (9.8)
Make fat in body	336 (91.3)	8 (2.2)	24 (6.5)
Help make blood	76 (20.6)	264 (71.7)	28 (7.6)
Help BP control	128 (34.8)	212 (67.6)	28 (7.6)
Digest food	332 (90.2)	8 (2.2)	28 (7.6)
2. Risk factors of kidney disease?			
Diabetes	228 (60.6)	124 (30)	24 (6.4)
Hypertension	236 (62.7)	116 (30.8)	24 (6.4)
Tobacco smoking	80 (21.3)	272 (72.3)	24 (6.4)
Obesity	132 (35.1)	220 (58.5)	24 (6.4)
Family history	136 (36.2)	216 (57.4)	24 (6.4)
Kidney stone disease	212 (56.4)	140 (37.2)	24 (6.4)
Pain medications	192 (51.1)	160 (42.5)	24 (6.4)
Herbal medications	71 (19.1)	280 (74.5)	24 (6.4)
3. Symptoms of kidney disease?			
Hematuria	240 (53.1)	212 (46.9)	
Nausea / Vomiting	116 (25.7)	336 (74.3)	
Jaundice	400 (88.5)	52 (11.5)	
Weight loss	80 (17.7)	372 (82.3)	
Constipation / Diarrhea	404 (89.4)	48 (10.6)	
Cough / Sputum	440 (97.3)	12 (2.6)	
Dyspnea on exertion	84 (18.6)	368 (81.4)	
Swellings	244 (54)	208 (46)	
4. Tests for kidney disease?			
Urine for protein	260 (58.5)	164 (36.9)	20 (4.5)
Creatinine, Electrolytes	308 (69.3)	116 / 26.1	20 (4.5)
ALT, AST	361 (81.3)	63 / 14.2	20 (4.5)
5. Diet advice for kidney patients?			
Kidney appropriate diet plan	256 (69.6)	52 (14.1)	60 (16.3)
6. How to prevent kidney disease?			
Control diabetes	220 (59.8)	148 (40.2)	
Control blood pressure	256 (69.6)	112 (30.4)	
Avoid exercise	352 (95.6)	16 (4.3)	
Quit / avoid tobacco	156 (42.4)	212 (57.6)	
Avoid pain meds	256 (69.6)	112 (30.4)	
Avoid herbal meds	108 (29.3)	260 (70.6)	
Avoid high salt diet	237 (64.4)	119 (32.3)	12 (3.3)
7. Who to consult?	**n / %**		
Nephrologist	281 (76.3)		
General Physician	44 (11.9)		
Homeopath	27 (7.3)		
Hakeem	12 (3.2)		
Surgeon	4 (1.1)		

college educated. This may also be one of the aspects that should be dealt with in forming educational activities for the general public.

There were certain knowledge voids with regards to the risk factors of kidney disease (Table 2). Up to 30 % of the participants did not believe that Diabetes and Hypertension are risk factors for kidney diseases. The awareness of tobacco smoking, obesity, family history and use of pain and herbal medications as risk factors was even dismal. Obesity is a growing epidemic in the world including Pakistan. Up to 23 % of the Pakistani population is either overweight or obese according to the WHO criteria for South Asian populations.[6] Traditionally, higher body weight has been regarded as a symbol of health, prosperity and wealth in South Asians[7]. Our population, therefore, tends to accept overweight / obesity as a norm and is thus at a higher risk of not perceiving it to be of any concern. The link between obesity and kidney disease is strong and well established.[8] Most of the participants also did not believe that tobacco smoking is a risk factor for development of kidney diseases.[9] Combined with the fact that, in spite of government curbs, almost one fourth of male population is smoker in Pakistan[10] this seems to be a valuable insight into the problem. Indeed, efforts to educate people about this connection between tobacco smoking and kidney disease may be fruitful in the long term. The effect of pain and herbal medications either causing or complicating kidney diseases is also well known.[11,12] Most of our responders were unaware of the link between these medications and kidney disease. There is wide spread use of over-the-counter analgesic medications for various reasons. Most of these medications are NSAIDs, that are dispensed based on customer demand. The ingestion of higher doses or normal doses for a longer period of time both can cause kidney disease. Same is the case with herbal medications. Our population believes in herbal medication efficacy and purported lack of side effects considering these concoctions as "natural products". However, our population needs to be educated that in spite of being "natural", there are pharmacologically active ingredients in these herbal medications,[13] thus can lead to kidney and other organ dysfunction.

There was significant lack of understanding of common kidney disease symptoms as well. Most of the participants were unaware that shortness of breath on exertion, nausea and vomiting and weight loss can be attributes of kidney diseases. Half of the participants were unable to correctly identify hematuria and swellings as symptoms of kidney disease. However, most of the cohort rejected non renal symptoms (constipation, diarrhea, cough, sputum, jaundice) as being caused by kidney disease which may be an encouraging finding. The trends with kidney tests were similar. Most of the cohort was able to identify appropriate kidney tests and reject non kidney tests (ALT, AST).

Almost 70% of our cohort was able to identify a kidney appropriate diet plan. There were two options in this question. One diet plan was a low potassium, low phosphate diet plan and the other one was a regular diet with no restrictions. This insight is surprising for a cohort which performed rather poorly in multiple other aspects of the survey. The awareness of diet may have something to do with the fact that in our society it is rather common to believe that diet has a prominent role in preventing or reverting disease states. Treatment with diet (Ilaj-bil-ghiza) is still practiced widely in our population under guidance by traditional hakeems.

As regards the prevention of kidney disease, most of the participants chose the right options. However, it was dismaying to see that most of the participants did not know that avoidance of tobacco smoking is a preventive strategy for the kidney diseases. This is in line with the responses to the question about tobacco smoking being a risk factor for kidney disease (see above). There is sufficient evidence that tobacco products are detrimental to kidney health[13]. Thus, prevention of tobacco smoking by instituting class room discussions in educational institutes, utilization of social media, and other platforms and direct advertisements on tele-media should be a priority now. Our population also did not consider the herbal medication avoidance to be a preventive strategy for kidney disease. This is understandable because, herbal medications have been the go-to medical treatment in our society for centuries. However, there has been growing evidence that herbals may not be entirely innocuous. Discussion of the harmful effect of herbals on kidneys as well as other organ systems should also be a priority for educational activities.

Another important and encouraging insight from our data was that most of the responders were aware that nephrologist should be consulted for kidney diseases

(Table 2). This is an important aspect of care of patient with kidney diseases since it is a common observation in the nephrology healthcare community that patients either do not reach a nephrologist clinic or they reach late in the course of the disease[14,15] when a therapeutic benefit of medical interventions other than renal replacement therapy is likely to be low.

Apparent from our results, males were more likely to provide correct answers to the questions. This is encouraging. It is common knowledge that in our society females tend to do better in early education as compared to their male counterparts who are expected to continue education as well as play an economic role in society. Males giving better answers may translate into an undercurrent of knowledge that males obtain as part of discussions outside their home or educational institute. Significant differences based on level of education are self-explanatory. And these effects have been documented elsewhere as well.[16]

Our study has a limitation. Although the questionnaire was formed after rigorous discussion among the authors so as to represent the entire theoretical construct of the designed model of the problem under consideration - namely the knowledge of general public about the kidney diseases, the survey questionnaire was not formally validated before launching. However, we are sure that the insights obtained may actually help us in planning educational activities targeting the knowledge voids brought out by our study.

Conflict of Interest *None*

Funding Source *None*

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Authors Contribution

OS: Conceptualization of Project
MZZ, AO: Data Collection
AZKC: Literature Search
OS: Statistical Analysis
ZAB, BB: Drafting, Revision
OS: Writing of Manuscript