

Pharmacists' Knowledge about Chronic Kidney Disease and its Management: Exploring Gaps and the Associated Factors

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ABSTRACT

Chronic kidney disease (CKD) is a worldwide public health problem. This study assessed pharmacists' knowledge about CKD and its therapeutic management. Online questionnaire was composed of three sections: sociodemographic factors, disease knowledge questions (range 0-11) and therapeutic knowledge-based questions (range 0-12). Disease and therapeutic knowledge indices were developed by calculating the median of the right answers for each part. Regression analysis was conducted to explore variables associated with CKD knowledge and its management. 352 pharmacists participated in the study. The median age was 31 (23–35) year, The majority of pharmacists (58%) were female, had bachelor's degree of pharmacy (84.7%), and had 1-3 years of experience (52.6%). The findings showed the participants exhibiting insufficient degree of knowledge about CKD knowledge with a median score of 7 (3-10) and a slightly higher degree of understanding in therapeutic knowledge compared to disease knowledge with median score 8 (4-11). Nevertheless, 79.5% of the sample members indicated that CKD is preventable. Increased age was associated with decreased knowledge ($\beta = -0.038$; $P = 0.028$). Hospital pharmacist increased the odds of having better knowledge about CKD ($\beta = 0.044$; $P = 0.02$). Higher academic achievement ($\beta = 0.065$; $P = 0.001$) and being hospital pharmacist ($\beta = 0.033$; $P = 0.02$) were associated with improved CKD therapeutics'. The CKD knowledge among pharmacists is insufficient. Pharmacists need to be updated on CKD and encouraged to participate in formal training programs about renal disease management.

Keywords: Chronic kidney disease (CKD), Knowledge, Hospital Pharmacists, Community Pharmacists.

INTRODUCTION

Reduced kidney function, indicated by less than 60 mL/min/1.73 m² of glomerular filtration rate (GFR), renal damage indicators, or both, for a minimum of three months, is known as chronic kidney disease (CKD) [1]. CKD is major public health concern [2] that most commonly develop in the elderly and people with concomitant conditions, particularly diabetes and

hypertension.

Renal illness ranked as the 12th most common cause of death globally, in the study by Neuen et al., accounting for over 1.1 million fatalities [3]. According to the Ministry of Health in Palestine, renal failure accounts for 3.2% of all recorded fatalities in Palestine, making it the ninth leading cause of death [4]. In 2019, there were 11 dialysis units in the West Bank, of which 10 are owned by the Ministry of Health and include 240 devices for the Industrial College. Additionally, there are 5 units in the Gaza Strip that contain 102 sets for the Industrial College and one at An-Najah National University Hospital in

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Received: 07/03/2024 Accepted: 18/05/2024.

DOI: <https://doi.org/10.35516/jjps.v17i4.2463>

Nablus that contains 45 machines for the Industrial College. In 2020, there were 1573 patients who regularly received dialysis services in hospitals in the West Bank [4].

An average of 12 to 19 prescription drugs were given to patients with CKD; however, over 30% of patients did not take their medications as directed, which had a negative impact on treatment results [5]. With their expertise in identifying potential drug interactions, following the lab results, adjusting the dose, establishing monitoring strategies, avoiding medications that toxic to liver, managing adverse effects from kidney disease, patient education, and creating efficient medication therapy management, pharmacists perform an essential part as members of a kidney patient's healthcare team of CKD management [6]. Several studies demonstrate how well pharmacists can manage end-stage renal illness and chronic kidney disease (CKD), improving patient outcomes and patient care [7-9].

The aim of this study was to bridge this gap in the literature by assessing professional pharmacists' knowledge of chronic dialysis, management, consequences, risk factors, and kidney disease detection.

METHODS

Study design and procedure

In this cross-sectional study, a self-reported online questionnaire was distributed on pharmacists in the community and hospital settings across different provenances in the West Bank via social media platforms (WhatsApp groups, Facebook, Twitter, etc.) in the period from March 1st, 2023 to May 30th, 2023 using convenience sampling technique.

Inclusion criteria

All pharmacists were included in the study if they had a Bachelor of Pharmacy (B. Pharm) degree or higher and had at least one year of professional experience and signed the consent form.

Exclusion criteria

Any pharmacist who cannot understand English survey or who did not sign the consent form.

Ethical approval

The Al-Quds University Ethical Approval Committee granted ethical approval for this investigation (Ref No: 284/REC/2023). The online completely anonymous questionnaire ensured the participants' confidentiality. No data revealing the participants' personal information was collected by the survey.

Sample size

The minimum sample size was determined by employing Epi Info and a sample size formula [10] This calculation was predicated on 4000 community pharmacists work in Palestine, with a 95% confidence level and a 5% precision level. Consequently, 352 was the bare minimum sample size necessary for this survey.

Study instrument

After a review of the literature the 26-item survey was adopted from [11]. The survey included 11-item disease knowledge questionnaire and 15-item therapeutic management questionnaire. The disease knowledge part evaluated knowledge in terms of definition, guidelines, symptoms, risk factors, complications and treatment perceptions. The therapeutic management part evaluated pharmacists' knowledge of key concepts of pharmacological and non-pharmacological management of CKD. The Cronbach alpha value of 0.741 demonstrated the reliability of the study survey. A panel of experts in the field including two nephrologists and three pharmacists evaluated the survey validity. To evaluate the relevance and clarity of the questionnaire items, ten community pharmacists participated in a pilot study of the survey, which was not included in the final data analysis

Statistical analysis

The data was reviewed for completeness and consistency before being analyzed with IBM SPSS Statistics. The demographic characteristics were

summarized using descriptive statistical analysis. For all variables, including awareness of chronic kidney disease, frequencies and percentages will be determined. This comprises general understanding, prevention, treatment strategies, and prescribing. To test for differences in response, Fisher's exact test will be performed. Continuous data were analyzed using the Student's t-test and ANOVA tests, and were reported as means and standard deviations ($M \pm SD$). To test for differences in response, Fisher's exact test will be performed. On both illness and treatment knowledge, bivariate and multiple regressions were used and a p value set of <0.05 was considered significant.

RESULTS

Most of the study participants were female (58%), aged between 23-35 years (65.6%), held a Bachelor degree in pharmacy (84.7%), had professional experience of less than 3 years (52.6%), and were employed in a community pharmacy setting (65.9%). Further details are presented in Table (1). As shown in figure (1), 48% of the participants reported poor disease knowledge and 60% reported poor knowledge about CKD management.

The result of this study suggests that there is a need for increased pharmacist understanding of certain elements of chronic kidney disease (CKD). The detection of early signs is a key area where information is limited, with just 55% identifying decreasing urine output as a symptom. There is also a misunderstanding of specific diagnostic criteria, specifically the classification of CKD based on albuminuria levels, which is acknowledged by just 48% of respondents. Furthermore, there are significant misconceptions about the treatability of CKD, with a low percentage correctly knowing that disease is incurable with surgery or medicine. Furthermore, there is a lack of knowledge regarding specific risk factors and consequences, such as dyslipidemia (31%), and

metabolic bone disease (29.8%), as shown in Table (2).

The study highlights the need for more understanding in a few areas related to the management of chronic kidney disease (CKD). The use of diuretics in acute kidney injury (AKI), which is only acknowledged by 25.7% of respondents, is one area with significant knowledge gaps. Furthermore, fewer than half (46%) knew exactly what the recommendations were for loading doses in patients with CKD. It is also necessary to raise awareness of dietary guidelines and specific pharmaceutical uses in cases of AKI and CKD. For example, few people were aware of the usage of metformin and ACE inhibitors at particular phases of chronic kidney disease. Results of univariate analysis showed a statistically difference in the disease knowledge score was in those group of pharmacists depending on age, number of years of experience, years of experience as a hospital pharmacist and academic achievement as a PhD graduate p value = 0.001, 0.041, 0.001 and 0.037 respectively (Table 4). Statistically difference in the medication knowledge score was in those group of pharmacists depending on age and years of experience as a hospital pharmacists P value = 0.038, 0.031 respectively. Table 3 provides a summary of the percentage of accurate answers to each question on the CKD treatment questionnaire.

The multivariate analysis revealed that for every 1-year increase in the age of the pharmacist, the disease knowledge score decreased by the 0.031. ($\beta = -0.031$; p value = 0.028) (Table 2). On the other hand, there was a positive association between the disease knowledge score and being a hospital pharmacist. ($\beta = 0.044$; p value = 0.001). Results also showed that being a hospital pharmacist ($\beta = 0.033$; p value = 0.028) and increased years of experience ($\beta = 0.065$; p value = 0.001) increased the odds of having improved knowledge about the therapeutic management of CKD.

Table 1: Demographic characteristics of the study participants.

Variable	Number of patients (N=352)	% of Patients
Gender		
Male	148	42.0%
Female	204	58.0%
Age		
23-35 years	231	65.6%
36-45 years	92	26.1%
> 45	29	8.3%
Governorate		
Jerusalem	63	17.9%
Ramallah	72	20.5%
Bethlehem	80	22.7%
Hebron	40	11.4%
Nablus	32	9.1%
Jenin	16	4.5%
Jericho	10	2.8%
Tulkarm	15	4.3%
Tubas	4	1.1%
Salfit	5	1.4%
Qalqilya	6	1.7%
Gaza	9	2.6%
Jerusalem	63	17.9%
Academic achievement		
Bachelor's degree	298	84.7%
Master's degree	40	11.4%
Ph.D.	14	4.0%
Place of residence		
City	230	65.3%
Village	100	28.4%
Camp	22	6.3%
Employer		
Community Pharmacy	232	65.9%
Hospital Pharmacy	120	34.1%
Years of experience		
1-3 years	185	52.6%
4-7 years	68	19.3%
8-10 years	69	19.6%
>10 years	30	8.5%

Table 2: Percentage of Correct Response to Individual Items on the CKD knowledge Questionnaire.

Disease Knowledge Items	Response N (%)	
	Correct	wrong
CKD is changes in kidney structure or function that have persisted for more than three months and have an impact on health	156 (91.2)	15 (8.8)
What is/are the symptom of early kidney disease (Tick as applicable)		
<i>Back Pain</i>	103(60)	68(40)
<i>Reduce in urine output</i>	95(55)	76(45)
<i>Weight/ appetite loss</i>	111(65)	60(35)
<i>Tiredness</i>	132(77)	39(23)
According to the KDOQI recommendations, CKD is divided into 5 classes (G1 through G5) based on GFR levels	131 (76.6)	40 (23.4)
According to the KDOQI criteria, there are three groups (A1 to A3) for CKD based on albuminuria values	89 (52.0)	82 (48.0)
Is increased serum creatinine alone a poorer indicator of a deterioration in renal function than eGFR?	106 (62.0)	65 (38.0)
Is low eGFR associated with normal serum creatinine, normal urine analysis, and normal USG possible with an age-related decrease in eGFR	114 (66.7)	57 (33.3)
When estimating GFR, the Cockcroft-Gault equation performs better than the MDRD equation.	47 (27.5)	124 (72.5)
The risk factors listed below should be taken into account while estimating the prognosis for CKD (Tick as applicable)		
<i>Elevated blood pressure</i>	111 (64.9)	60 (35.1)
<i>Hyperglycemia</i>	97 (56.7)	74 (43.3)
<i>Dyslipidemia</i>	53 (31.0)	118 (69.0)
<i>History of cardiovascular disease</i>	88 (51.5)	83 (48.5)
<i>Chronic use of NSAIDs, lithium, cyclosporine</i>	101 (59.1)	70 (40.9)
<i>Glomerulonephritis</i>	114 (66.7)	57 (33.3)
The 2017 ACC/AHA guidelines state that patients with CKD should aim for a blood pressure of less than 130/80 mmHg; those whose blood pressure is higher than 130 mmHg will be considered hypertensive.	131 (76.6)	40 (23.4)
Every patient with chronic kidney disease (CKD) should have ongoing monitoring for the following consequences. (Tick as applicable)		
<i>Anemia</i>	77 (45.0)	94 (55.0)
<i>Metabolic bone disease</i>	51 (29.8)	120 (70.2)
<i>Hyperkalemia</i>	118 (69.0)	53 (31.0)
<i>Acidosis</i>	85 (49.7)	86 (50.3)
<i>Edema</i>	106 (62.0)	65 (38.0)
<i>Acute Kidney Injury</i>	108 (63.2)	63 (36.8)
Every CKD patient has to be aware that they have a significant chance of suffering an acute kidney injury (AKI).	134 (78.4)	37 (21.6)
Regarding CKD		
<i>Kidney disease can be prevented</i>	135 (79.4)	36 (20.6)
<i>Kidney disease can be cured by medication</i>	17(9.7)	154(90.3)
<i>Kidney disease can be cured by surgery</i>	19(10.9)	152(89.1)
Overall correct answer (median)	8 (3-11)	

Table 3: Percentage of Correct Response to Individual Items on the CKD therapeutic knowledge Questionnaire

Therapy management Knowledge Items	Response N (%)	
	Correct	Wrong
Are ACE inhibitors the first-choice medications for treating both diabetic and non-diabetic patients' CKD?	91(53)	80(47)
Every patient with chronic kidney disease who is at risk of acute kidney injury should follow a high-protein diet (AKI)	112 (65.5)	59 (34.5)
Guidelines advise CKD patients with AKI to maintain their level of hydration by using isotonic crystalloid fluids.	89 (52.0)	82 (48.0)
When electrolyte and fluid levels in CKD patients with AKI suddenly shift, dialysis should be started.	106 (62.0)	65 (38.0)
Diuretics are advised for CKD patients with AKI in order to enhance renal function.	44 (25.7)	127 (74.3)
Patients with AKI receiving dialysis who are not at risk of bleeding are advised to receive anticoagulation medication with enoxaparin or unfractionated heparin	107 (62.6)	64 (37.4)
Since valproic acid, an anticonvulsant medication, can be dialyzed, does it need to be taken again after dialysis?	82(47.9)	89(52.1)
Iron treatment is advised for anemic CKD patients.	111 (64.9)	60 (35.1)
At Hb > 10 g/dl, erythropoietin therapy is not advised	111 (64.9)	60 (35.1)
Patients with CKD who have anemia and a systemic infection should continue receiving IV iron dextran.	41 (24.0)	130 (76.0)
Patients with CKD who are at risk of mineral and bone disorders should receive phosphate lowering therapy with phosphate binders.	107 (62.6)	64 (37.4)
Patients with CKD do not require modifications to loading doses.	79(46)	92(54)
If there is a more than 30% increase in serum creatinine, ACE inhibitors should be stopped.	120(70)	51(30)
Patients with stage 5 CKD and a GFR of less than 15 ml/min can take metformin.	96(56)	75(44)
When treating G3a-G5 stage CKD patients, should the dosage of calcium-based phosphate binders be avoided?	109(63.7)	62(36.3)
Overall correct answer (median)	10 (4-12)	

Table 4: Univariate analysis of various factors affecting Pharmacist's knowledge

		Disease Knowledge		P. Value
		Poor n (%)	Good n (%)	
Gender	Male	85(49.3)	86(50.7)	0.11
	Female	95(55.4)	76(44.6)	
Age	23-35 years	100(58.8)	71(41.2)	0.001**
	36-45 years	46(26.8)	125(73.2)	
	> 45	47(27.3)	124(72.7)	
Experience	1-3 years	69(40.1)	102(58.9)	0.041*
	4-7 years	105(61.4)	66(38.6)	
	8-10	63(37.1)	108(62.9)	
	> 10			
Employer	Community Pharmacy	103(60.1)	68(39.9)	0.001**
	Hospital Pharmacy	47(27.4)	124(72.6)	
Academy achievement	Bachelor's degree	96(56.0)	75(44.0)	0.037*
	Master's degree	60(35.0)	111(65.8)	
	Ph.D.	69(40.1)	102(58.9)	
Place of residency	City	93(54.1)	78(55.9)	0.08
	Village	108(63.4)	63(41.6)	
	Camp	104(61.0)	67(39.0)	
		Medication Knowledge		P. Value
		Poor n (%)	Good n (%)	
Gender	Male	104(61.0)	67 (39.0)	0.21*
	Female	96(56.1)	75(43.9)	
Age	23-35 years	101(58.8)	70(41.2)	0.038*
	36-45 years	61(35.8)	110(64.2)	
	> 45	69 (40.4)	102(59.6)	
Experience	1-3 years	69(40.1)	102(58.9)	0.031*
	4-7 years	105(61.4)	66(38.6)	
	8-10	63(37.1)	108(62.9)	
	> 10			
Employer	Community Pharmacy	82(48.2)	89(51.8)	0.001**
	Hospital Pharmacy	39(22.9)	132 (77.1)	
Academy achievement	Bachelor's degree	103(60.0)	68(40.0)	0.001**
	Master's degree	38(22.2)	133(77.8)	
	Ph.D.	69(40.1)	102(58.9)	
Place of residency	City	53(31.1)	118(69.9)	0.02*
	Village	103(60.2)	68(39.8)	
	Camp	101(58.9)	70(40.1)	

Table 5: Multiple regression analysis for CKD disease and therapeutics knowledge

Disease Knowledge					Therapeutic Knowledge			
Variable	β	SE	t-statistics	P. Value	β	SE	t-statistics	P. Value
Constant	0.191	1.393	0.139	0.893	0.191	1.393	0.139	0.893
Gender	0.229	0.587	0.389	0.711	-.007	0.04	-0.177	0.711
Years of practice	0.483	0.297	1.628	0.169	-0.201	0.463	-0.433	0.675
Age	-0.031	0.311	-2.615	0.028	0.017	0.032	0.546	0.586
Hospital pharmacy	0.044	0.014	3.142	0.020	0.033	0.010	3.142	0.028
Education degree ^c	0.333	0.293	1.13	0.124	0.065	0.017	3.89	0.001
Residency ^d	0.739	0.390	1.912	0.071	0.031	0.016	1.93	0.066
Pharmacy owner ^e	-0.201	0.463	-0.433	0.675	-	-	-	-

N=352. Adjusted R²=0.684. ^aGender coded, 1= male, 0 =female. ^bYears of practice coded, 1= <3 years, 2= 4-10, 3= 11-20, 4= >20. ^cEducation 1= PhD, Master's degree, 0= Bachelor. ^dResidency coded, 1 =middle, 2 = north, 3 = south. Pharmacy owner coded, 1 = yes, 0 = no.

DISCUSSION

In addition to be the first study which evaluated pharmacists' knowledge about CKD and its therapeutic management in Palestine, earlier research studies reported inconsistent findings of knowledge levels and its associated factors, which necessitates further investigations for this purpose.

The respondents in this study have modest understanding about CKD, with a median of seven correct responses out of eleven. An earlier study reported that pharmacists were equally distributed to have good or poor knowledge with a mean knowledge score of 54.76 ± 16.3 percent [11-13].

The high recognition percentage (91.2%) of the CKD definition in this survey is encouraging, indicating that respondents had a sound basic understanding. However, the disparity in the detection of symptoms such as fatigue (77%) and decreased urine output (55%) suggests a need for increased education on early CKD indications. Most of the present study participants were able to classify CKD using GFR values, demonstrating knowledge of the KDOQI recommendations. On the other hand, the lesser understanding of albuminuria-based classification (48%) indicates a specific area for educational improvement.

The disparity in identifying CKD risk factors in this

study might have an impact on preventive actions. Similarly, the disparity in the detection of consequences such as hyperkalemia and metabolic bone disease highlights the need for comprehensive education on CKD outcomes. The low percentage of respondents who recognized the incurability of CKD through surgery and medicine is a major concern, since it may have an impact on patient counseling and care, which underlined the need for increased education on CKD management.

The fact that 53% of people are aware that ACE inhibitors are the first-line treatment for CKD, which is lower than the findings of another study [14], highlights a need for more education as ACE inhibitors represent a cornerstone in CKD management. On the other hand, a higher proportion of the current study participants were able to identify erythropoietin and iron therapy use guidelines for anemia management. Understanding of the necessity of dialysis, as well as the appropriate use of anticoagulant medicine in AKI patients on dialyses, is rather high, demonstrating superior awareness in these specific therapy elements. However, the majority of the participants were unable to recognize diuretics function in AKI. A more encouraging response about the use of dietary advice and the administration of isotonic crystalloid fluids for AKI management was reported in this study.

Regression analysis showed that knowledge was age

dependent, with pharmacists of lower ages having the best Disease knowledge levels. These results were in agreement with a study conducted on healthcare professionals in Saudi Arabia, which discovered that being under 40 years old is related with higher knowledge scores [15]. The outcomes of disease knowledge among pharmacists of various levels of education were startlingly divergent, which may be cause for concern. It was discovered that pharmacists with higher Postgraduate degrees, such as Master's and PhD degrees, have stronger clinical understanding than those with only a Bachelor's degree. One key explanation for that advanced degrees foster critical thinking and problem-solving skills, which are vital in clinical practice. Pharmacists with postgraduate degrees are better equipped to assess complex patient cases, interpret medical literature, and make informed decisions, all of which contribute to superior clinical understanding [16].

Consistent with the findings of Teh's team [17], being a hospital pharmacist and increased years of experience were associated with increased pharmacists' therapeutic knowledge about CKD. Hospital pharmacists are regularly engaged in medication evaluations and dose modifications that would enrich disease management information. Furthermore, was associated with improved therapeutic knowledge, which is consistent with earlier research finding [18-21].

One notable advantage of this study is its pioneering nature; it is the first to test pharmacists' knowledge of chronic renal disease and drugs used in Palestine. The study findings can be used in a variety of practical ways to improve pharmacists' knowledge of CKD and improve patient health outcomes. For starters, introducing CKD-specific continuing education programs can keep pharmacists up to date on the most recent treatment guidelines and management practices. Second, holding interactive seminars and case study discussions might help them better comprehend the complexity of CKD. Third, by incorporating CKD management into regular pharmacy

practice, such as through medication review guidelines for CKD patients, pharmacists can ensure they are actively involved in patient care. Creating easily accessible reference materials and decision support tools suited for pharmacy practice can also help with quick and accurate information retrieval during patient consultations. These measures can help pharmacists become more knowledgeable, resulting in better medication management and health outcomes for CKD patients. However, one major restriction is that online questionnaires do not provide the human engagement that in-person or phone interviews do. As a result, data quality may suffer since respondents may not request clarification on confusing questions.

CONCLUSION

There is an insufficient of understanding about CKD treatment. Hospital pharmacists are better knowledgeable about CKD treatment. There is a need to refresh pharmacists' renal disease knowledge and urge them to participate in structured kidney disease management training programs. Professional clinical experience is as crucial as the pharmacist's level of education. To generate pharmacists with stronger clinical abilities, the pharmacy teaching and training system should be upgraded.

AUTHOR'S CONTRIBUTION: Study concept and design: R.G., and M. K; analysis and interpretation of data: R.G., M.K. and A.J.; drafting of the manuscript: A.J. and R.G.; critical revision of the manuscript for important intellectual content: R.G., T.M., and M.K.; statistical analysis: R.G., M.K., A.J., T.M., H.S, A.G., and A.M. Data collection: H.S., A.G., and A.M. All authors contributed to the drafting and critical review of the manuscript and have approved the final draft of the manuscript.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

DATA AVAILABILITY

The dataset presented in the study is available on request from the corresponding author during submission

or after its publication.

ACKNOWLEDGMENT

The authors would like to thank all the participants for providing the data used in this study.

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معرفة الصيادلة بمرض الكلى المزمن وإدارته: استكشاف الثغرات و العوامل المرتبطة بها

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ملخص

مرض الكلى المزمن (CKD) هو مشكلة صحية عامة في جميع أنحاء العالم. قيمت هذه الدراسة معرفة الصيادلة حول CKD وإدارة علاجه. تكون الاستبيان المرسل عبر الإنترنت من ثلاثة أقسام: العوامل الاجتماعية والديموغرافية، أسئلة معرفة المرض (العلامات 0-11) والأسئلة العلاجية القائمة على المعرفة (العلامات 0-12). وقد تم تطوير مؤشرات المرض والمعرفة العلاجية من خلال حساب متوسط الإجابات الصحيحة لكل جزء. تم إجراء تحليل الانحدار لاستكشاف المتغيرات المرتبطة بمعرفة CKD وإدارتها. شارك في الدراسة 352 صيدلاني. أظهرت النتائج أن لدى المشاركين درجة متواضعة من المعرفة حول مرض الكلى المزمن مع متوسط درجة 7 (3-10) ودرجة أعلى قليلاً من الفهم في المعرفة العلاجية مقارنة بمعرفتهم بالمرض مع متوسط درجة 8 (4-11). ومع ذلك، أشار 79.5% من أعضاء العينة إلى أن CKD يمكن الوقاية منه. في حين أن تقدم العمر لدى عينة الدراسة كان مرتبطاً بانخفاض المعرفة ($\beta = -0.038$ ، $P = 0.028$). أشارت الدراسة إلى أنه لدى صيادلة المستشفيات معرفة أفضل حول CKD ($\beta = 0.044$ ، $P = 0.02$). كما أوضحت الدراسة أن الصيادلة ذوي التحصيل الأكاديمي العالي ($\beta = 0.065$ ، $P = 0.001$) ومن هم من صيادلة المستشفيات ($\beta = 0.033$ ، $P = 0.02$) كانت لديهم معرفة أفضل فيما يخص علاجات CKD. معرفة CKD بين الصيادلة كانت غير كافية، والصيادلة بحاجة إلى تحديث معلوماتهم حول مرض CKD وإدارة علاجه، وتشجيعهم على المشاركة في برامج التدريب الرسمية المتعلقة بذلك.

الكلمات الدالة: مرض الكلى المزمن (CKD)، معرفة، صيادلة المجتمع، صيادلة المستشفيات.

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تاريخ استلام البحث 2024/03/07 وتاريخ قبوله للنشر 2024/05/18.