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Research Article

Impact of Educational Intervention on Pharmacists' Knowledge of Therapy of Chronic Kidney Disease

***Aghoja. O.[1], Odili V.[2], Akonoghrere. R.[1], Adje. D. and Akpovwovwo. E.[3]**

[1]*Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, Delta State University, Abraka, Delta State, Nigeria*

[2]*Department of Clinical Pharmacy and Pharmacy Practice, University of Benin, Benin city, Edo State, Nigeria*

[3]*Department of Pharmaceutical Services, Delta State University, Teaching Hospital Oghara, Delta State*

ABSTRACT

The objectives of this study were to determine the knowledge of pharmacists regarding chronic kidney disease and to determine the impact of socio-demographic characteristics on pharmacists' knowledge as well as to determine the impact of educational intervention on pharmacists' knowledge of chronic kidney disease. The study was a prospective, cross-sectional interventional study undertaken in the Department of Pharmacy, Federal Medical Centre Asaba and the Department of Pharmacy Delta State University Teaching Hospital Oghara, as well as in all the Central hospitals in the State for over a period of one year. Data collection was done using the kidney knowledge survey (KIKS) 28-items questionnaire. The data on the retrieved copies of the questionnaire were analyzed with Statistical Package for Social Sciences version 20. The average knowledge of the respondents in the various centers surveyed was good. There was no statistically significant difference in the overall mean knowledge score between the centers p>0.05. However, DELSUTH Oghara had a higher overall mean score of 21.89±3.01 (78.2%), followed by Federal Medical Center Asaba 20.41±2.61 (72.9%) and Central hospitals 19.40±3.72 (69.3%). Socio demographics had no impact on the average knowledge of the pharmacists. The intervention programme impacted positively on pharmacists' knowledge of chronic kidney disease.

Keywords: *Knowledge, pharmacists, renal disease, chronic, humans*

**Author for correspondence: Email: stmajella@yahoo.co.uk; Tel: +2348028427771*

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INTRODUCTION

Kidney disease, also known as Nephropathy, means damage to or abnormal functioning of the kidney. Causes of kidney disease include deposition of IgA antibodies in the glomerulus, administration of analgesics, xanthine oxidase deficiency, toxicity of chemotherapy agents, and long-term exposure to Lead or its salts. Chronic conditions that can produce nephropathy include systemic lupus erythematosus, diabetes mellitus and high blood pressure (hypertension), which can lead to diabetic nephropathy and hypertensive nephropathy respectively (Longa *et al*, 2011).

In sub-Saharan Africa, and indeed also in Nigeria, hypertension and diabetes mellitus are among the leading causes of end-stage renal disease (Kadiri *et al*, 1999). By 2020, the burden of diabetes and cardiovascular disease will have increased by 130% in Africa alone, with concomitant increases in the prevalence of chronic kidney disease (CKD) and end-stage renal disease (ESRD) (Schena, 2000).

The cost of management of renal disease is high (Ijoma, 1998). In developing countries, there are few places where renal replacement therapy is available and are usually unaffordable by most patients.

In Nigeria and other developing countries, there is no social security system or health insurance scheme in place to assist the patients and hence the burden is borne solely by the patients and their relatives. However, almost all the therapies aimed at slowing disease progression and reducing associated complications depend on the patient's self-care, including adherence to medication therapy (NKF, 2003; NKF, 2004; NKF, 2005), avoidance of further nephrotoxic insults (Harkonen and Kjellstrand, 1981), and in advanced stages,

maintenance of strict diet control (NKF, 2000). It has been established by research that good patient knowledge is associated with improved patient self-management behaviors in patients receiving hemodialysis (Curtin, 2004), improved glycemic control in patients with diabetes (Fitzgerald 1988; Huizinga *et al*, 2008) and increased medication adherence in patients with HIV (Osborn *et al*, 2010) .

In the light of the above, adequate knowledge of CKD by pharmacists is necessary to be effective in educating, training and counselling patients with CKD on self-care, including adherence to medication, avoidance of further nephrotoxic insults and in advanced stages, maintenance of strict diet control.

Many studies have been undertaken to assess the knowledge of CKD among medical doctors (Agaba *et al*, 2011; Agaba *et al*, 2012; Mahmud *et al*, 2016; Godswill *et al*, 2016). However, there is paucity of information on studies to assess the knowledge of CKD among pharmacists. The objectives of this study were to determine the knowledge of pharmacists regarding chronic kidney disease and to determine the impact of socio-demographic characteristics on pharmacists' knowledge as well as to determine the impact of educational intervention on pharmacists' knowledge of CKD.

MATERIALS AND METHODS

Study Design: The study was a prospective, cross-sectional interventional study undertaken in the Department of Pharmacy Federal Medical Centre Asaba and the Department of Pharmaceutical Sciences, Delta State University Teaching Hospital Oghara, as well as in all the central hospitals in the State for over a period of one year.

Settings: The study was undertaken in Federal Medical Centre Asaba and Delta State University Teaching Hospital, Oghara as well as in all the central hospitals in the State.

Federal Medical Centre Asaba is a Tertiary health care institution with 300 beds, located in Asaba, Delta State.

Among other specialties, the hospital has a renal unit with two consultant nephrologists and two dialysis machines; with one of the dialysis machines dedicated to renal patients who are HIV positive and those who have hepatitis.

Delta State University Teaching Hospital (DELSUTH), Oghara is a two hundred and twenty (220) bed hospital with a high patient traffic because of its uniqueness in the area, medical care and also being the only teaching hospital in the State.

The Hospital has a nephrology department with two consultant nephrologists, three senior registrars and seven registrars. The department has eight dialysis machines with three of the dialysis machines dedicated to renal patients who are HIV positive and those who have hepatitis.

Central hospital is the State-owned hospital under the management of Delta State hospitals management board.

Inclusion Criteria: All pharmacists in the health care facilities that were present participated in the studies.

Exclusion Criteria: Pharmacists who were absent from duty on the day the study started, and those who were co-researchers.

Sampling Size and Sampling Technique:

All the consenting pharmacists that met the inclusion criteria participated in the study.

Instrument for Data collection: Data collection was done using the kidney knowledge survey (KIKS) 28-items questionnaire. The questionnaire had three sections; the first section comprised general knowledge of kidney disease, the second was the knowledge of function of the kidney while the third section assessed patient's knowledge of symptoms of progression of kidney disease/or failure. The questions were made up of yes or no and some multiple-choice questions with potential scores of 0-28. The instrument has been shown to have good reliability (Kuder-Richardson-20=0.72) (Wright *et al*, 2011). The first 9 items on the KIKS assess general knowledge of kidney such as target BP, medications important to the kidney, reason why protein in urine is a problem, medications people with chronic kidney disease should avoid, treatment options for renal failure, definition of GFR, knowing there are stages of chronic kidney disease, understanding increased risk of heart disease and understanding increased risk of mortality, while the remaining 19 items have questions on kidney function and symptoms of progression.

Educational Intervention: The KIKS questionnaire was first used to assess the knowledge of the respondents and based on the knowledge gaps identified, an educational training program was designed covering all the areas the respondents were deficient in knowledge. Thereafter, all the respondents that participated in the initial survey were trained and the KIKS questionnaire was used to assess their knowledge again. The curriculum for educational intervention included areas covered by the questionnaire and more such as epidemiology and definition of chronic kidney disease, pathophysiology, signs and symptoms and diagnosis of the disease. Others are complications of chronic kidney disease and treatment goals. Educational intervention lasted for 2 hours.

Ethical Consideration: Ethical approval was obtained from the ethics committee of Delta State university teaching Hospital with document number DELSUTH/HREC/2017/012/0236 dated 01/03/2017 and central hospital with certificate number CHW/ECC VOL 1/086 dated 05/04/2016 before the commencement of the study.

Data Analysis:

The collected data was coded and entered into SPSS version 20.0 and analyzed. The various variables were expressed as simple frequencies and percentages. The Statistical Package for Social Sciences (SPSS) was used for the inferential statistics with the p-value set at less than 0.05. Students t tests were performed to investigate relationship between factors.

RESULTS

Demographic characteristics: Of the 55 Pharmacists sampled, majority were male 34(61.8%). The mean years of practice of the pharmacists was 11.65 ± 6.45. Majority, 36 (65.6%) of the respondents had a BPharm degree followed by those who had a Pharm D degree, 11(20%). Those who had a postgraduate qualification were few and are as shown in Table 1. There was no significant difference in the overall mean knowledge score between the centers (p>0.05). However, DELSUTH Oghara had a higher overall mean score of 21.89 ± 3.01 (78.2%), followed by Federal Medical Center Asaba 20.41 ± 2.61 (72.9%) and Central hospitals 19.40 ± 3.72 (69.3%).

Knowledge of Renal Disease: Overall, on the KiKS there were certain knowledge deficiencies that cut across all the centers. Respondents from all the centers performed poorly in 5 questions. (Table 2). The first was the question which asked respondents to state the "target blood pressure for patients with chronic kidney disease". Federal Medical Center Asaba and Central Hospitals had an average correct score of less than (40%) respectively, while DELSUTH Oghara had slightly above (65%).

Table 1:
Socio-Demographics of Pharmacists

Variables		F	(%)	Mean	SD
Centre	FMC Asaba	22	40.0		
	Central Hospital	15	27.3		
	DELSUTH	18	32.7		
Sex	Male	34	61.8		
	Female	21	38.2		
Length of Practice				11.65	6.45
Qualification	B.Pharm	36	65.5		
	Pharm D	11	20.0		
	MPharm	1	1.8		
	FPCPharm	7	12.7		

Table 2:
Pharmacists Knowledge of Renal Disease

		Pharmacists with correct answers to the questions					
		Centre					
		FMC, Asaba		**Central Hospitals**		**DELSUTH**	
		N	**%**	**N**	**%**	**N**	**%**
General knowledge	BP goal	7	31.8	5	33.3	12	66.7
	Medication important to kidney health	16	72.7	10	66.7	16	88.9
	Reason why protein in urine is a problem	8	36.4	5	33.3	0	0.0
	Medications a person with CKD should avoid	5	22.7	6	40.0	12	66.7
	Treatment options for kidney failure	22	100.0	14	93.3	18	100.0
	Definition of GFR	22	100.0	14	93.3	18	100.0
	Knowing there are stages of CKD	18	81.8	15	100.0	18	100.0
	Understanding increased risked of heart disease	20	90.9	12	80.0	18	100.0
	Understanding increased risk of mortality	22	100.0	14	93.3	18	100.0
Knowledge of kidney function	Role in urine production	21	95.5	14	93.3	18	100.0
	Role in waste clearance	21	95.5	15	100.0	18	100.0
	Role in bone health	14	63.6	13	86.7	12	66.7
	Role in hair loss	7	31.8	9	60.0	6	33.3
	Role in Anemia	17	77.3	8	53.3	14	77.8
	Role in BP control	21	95.5	11	73.3	16	88.9
	Role in Glucose control	2	9.1	14	93.3	10	55.6
	Role in potassium control	21	95.5	4	26.7	14	77.8
	Role in phosphorus control	19	86.4	12	80.0	14	77.8
Knowledge of symptoms of progression/failure	Increased fatigue	22	100.0	9	60.0	18	100.0
	Shortness of breath	16	72.7	14	93.3	14	77.8
	Metallic/bad taste	12	54.5	9	60.0	12	66.7
	Unusual itching	11	50.0	8	53.3	10	55.6
	Nausea/vomiting	22	100.0	12	80.0	16	88.9
	Hair loss	6	27.3	10	66.7	6	33.3
	Difficulty sleeping	17	77.3	7	46.7	14	77.8
	Weight loss	18	81.8	9	60.0	16	88.9
	Confusion	19	86.4	9	60.0	12	66.7
	No symptoms at all	2	9.1	9	60.0	6	33.3

Table 3:
Relationship between socio-demographic Characteristics and Knowledge of Renal Disease amongst Pharmacists

Variables		General Knowledge				
		Count	**Mean**	**SD**	**t-test**	**P-Value**
Centre	FMC Asaba	22	20.41	2.61	-1.614	0.115
	Central Hospitals	15	19.40	3.72		
	DELSUTH	18	21.89	3.01		
Sex	Male	34	20.85	2.96	.641	0.525
	Female	21	20.24	3.53		
Qualification	B.Pharm	36	20.31	3.36		
	Pharm D	11	20.91	3.33	-.010	0.992
	MPharm	1	23.00	.		
	FPCPharm	7	21.43	1.90		
Center	Renal Units	33	20.12	2.50	3.068	0.083
	Non-Renal Units	22	21.36	3.92		

Table 4:
Differences in Pharmacists Knowledge at Baseline and after Intervention

		FMC Asaba				**DELSUTH**			
		Treatment				**Treatment**			
		Baseline		**Intervention**		**Baseline**		**Intervention**	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
General knowledge	BP goal	7	31.8	20	90.9	12	66.7	18	100.0
	Medication important to kidney	16	72.7	22	100.0	16	88.9	16	88.9
	Reason why protein in urine is a problem	8	36.4	17	77.3	0	0.0	16	88.9
	Medications people with CKD should avoid	5	22.7	22	100.0	12	66.7	18	100.0
	Treatment option for kidney failure	22	100.0	22	100.0	18	100.0	18	100.0
	Definition of GFR	22	100.0	22	100.0	18	100.0	18	100.0
	Knowing there are stages of CKD	18	81.8	22	100.0	18	100.0	18	100.0
	Understanding increased risk of heart disease	20	90.9	22	100.0	18	100.0	18	100.0
	Understanding increased risk of mortality	22	100.0	22	100.0	18	100.0	18	100.0
Knowledge of kidney function	Role in urine production	21	95.5	22	100.0	18	100.0	18	100.0
	Role in waste clearance	21	95.5	21	95.5	18	100.0	18	100.0
	Role in bone health	14	63.6	21	95.5	12	66.7	18	100.0
	Role in hair loss	7	31.8	11	50.0	6	33.3	14	77.8
	Role in Anemia	17	77.3	21	95.5	14	77.8	18	100.0
	Role in BP control	21	95.5	22	100.0	16	88.9	18	100.0
	Role in Glucose control	2	9.1	14	63.6	10	55.6	14	77.8
	Role in Potassium control	21	95.5	21	95.5	14	77.8	18	100.0
	Role in Phosphorus control	19	86.4	21	95.5	14	77.8	18	100.0

Table 5:
Differences in Baseline and Intervention Mean Scores on KIKS

Variables		**Baseline**			**Intervention**			
		General Knowledge			**General Knowledge**			
		N	**X**	**S.D**	**N**	**X**	**S.D**	**P-value**
Centre	FMC Asaba	22	20.41	2.61	22	25.41	1.74	0.001
	DELSUTH	18	20.89	3.01	18	26.44	1.54	<0.0001
Sex	Male	22	20.36	3.11	22	26.18	1.74	<0.0001
	Female	18	19.78	2.56	18	25.50	1.65	<0.0001
Qualification	B.Pharm	26	20.15	2.87	26	25.96	1.56	<0.0001
	Pharm D	7	19.57	3.82	7	26.29	1.80	0.0012
	MPharm	1	22.00	.	1	23.00	.	
	FPCPharm	6	20.17	1.94	6	25.50	2.17	0.0012

The second was question 3, which was a question on "the reason why presence of protein in the urine is a problem", (36.3%) of pharmacists in Federal Medical Center Asaba and (33.3%) of pharmacists in Central hospitals knew the correct answer, interestingly, no pharmacist in DELSUTH Oghara knew the correct answer. The third question was question 4 on the KiKS which asked about what "medications a person with chronic kidney disease should avoid", only (22.7%,) (40%) and (66.7%) of pharmacists in Federal Medical Center, Asaba, Central hospitals and DELSUTH Oghara respectively chose

the correct medications. The fourth question; question 13 on the KiKS asked about "the role of kidney in hair loss". Pharmacists from Federal Medical Center, Asaba failed this question the most. Only (31.8%) of them got the right answer, followed by (33%) and (60%) of pharmacists in DELSUTH Oghara and Central hospitals respectively. Finally, question 28 on the KIKS asked about the possibility of "chronic kidney disease patients not having any symptom at all" was the fifth question commonly missed by respondents. Federal Medical Center Asaba failed this question most with only (9%) having the correct answer, followed by (33.3%) and (60%) of pharmacists in DELSUTH Oghara and central hospitals respectively.

The pharmacists in Central hospitals were not included in the educational intervention because we could not get a sizeable number of respondents in each of the Central hospitals. Following the educational intervention, there was a statistically significant increase in the respondents' knowledge. Mean knowledge score increased from 20.41 ± 2.61 (69.48%) at FMC Asaba and 20.89 ± 3.01 (76.6%) at DELSUTH Oghara at baseline to 25.41 ± 1.74 (90.75%) and 26.44 ± 1.54 (94.44%) after educational intervention respectively ($p<0.001$). (Table 5) The analysis of the pharmacists' KiKS score based on sample characteristics revealed a statistically significant difference between their baseline KiKS score and intervention KiKS score. The difference in respondents' KiKS score before and after intervention based on pharmacy unit in the hospital where they practiced was not significant.

DISCUSSION

The average knowledge of the respondents in the various centers surveyed was good. However, the results of this study revealed that there are some gaps in the knowledge of pharmacists studied in the various centers.
General knowledge of kidney appears to be one area where most of the pharmacists had a challenge.

A good number of the respondents did not know what the recommended target blood pressure should be in patients with chronic kidney disease. Incidentally, blood pressure control is seen as a fundamental element in the management of chronic kidney disease. The Kidney Disease Outcomes Quality Initiative guidelines recommends a target blood pressure of less than 130/80mmHg in patients with chronic kidney disease, and the preferred choice of antihypertensive drug for both diabetic and non-diabetic patients are angiotensin converting enzymes inhibitors and angiotensin receptor blockers [(Levey *et al*, 2007). This corroborates the findings reported by Agaba *et al*, (2012) which was similar. But in contrast to the findings of Agrawal *et al*, (2009) who reported that most of their respondents were aware of what the target blood pressure for patients with chronic kidney disease should be.

Majority of our respondents lacked understanding of why protein in urine is a problem. However, reducing proteinuria is one of the mainstays of therapy in chronic kidney disease, as the presence of protein in the urine is not only a marker of kidney damage, but if left uncontrolled may contribute to disease progression (Burton and Harris, 1996). Most of our respondents identified the importance of medications such as angiotensin converting enzyme inhibitors and angiotensin receptor blockers in reducing protein in the urine. This is consistent with the findings of other related studies carried out by other researchers (Agrawal *et al*, 2009; Agaba *et al*, 2012).

More than half of our respondents were unable to identify non-steroidal anti-inflammatory drugs as the medication to avoid by chronic kidney disease patients as the use may promote progression of the disease (Nanra *et al*, 1978; Fored *et al*, 2001; Gooch *et al*, 2007). This is disturbing because avoidance of non-steroidal anti-inflammatory drugs can delay disease progression. Therefore, some pharmacists may not be aware that they have to counsel patients with chronic kidney disease to avoid the use of non-steroidal anti-inflammatory drugs.

Most of the respondents had limited knowledge of the symptoms of progression of chronic kidney disease, as only a small percent of the respondents knew that as chronic kidney disease progresses there may not be any symptom. It is pertinent that patients should be aware that even without symptoms chronic kidney disease can progress to advanced stages.

Almost all the respondents identified that there is increased risk of heart disease in chronic kidney disease patients. This is inconsistent with the report of other related studies which found that only a few participants identified cardiovascular disease as a complication of chronic kidney disease (Lenz and Fomoni, 2006; Agaba *et al*, 2012; Yaqub *et al*, 2013; Chuokem *et al*, 2016). All our respondents identified both renal transplant and hemodialysis as forms of renal replacement therapy. This may be as a result of the availability of renal unit in the hospitals where this study was undertaken.

It has been reported that patients' knowledge deficit may be a consequence of some specific knowledge deficits among health professionals (Spreight and Bradley, 2001). Our data give a snapshot of the gaps in knowledge of chronic kidney disease among hospital pharmacists. These deficiencies may mean a deficiency in the curriculum for training or an under development or absence of a structure to continuously educate health professionals and implement new research findings in day to day clinical practice. It has been shown that it can take up to ten years for new development or evidence to be implemented clinically (Haines and Donald, 1998).

There was an overall improvement in the chronic kidney disease knowledge of the pharmacists after the educational intervention. This increase in knowledge was statistically significant indicating that majority of the pharmacists sampled were able to acquire knowledge after the training. This is consistent with the result of a study on short term impact of a continuing education programme on pharmacists' knowledge after a 7 hours' educational intervention (Chen *et al*, 2004).
The respondents' characteristics such as center, gender, qualification, and unit in the hospital did not have any impact at all on their knowledge at baseline and after the educational intervention. This may be because the respondents are from the same region of the country and might have attended the same universities having similar undergraduate and postgraduate training as well as similar seminars and workshops.

An analysis of the rates of correct items on the KIKS before and after intervention revealed that despite the overall

average increase in pharmacists' knowledge after intervention, there were areas where the pharmacists still performed poorly. Such areas include general knowledge of kidney disease, functions and symptoms of disease progression. This is consistent with the reports of studies in diabetes (Chen *et al*, 2004; Bisheya, 2011). This finding indicates that continuing education programmes on renal disease should be ongoing rather than a single intervention so that emphasis can be placed on the areas that pharmacists still showed deficiencies after a previous educational intervention.

In conclusion, there are deficits in the chronic kidney disease knowledge of pharmacists sampled in this study. The healthcare facilities studied have similar challenges in specific areas such as, target BP for chronic kidney disease patients, reasons why presence of protein in urine is a problem, medications a person with chronic kidney disease should avoid, role of kidney in hair loss as well as the possibility of a patient with chronic kidney disease not having any symptoms at all. There were also some disparities in the knowledge which may be due to the routine practice in the various centers. Socio demographics had no impact on average knowledge of the pharmacists The educational intervention programme impacted positively on pharmacists' knowledge of chronic kidney disease.

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