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IMPACT OF CLINICAL PHARMACIST PROVIDED EDUCATION ON MEDICATION KNOWLEDGE AND ADHERENCE OF HEMODIALYSIS PATIENTS IN A SOUTH INDIAN UNIVERSITY HOSPITAL

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ABSTRACT

Objective: To evaluate the medication knowledge of the patients on maintenance hemodialysis, their adherence to drug therapy and to assess the effect of patient counselling in improving their medication knowledge and adherence.

Methods: Data was obtained from the patients by medical history interview and review of their medical records. The medication knowledge was assessed using Medication knowledge assessment questionnaire (MKAQ) and their medication adherence behaviour using Brief Medication questionnaire (BMQ). Patients were counseled both verbally and by distribution of education leaflets regarding their disease, dialysis procedure, the drugs, diet and fluid restrictions on regular dialysis days and the effect of patient counselling in improving their medication knowledge and adherence was assessed using the respective questionnaires at the baseline, after 6 and 12 weeks. The mean scores were subjected to statistical analysis.

Results: 85 patients (57 males and 28 females; mean age 50.52±13.28years) were included and 79% were on twice weekly and 21% were on thrice weekly dialysis. The average number of drugs prescribed for a patient was found to be 6.47±1.57. Hypertension was found to be the major co-morbidity in 52.94% patients and antihypertensives were the most prescribed drugs (75.3%). Based on the mean MKAQ score, there was a significant increase in the medication knowledge from baseline of 14.30±6.97 to 19.32±6.61 at the end of sixth week (p=0.000) and to 33.62±7.76 at the end of twelfth week of counseling (p= 0.000). The mean BMQ score was 4.26±0.95 at the baseline, 2.99±0.82 on the sixth week and 1.73±0.94 on the twelfth week of counseling, indicating a significant improvement in medication adherence with continuous patient counseling (p=0.000).

Conclusion: The study emphasized that provision of constant patient education to hemodialysis patients would increase the medication knowledge of the patients and improve their adherence.

Keywords: adherence, knowledge, hemodialysis, medication

INTRODUCTION

Chronic kidney disease (CKD) is a condition with progressive loss of renal function and a worldwide public health problem with an increasing incidence and prevalence, poor outcomes, and high cost[1]. Hemodialysis (HD) is a viable, safe and efficient method for the maintenance of patients with CKD progressing to end stage renal disease (ESRD) and the patients are to be dialysed twice or three times per week for approximately 4 hours per session[2].

Patients on maintenance hemodialysis have a complex drug regimen and may receive on average 10-12 medications per day, many of which require multiple doses/day [3]. Effective management of ESRD patients on hemodialysis is adherence to their therapeutic regimen. Medication adherence refers to the extent of patients taking medication and because of the demands of hemodialysis; many patients might not adhere to the prescribed regimen, thereby jeopardizing successful clinical outcomes [4].

Various factors are said to influence medication nonadherence in these patients which include; polypharmacy, frequent medication adjustments on dialysis versus non-dialysis days, medically unstable nature of the disease, lack of knowledge on the name, indication, dosage, frequency, side effects of the medications and restricted life style[5]. Studies conducted in developed countries have documented non adherence patterns in patients on maintenance hemodialysis. Results of these studies indicated that hemodialysis patients have inadequate knowledge and understanding about their medications [6].

In addition to these reasons, ESRD itself is a life threatening condition, which causes physical and psychological disturbances (such as anxiety, stress) contributing for reduced functional capacity and quality of life. Assessing the medication knowledge of these patients and providing them with required medication related information would be more meaningful and beneficial. Patient

focused interventional strategies such as identification and removal of barriers to medication adherence, patient education and cognitive behavioral strategies may improve adherence to the treatment regimens [7].

In India, studies were done on hemodialysis patients focusing almost exclusively on fluids and diet with little or no attention paid to medication and very few data are available on studies assessing medication knowledge and adherence of dialysis patients to medications [6,8]. Hence a study was conducted with the objective of assessing the medication knowledge of CKD patients undergoing maintenance hemodialysis, to assess the effect of a clinical pharmacist provided continuous patient education in improving medication adherence and to evaluate the association between medication knowledge and medication adherence behaviour in hemodialysis patients.

MATERIALS AND METHODS

The study was conducted in patients of either sex, aged above18 years, undergoing twice/thrice weekly maintenance hemodialysis on outpatient basis and was receiving their scheduled medication regimen in the dialysis unit of a South Indian multispecialty University hospital and consenting to participate in the study after obtaining approval of the institutional ethics committee. Patients with multiple organ system failure, loss of consciousness, memory impairment, severely disabled, malignancies, irregular dialysis, patients who were unable to speak/understand English or local language (Tamil) were excluded from the study.

Data including Patient demographics (age, sex), past medical & medication history, duration and frequency of dialysis, medications prescribed [name, dose, frequency, route, duration of the drug] were obtained by direct patient history interview and review of the patient medical records and documented in the data collection forms specially designed for the study. Patients were counseled verbally

(15-30 min/patient) on their regular dialysis days regarding their disease, dialysis procedure, the drugs, diet and fluid restrictions. Patient education leaflets were prepared in English and vernacular language (Tamil) and distributed to the patients on the first episode of counseling.

Patients' medication knowledge was assessed using a validated interviewer administered Medication knowledge assessment questionnaire (MKAQ) [8]. The questionnaire consists of 5 questions and two columns named as 'actual' and 'patient' for each question. The 'actual' column contains the current actual list of the medications taken by the patient. This column was filled by the interviewer before interviewing the patient by referring to patients' case records and dairies. An interview was conducted for each patient in a single session of 20-30 min to assess the parameters like ability of each patient to recall the names of his/her medications, the purpose of use (indication), dose/strength, the number of doses to be taken each time and side effects of their medications and the responses were used to score questions 1 to 4 separately in the corresponding "patient" column. If the patient recalled only one of the parameter without recalling the other three parameters it was considered as true knowledge. Question number five does not have a scoring system hence it was not scored.

The medication adherence pattern of the patients was assessed using Brief medication questionnaire (BMQ) [9], to assess the reported medication adherence behavior of the study subjects. BMQ consists of three screens: 5-item Regimen Screen that asks patients how they took each medication in the past week, a 2-item Belief Screen that asks about drug effects and bothersome features, and a 2-item Recall Screen about potential difficulties remembering. All these BMQ screens consist of a positive and negative screen. A score of ≥ 01 denote a positive screen representing the patient reported non-adherence regarding his/her medication regimen, while a score zero denote a negative screen, signified patient adherence to the prescribed medication regimen. The higher the BMQ score, the higher the reported rate of non-adherence. Both the questionnaires were administered at the baseline, on the sixth week and on the twelfth week. The responses obtained from the patients were scored as stated in the questionnaires and were subjected to statistical analysis.

Statistical analysis

The association between patient education, reported medication adherence pattern and patients' knowledge about the medications was examined using the two tailed independent paired T- test. The correlation between patients medication knowledge and medication adherence was assessed using Pearson's correlation coefficient. A p value of < 0.05 was considered statistically significant.

RESULTS

A total of 85 patients were included in the study of which, 57 were males and 28 were females in the age range of 18-80 years (mean age of 50.52±13.28years). 31 (36.5%) patients were in the age range of 51-60 years, 19 (22.4%) were in the age range of 61 to 70 years. Of 85 patients, 67 (78.82%) patients were undergoing twice weekly dialysis and 15(17.64%) were on thrice weekly dialysis. The total number of medications prescribed per prescription was found to be 5 to 6 medications in 37(43.52%) patients; 7 to 8 medications in 35(41.17%) patients; 2 to 4 medications in 7(8.23%) and 9 to 10 medications in 5(5.88%) patients. Only 1(1.17%) patient received more than 10 medications. The average number of drugs prescribed for a patient was found to be 6.47±1.57. Hypertension was the co morbidity found in majority of the patients 45(52.94%), followed by diabetes and hypertension in 27(31.76%) patients, nephropathy in 6(7.05%) patients, diabetes alone in 5(5.88%) patients, CAD and left ventricular dysfunction in 3(3.52%) patients, bronchial asthma in 1(1.17%) patient and tuberculosis in 2(2.35%) patients.

Table 1 shows the antihypertensives prescribed for the study. 64(75.29%) patients received calcium channel blockers, 30(35.29%) patients were on loop diuretics, (25.88%) patients were on beta blockers, 20(23.52%) patients were on alpha adrenergic agonist clonidine, 12(14.11%) patients received alpha adreno receptor

blocker Prazosin and 4(4.70%) patients received angiotensin II receptor antagonist Losartan.

Table 1: Antihypertensives Prescribed in Study Population

ANTIHYPERTENSIVES	NO OF PATIENTS (N=85)		
			TOTAL
	(n)	(n)	(%)
Calcium channel blockers			
Nifedipine	48	64	75.29
Amlodipine	16		
Loop diuretics			
Furosemide	28	30	35.29
Torasemide	2		
Beta blockers			
Atenolol	6		
Carvedilol	2	22	25.88
Metaprolol	10		
Labetalol	4		
Alpha 2 adrenergic agonist			
Clonidine	20	20	23.52
Alpha 1 adreno receptor blocker			
Prazosin	12	12	14.11
Angiotensin II receptor antagonist			
Losartan	4	4	4.70

Table 2 shows the other classes of medications prescribed for the study population which included vitamin preparations for 65(76.47%) patients, proton pump inhibitors for 58(68.23%) patients, calcium supplements for 47(55.29%) patients, erythropoietin for 46(54.11%) patients, antiplatelets for 16(18.82%) patients, nitrates for 13(15.29%) patients, lipid lowering agents for 12(14.11%) patients, H2 receptor blockers for 8(9.41%) patients, anxiolytics for 7(8.23%) patients, phosphate binders for 6(7.05%) patients, allopurinol for 5(5.88%) patients, antibacterials, anticonvulsants, laxatives and antiemetics for 4(4.70%) patients each and steroid prednisolone for 3(3.52%) patients.

Table 2: Other Medications Prescribed in Study Population

OTHER CLASS OF MEDICATIONS	NO OF PATIENTS (N=85)		
	n	(n)	(%)
Vitamins	65	65	76.47
Proton pump inhibitors			
Pantoprazole	51		
Omeprazole	5	58	68.23
Esomeprazole	2		
Calcium supplements			
Calcium acetate	11	47	55.29
Calcium carbonate	36		
Erythropoietin	46	46	54.11
Antiplatelet (Clopidogrel)	16	16	18.82
Nitrates			
Isosorbide dinitrate	5		
Glyceryl trinitrate	7	13	15.29
Nicorandil	1		
Lipid lowering agents			
Lovastatin	1	12	14.11
Atrovastatin	11		
H2 receptor blocker			
Ranitidine	8	8	9.41
Anxiolytics			
Alprazolam	3		
Clonazepam	1	7	8.23
Nitrazepam	1		
Zolpidem	2		
Phosphate binders			
Selvelamer hydrochloride	4	6	7.05

Lanthanum carbonate	2		
Antigout (Allopurinol)	5	5	5.88
Antibacterials			
Isoniazid & Rifampacin	2		
Ofloxacin	2	4	4.70
Anticonvulsants			
Phenytoin	1		
Pregabalin	1	4	4.70
Valproate	1		
Divalproex sodium	1		
Laxative (Lactulose)	4	4	4.70
Antiemetics			
Ondonsetron	2		
Domperidone	2	4	4.70
Corticosteroid			
(Prednisolone)	3	3	3.52

The mean MKAQ scores and the statistical analysis of difference in the mean scores at the baseline, sixth week and twelfth week were assessed. The mean MKAQ score before initiation of patient counseling was found to be 45.07±7.93, on the sixth week of patient counseling was 59.37±6.87 and on twelfth week of patient counseling was 78.69±6.76 (Table 3). There was a statistically significant increase in the mean MKAQ score from baseline of 14.30±6.97 to 19.32±6.61 at the end of sixth week of counseling (p=0.000) and to 33.62±7.76 at the end of twelfth week of patient counseling (p= 0.000) (Table 4).

Table 3: Mean Scores of Medication Knowledge Assessment Questionnaire (MKAQ)

MKAQ assessment duration	Mean Score ± Standard Deviation
Baseline	45.0715 ±7.93088
6th week	59.3799 ± 6.87017
12th week	78.697 ± 6.7621

Table 4: Statistical Analysis of Mean MKAQ Scores

MKAQ	Mean Score ± Standard Deviation	95% confidence interval of the difference		t Value	p Value
		Lower	Upper		
Baseline-6th week	14.30835 ± 6.97496	15.81282	12.80389	18.913	0.000*
Baseline-12th week	33.62541 ± 7.75820	35.29882	31.95201	39.959	0.000*
6th week-12th week	19.31706 ± 6.61438	20.74375	17.89037	26.925	0.000*

*Statistical significance

The assessment of the medication adherence behavior of the patients done using BMQ scores revealed the following: the mean BMQ score was 4.26±0.95 at the baseline, 2.99±0.82 on the sixth week of counseling and 1.73±0.94 on the twelfth week of counseling (Table 5). The statistical analysis performed to assess the association between patient counseling and medication adherence was found to be highly significant (p=0.000). There was a significant drop in the BMQ scores from the baseline to the sixth and twelfth week of counseling (Table 6).

Table 5: Mean Scores of Brief Medication Questionnaire (BMQ)

BMQ assessment duration	Mean Score ± Standard deviation
Baseline	4.26 ± 0.953
6th week	2.99 ± 0.824
12th week	1.73 ± 0.944

Table 6: Statistical Analysis of mean BMQ Scores

BMQ	Mean Score ± Standard deviation	95% confidence interval of the difference		t Value	p Value
		Lower	upper		
Baseline-6th week	1.271± 0.662	1.128	1.413	17.704	0.000*
Baseline-12th week	2.529 ± 0.853	2.345	2.713	27.326	0.000*
6th week-12th week	1.259 ± 0.538	1.143	1.375	21.575	0.000*

* Statistical significance

There was a negative correlation between medication knowledge and medication adherence behavior of the study population (r = -0.025) based on the Pearson correlation coefficient analysis indicating that there was not statistically significant association (p=0.817) between medication knowledge and adherence (Table 7).

Table 7: Correlation of Mean MKAQ and Mean BMQ Scores

Correlation	Mean score ± S.D	R	P
MKAQ-12 Weeks	78.697 ± 6.76	-0.025	0.817
BMQ-12 Weeks	1.73 ± 0.944		

DISCUSSION

ESRD is a chronic disease that affects many people all over the world and is associated with a high morbidity and mortality. ESRD patients on maintenance hemodialysis, have co morbidities that require multiple medications which lead to poor adherence. A study was done to assess the effect of pharmacist provided patient education in improving patients' knowledge of their medications and their adherence toward the treatment.

Majority of the patients (53%) were in the age group of 51 years and above in the study and were on 6 medications per day on an average.

This is in consistence with other studies [3, 6], which have reported that older adults have higher prevalence of CKD and the average of 7 medications were prescribed per patient. Hemodialysis patients have multiple co morbid conditions which often necessitates the use of many drugs. Almost 50% of the patients in this study had hypertension as co-morbidity and around 32% had both hypertension and diabetes necessitating the use of antihypertensive medications in majority of the patients.

The present study assessed the medication knowledge of hemodialysis patients using MKAQ questionnaire at the baseline and at the end of 6th and 12th weeks, after providing with structured education about their medications continuously for 12 weeks. The

study observed a significant improvement (p=0.000) in the medication knowledge of these patients from baseline to the twelfth week after continuous education. During the baseline assessment of medication knowledge, some patients had a poor knowledge about the name and strength of the medications given to them and also had a negative belief towards the medication usage as they thought that it was not so important to adhere to the instructions given to them regarding the doses, dosing interval, dosing frequency of the medications they were taking.

The knowledge about the indications of all the medications they were taking was also low. Majority of the patients were aware of the indications for the antihypertensive medications, calcium supplements and erythropoietin than for other class of medications like phosphate binders, proton pump inhibitors, lipid lowering drugs and others. These observations are in accordance to that reported by Sathvik B S., et al [8] and Cleary, et al. [10], who found that majority of the dialysis patients knew the indication for their antihypertensive medications than for their phosphate binders. These findings were also consistent with the findings of Lim A., [10] where the author reported that medication knowledge of the dialysis patients was deficient particularly about their phosphate binders and Vitamin D.

Medication adherence has a correlation with medication knowledge [12]. In this study compared to baseline, there was a significant reduction in the mean BMQ regimen, belief & recall Screens scores after the sixth and twelfth week of education sessions provided by the clinical pharmacist. Considering the mean BMQ medication screen scores as an adherence determining parameter, the extent of nonadherence was found to decrease significantly (p=0.000) after the counseling sessions provided by the clinical pharmacist.

In this study, prior to patient education sessions, majority of study patients had limited knowledge/poor understanding of the exact role of all the medications they were taking. Insufficient and poor understanding of the prescribed medications has been reported in the literature as possible cause of nonadherence [13,14]. Research has consistently demonstrated that patients' understanding of their conditions and medications is positively related to adherence [15]. But there was no significant association between medication knowledge and adherence behavior towards medications in this study (p=0.817) indicating that other factors like patient demographic parameters like gender, age, socioeconomic status and literacy status, duration of dialysis, and number of medications also influence the medication adherence pattern of the patients. The major limitation of this study is that it did not assess the association of these factors with medication knowledge and adherence behavior of the patients. A study done by Jean K., et al [16] had found that the lack of patient education about medications was not an important factor in medication nonadherence but the number of daily medications (typically more than 11) and lack of funds were found to be the most common reasons.

The reasons for medication nonadherence among dialysis patients were reported in earlier studies as both the complexity of the medication regimens and the need to be taken throughout life. Adherence decreases as the complexity and duration of the regimen increases. The consequences of poor adherence include poor health outcomes and increased health care costs [17].

The study emphasizes that provision of constant patient education to hemodialysis patients would increase the medication knowledge of the patients and improve their adherence. It is also essential to identify other factors leading to poor adherence to medication regimens as it would be beneficial for healthcare professionals to recognize patients who may benefit from interventions to improve medication adherence. By making patients understand the significance of the medications being prescribed for them, an increased adherence with long-term medication therapies can be achieved. Emphasis should also be made on the effects of missing medications on the patient's health care outcomes.

CONCLUSION

Medication adherence is a major issue posing a greater burden on management of ESRD. The involvement of the clinical pharmacist in the dialysis unit in providing patient education can improve patient adherence towards the medication by improving their knowledge towards their medications and thereby lessen the burden of the prescribing physicians.

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