THE KNOWLEDGE, ATTITUDE, AND PRACTICE TOWARDS PHOSPHATE BINDER'S AGENT AMONG DIALYSIS PATIENTS IN IPOH, MALAYSIA

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Abstract

The cross-sectional study was conducted among end stage renal failure (ESRD) patients requiring haemodialysis in Ipoh aimed at determining their level of knowledge, attitude, and practice (KAP) towards phosphate binder's drugs. All patients on phosphate binders' medication (105 patients) participated in the study. The questionnaires on sociodemographic characteristics and KAP towards phosphate binder medication were used to obtain the data. In this study, most of the patients were 40-60 years of age with slightly more women than men. Patients were generally highly knowledgeable about phosphate binders. Over 90% of respondents were aware of the importance of the medication and the need to follow the regimen. More than 70% of the patients have a positive attitude towards the medication. In terms of practice, most of the patients take the medication daily (90.5%) and always taking it with meals (93.3%). The older patients aged more than 45 years old, married and not working patients had significantly better compliance to medication ($p < 0.05$). The compliance to medication was 94.9%, 93.2% and 96.4% respectively. In conclusion, most patients in this study have a good knowledge of phosphate binder medications, a high positive attitude and good adherence to the medication. There is still a need for a structured health education method and counselling session to improve the knowledge of patients, change the attitude of a specific group of patients and increase the treatment compliance focusing on a specific ethnic group, young, unmarried, and employed patients.

Keywords**:** Phosphate binders' Medication, Dialysis, KAP Study, Malaysia

Introduction

Patients suffering from chronic kidney disease (CKD) especially end stage renal failure (ESRD) require dialysis to sustain life. Dialysis is needed to filter the waste product in the body to be excreted in the urine. Currently, 9.07% of the population in Malaysia are suffering from CKD and out of that 0.36% are ESRD (1). This worrying trend is on the rise. Due to kidney failure to eliminate waste from the blood, patients will develop complications such as hyperphosphatemia. Hyperphosphatemia is a condition characterized by an abnormally high serum phosphate concentration greater than 1.46 mmol/L (2). The normal level is between 1.2–1.5 mmol/L. It is known that elevated serum phosphate levels in CKD patients may cause cardiovascular calcification and mineral bone disease-CKD (MBD-CKD). Methods of controlling phosphate in the blood include removing phosphate during dialysis treatment, controlling dietary intake or consuming phosphorus binders (3).

More than 90% of dialysis patients used phosphate binder medications to reduce the amount of phosphorus absorbed in the gut to achieve normal serum phosphorus levels (4). Compliance with the medication can improve a patient's quality of life and prevent complications. Hence this study is aimed to determine the knowledge, attitude, and compliance of haemodialysis (HD) patients toward a phosphate binder intake and identify factors that contribute to practice for the HD patient in Ipoh.

Materials and methods

This cross-sectional study was conducted among ESRD patient requiring haemodialysis in one of the hemodialytic units in Ipoh. The respondents were the patients on phosphate binder medication. A total of 105 patients out of 144 patients in the unit participated in the study. The questionnaires either in Bahasa Malaysia or English were distributed to the participating patients during their HD session. The questionnaires were structured in 3

sections A, B and C. Section A is about sociodemographic characteristics. Section B is about knowledge and practice towards phosphate binder medication that was adapted from a study in Sri Lanka by Pirasath et al (5) whilst section C is on attitude towards the phosphate binder medication that was adapted from the Medication Adherence Questionnaire (MAQ) (6). The questions on knowledge and practice are randomly mixed and required a yes and no answer whilst the questionnaire on attitude is using Likert scale measurement. The responses were scored, and the median was used to categorise between high and low scores. For the knowledge questions, a score of 8 and above of the correct responses was considered having good knowledge, For the attitude questions, a score of above 28 (range is 0 - 45) was considered having positive attitude and for the practice questions, a score of above 6 (range 0 - 9) was considered having good compliance.

The appropriate statistical test was applied accordingly in the analysis using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corporation, Armonk, NY, USA). Chi square analysis was used to find the association between sociodemographic and knowledge, attitude, and practice. P values of less than 0.05 ($p < 0.05$) is considered significant. Ethical approval was given by Royal College of Medicine Perak Institutional Review Committee (UniKLRCMP/MREC/2019/PTMSPH-002).

Results

Sociodemographic profiles of dialysis patients

Out of 105 respondents, 46.7% were male and 53.3% were female. The age of the respondents ranged from 18 to 80 years old with the mean age of 54.1 years. Most patients were in the 45 - 60 years age category (about 40%). Malays and Chinese were the main recipients in this unit (35.2% in both groups). Almost 70% were married and the majority were not working either retired or unemployed (45.8%). The duration of the haemodialysis ranged from less than 1 year to 32 years. More than 40% of patients were already on dialysis for more than 10 years (Table 1).

Level of knowledge on phosphate binder intake

Table 2 shows the level of patient knowledge on phosphate binding uptake. From the results, patients' knowledge of phosphate binding uptake was found to be high. More than 90% of respondents knew the importance of the medication, the need to comply with the instruction, knew the type of medication, including phosphate binder and knew the reason for taking the phosphate binder. However, patients had less knowledge about drug interaction, side effects and drug adherence during illness. After scoring, 61% of patients were found to be able to correctly answer 8 - 10 of the questions and thus considered to have good knowledge.

Table 1: Profiles of dialysis patients in the study

Sociodemographic characteristics	Total sample (N = 105)	
	Response correctly (yes)	%
Age categories		
15-30 years old	7	6.7
31-45 years old	19	18.1
46-60 years old	41	39.0
61-75 years old	32	30.5
76-90 years old	6	5.7
Gender		
Male	49	46.7
Female	56	53.3
Race		
Malay	37	35.2
Chinese	37	35.2
Indian	25	23.8
Others	6	5.7
Marital Status		
Single	18	17.1
Married	73	69.5
Widowed	10	9.5
Divorced	4	3.8
Education level		
Primary	22	21.0 These numbers add up to above 100%
Secondary	59	56.2
Tertiary	24	22.9
Employment status		
Unemployed	48	45.8
Working	28	26.7
Retired	8	7.6
Self-employed	21	20.0
Duration of haemodialysis		
< 1 year	7	6.7
1-10 years	55	52.4
11-20 years	33	31.4
21-30 years	9	8.6
>30 years	1	1.0

Table 2: Level of knowledge on phosphate binder intake

Knowledge of patients	Total sample (N = 105)	
	n	%
I know the importance of each medication.	100	95.2
I strictly follow the medication order as prescribed by doctor.	97	92.4
I know all type of my medication.	100	95.2
The effectiveness of phosphate binder will increase if been taking together with other medications.	48	45.7
I can adjust the medication dose by myself.	60	61.9
I know which one from my medication is phosphate binder.	99	94.3
I know I must take my medication on the right time every day.	95	90.5
I will have skin itchiness if I am not taking phosphate binder correctly.	65	61.9
Phosphate binder helps to reduce development of bone disease.	99	94.3
I no need to take my medication when if I feel well.	63	60.0

The attitudes toward phosphate binder intake

Table 3 shows the attitude of the respondents toward phosphate binder consumption. It was shown that a high percentage (> 70%) of the patients have a positive attitude toward medication on most of the question asked. Most of patients agreed that they should not miss their medication (73%), should not stop taking the phosphate binders without consulting the doctor (78%), should not stop taking phosphate binders when feeling well (87%) or getting worse (87%) and should not be difficult to stick to a treatment plan (75%). After scoring the attitude responses, 91.4% of patients were found to have a positive attitude.

The practice on phosphate binder

Table 4 shows the practice on phosphate binder intake. It was shown that most of patients take the medication daily (90.5%) and always taking it with meals (93.3%). After scoring the practical responses, 88.6% of patients were found having good compliance to the medication.

Relationship between socio-demographic and total knowledge score

There was a significant association between race and employment status with knowledge on phosphate binder

Table 3: The attitudes toward phosphate binder intake

Attitude of patients	Total sample (N = 105)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
It is alright to forget to take my medication.	1(1.0)	9(8.6)	28(26.7)	50(47.6)	17(16.2)
I missed my medication several time for the past 2 weeks.	2(1.9)	8(7.6)	22(21.0)	48(45.7)	25(23.8)
When I travel, I sometimes forget to bring my medication.	4(3.8)	19(18.1)	31(29.5)	31(29.5)	20(19.0)
Sometimes, I am lazy to take the phosphate binder every day.	1(1.0)	11(10.5)	36(34.3)	37(35.2)	20(19.0)
I had stopped or taken again the phosphate binder without consulting the doctor.	0(0.0)	7(6.7)	20(19.0)	49(46.7)	29(27.6)
When I feel like my health is under control, I will stop the phosphate binder sometimes.	0(0.0)	3(2.9)	15(14.3)	61(58.1)	26(24.8)
I will be stopped taking the phosphate binder when I feel worse.	0(0.0)	4(3.8)	14(13.3)	57(54.3)	30(28.6)
I hate to take phosphate binder because of the taste.	9(8.6)	23(21.9)	15(14.3)	40(38.1)	18(17.1)
I feel hassled about sticking to my treatment plan.	0(0.0)	0(0.0)	30(28.6)	53(50.5)	22(21.0)

Table 4: The practice on phosphate binder

Practice of patients	Total sample (N = 105)	
	n	%
I take phosphate binder every day.	95	90.5
I always take phosphate binder before bed.	71	67.6
Most of the time, I use a calendar as a reminder for my medicine intake.	48	45.7
If I am not well, I will take the medication with help by my family member.	70	66.7
I usually swallow the phosphate binder.	56	53.3
I usually mixed all the medicine and swallow them together at the same time.	67	63.8
I always take the phosphate binder with meal.	98	93.3
I will inform doctor if I forget to take the medication.	69	65.7
I always check on my appointment card to get the medication about to finish.	102	97.1

intake (Table 5). Indian (80%) and Chinese (64.9%) patients seem to have higher knowledge as compared to other races in this study (X^2 = 8.32, p = 0.035). Unemployed patients have better knowledge (73.2%) compared to those employed (46.9%) (X^2 = 7.58, p = 0.009).

Relationship between socio-demographic and total attitude score

Table 6 shows that there was a significant association between race and education levels with an attitude score on phosphate binder consumption (p < 0.05). The Chinese patients had higher positive attitude (100%) as compared to other races (X^2 = 9.69, p = 0.013). The primary educated patients seem to have a higher positive attitude (100%) as compared to other levels of education (93.2% in secondary level and 79.2% in tertiary) (X^2 = 6.91, p = 0.035).

Relationship between socio-demographic and total practice score

Table 7 shows that there is a significant association between age, marital status, and employment status with practice score on phosphate binder consumption (p < 0.05). The older patients aged more than 45 years old had better compliance (94.9%) to medication as compared to younger patients (69.2%) (X^2 = 12.77, p = 0.001). The married patients seem to comply better (93.2%) than non-married patients (78.1%) (X^2 = 4.96, p = 0.042). Patients who were not working complied better (96.4%) to medication as compared to working patients (79.6%) (X^2 = 7.32, p = 0.011).

Table 5: Socio-demographic and total knowledge score on phosphate binder consumption.

	Knowledge score (%)			
	Not good knowledge	Good knowledge	X^2	p
Age category				
< 45 years old	11 (42.3)	15 (57.7)	0.154	0.817
>45 years old	30 (38.0)	49 (62.0)		
Gender				
Male	24 (49.0)	25 (51.0)	3.808	0.071
Female	17 (30.4)	39 (69.6)		
Marital status				
Not married	15 (46.9)	17 (53.1)	1.185	0.287
Married	26 (35.6)	47 (64.4)		
Race				
Malay	19 (51.4)	18 (48.6)		
Chinese	13 (35.1)	24 (64.9)	8.325	0.037*
Indian	5 (20.0)	20 (80.0)		
others	4 (66.7)	2 (33.3)		
Education level				
Primary	10 (45.5)	12 (54.5)		
Secondary	20 (33.9)	39 (66.1)	1.501	0.488
Tertiary	11 (45.8)	13 (54.2)		
Employment status				
Not working	15 (26.8)	41 (73.2)	7.581	0.009*
Working	26 (53.1)	23 (46.9)		
Duration of haemodialysis				
< 10 year	2 (28.6)	5 (71.4)		
10-20 years	32 (36.4)	56 (63.6)	4.614	0.115
>20 years	7 (70.0)	3 (30.0)		

* Statistically significant at p value <0.05

Discussion

In this study, most patients were in the 40 - 60 years age category (about 40%). Slightly more female patients received dialysis (53.3%). Of these, 22.9% had tertiary level education. Almost 70% were married and the majority were unemployed (45.8%). More than 40% of patients were already on dialysis for more than 10 years. A Saudi Arabian study showed similar results for the age group of subjects (40 to < 60 years), 60% were married, but more patients who were not working received HD (63%) (7). Whist in Bandung, Indonesia, many patients were male (54%) and more than 30% of patients were tertiary level educated. The mean duration of dialysis was 3.4 years (8). The social status of being married provide additional social support to patients to comply with the treatment and follow up (9).

Table 6: Socio-demographic and total attitude score on phosphate binder consumption.

	Attitude score (%)			
	Negative attitude	**Positive attitude**	X^2	*p*
Age category				
<45 years old	4 (15.4)	22 (84.6)	2.047	0.220
>45 years old	5 (6.3)	74 (93.7)		
Gender				
Male	5 (10.2)	44 (89.8)	0.312	0.731
Female	4 (7.1)	52 (92.9)		
Marital status				
Not married	4 (12.5)	28 (87.5)	0.906	0.450
Married	5 (6.8)	68 (93.2)		
Race				
Malay	7 (18.9)	30 (81.1)	9.692	0.013*
Chinese	0 (0.0)	37 (100.0)		
Indian	1 (4.0)	24 (96.0)		
others	1 (16.7)	5 (83.3)		
Education level				
Primary	0 (0.0)	22 (100.0)	6.909	0.035*
Secondary	4 (6.8)	55 (93.2)		
Tertiary	5 (20.8)	19 (79.2)		
Employment status				
Not working	2 (3.6)	54 (96.4)	3.828	0.079
Working	7 (14.3)	42 (85.7)		
Duration of haemodialysis				
< 10 year	7 (11.3)	55 (88.7)	1.788	0.575
10-20 years	2 (6.1)	31 (93.9)		
>20 years	0 (0.0)	10 (100.0)		

Table 7: Socio-demographic and total practice score on phosphate binder consumption.

	Practice score (%)			
	Not good compliance	**Good compliance**	X^2	*p*
Age category				
< 45 years old	8 (30.8)	18 (69.2)	12.770	0.001*
> 45 years old	4 (5.1)	75 (94.9)		
Gender				
Male	8 (16.3)	41 (83.7)	2.177	0.218
Female	4 (7.1)	52 (92.9)		
Marital status				
Not married	7 (21.9)	25 (78.1)	4.962	0.042*
Married	5 (6.8)	68 (93.2)		
Race				
Malay	4 (10.8)	33 (89.2)	3.006	0.521
Chinese	3 (8.1)	34 (91.9)		
Indian	5 (20.0)	20 (80.0)		
others	0 (0.0)	6 (100.0)		
Education level				
Primary	1 (4.5)	21 (95.5)	3.219	0.252
Secondary	6 (10.2)	53 (89.8)		
Tertiary	5 (20.8)	19 (79.2)		
Employment status				
Not working	2 (3.6)	54 (96.4)	7.319	0.011*
Working	10 (20.4)	39 (79.6)		
Duration of haemodialysis				
< 10 year	8 (12.9)	54 (87.1)	0.332	0.897
10-20 years	3 (9.1)	30 (90.9)		
>20 years	1 (10.0)	9 (90.0)		

Patients' knowledge of phosphate binding uptake has been demonstrated to be high. More than 90% of respondents knew the importance of the medication, the need to comply with the instruction, knew the type of medication, including phosphate binder and knew the reason for taking the phosphate binder. However, patients had less knowledge about drug interaction, side effects and drug adherence during illness. Overall, after scoring, 61% of patients were found to have a good knowledge. This finding is supported by a previous study on the effects of education on low-phosphate diet and phosphate binder intake to control serum phosphate among maintenance HD patients. The study showed education partly increased patients' knowledge of the correct timing of taking phosphate binder (10). Another study also suggested that an aggressive patient education program and positive reinforcement by the nursing staff, renal dieticians, and nephrologists should be in place for the improvement of patients' knowledge (11). Short term one-to-one individualised pharmacist-led education and counselling about phosphate binders increased the knowledge of patients and improved the adherence to medications in Norway (12).

In this study, race and employment status seem to be significantly associated with the knowledge on phosphate binder intake ($p < 0.05$). Indian has the higher knowledge as compared to other races. Unemployed patients had significantly higher knowledge of the medication as compared to those employed. However, the impact of socioeconomic factors on medication adherence are inconsistent in many studies (13).

More than 70% of the patients have a positive attitude toward medication on all questions asked. After scoring. 91.4% of patients were found to have a positive attitude.

According to previous studies, non-adherence to phosphate binders was as high as 75% and partly due to psychosocial factors such as patients' attitudes and patients' perception of autonomy support from providers (14, 15). Another study showed that autonomy support from providers was able to empower patients and increase their confidence in self-care skills (16). It is important for the ESRD patients to have positive attitudes towards phosphate binder intake to enhance their compliance. Patients' beliefs about the necessity to adhere to a prescribed phosphate binding medication can explain the variation in non-adherence levels among HD patients. Dialysis patient's medication beliefs are potentially modifiable targets for future interventions (17).

In our study, it was found that there was a significant association between race and education levels with an attitude score on phosphate binder consumption ($p < 0.05$). The Chinese patients had a significantly higher positive attitude as compared to other races. The primary educated patients seem to have a higher positive attitude as compared to another level of education. However, no other study reported a similar result.

In terms of practice, most of patients take the medication daily (90.5%) and always taking it with meals (93.3%). After scoring, 88.6% of patients were found to have good compliance with the medication. Compliance to the phosphate binder intake is important among ESRD patients to prevent complications. Complication such as renal osteodystrophy can reduce the quality of life (QOL) among end stage renal failure patient (18-20). Many studies on renal patients' QOL showed that pain such as joint pain and bone pain associated with renal osteodystrophy can lower the quality of life. Patients with good compliance to phosphate binders' medication can reduce the development of bone disease and reduce the bone pain, hence improved overall QOL. In this study, some factors have been identified towards good practice or compliance in taking phosphate binder such as using the calendar as a reminder, need assistance in taking the medication when not well and checking on the appointment card to get the medication before the supply of medicine runs out. Poor use of a calendar as a reminder could contribute to non-compliance especially among elderly patients. Previous study on reminder systems such electronic reminders, environmental cues, peer support, and organizers seemed to encourage a correct and timely medication usage (21). Correct method of taking the medication could also reduce non-compliance. Phosphate binders should be taken 5 - 10 min before or immediately after meals and snacks and should not be taken before bed as this can reduce the effectiveness of the medication (22). Practice of wrong technique in medication consumption can cause ineffective outcomes.

There was a significant association between age, marital status, and employment status with practice score on phosphate binder consumption ($p < 0.05$). The older patients aged more than 45 years old had better compliance to medication as compared to younger patients (94.9% vs. 69.2%). The married patients seem to comply better than non-married patients (93.2% vs. 78.1%). Patients who were not working complied better to medication as compared to a working patient (96.4% vs. 79.6%). The older people seem to comply with medication probably because most of them already having multiple co-morbidities that require different drugs to maintain their health whilst the younger group may be busy with their job commitment. It was shown in many studies that the impact of socioeconomic factors on medication adherence are inconsistent (23).

The study has many limitations. The results need to be interpreted cautiously. Being a cross-sectional study, no causal-relationship between risk factors and the outcome can be made. Since it was conducted in a single dialysis unit with a limited number of patients, the results can be only generalised to a limited population of dialysis patients in Perak. However, the study does indicate the need for structured health education methods and counselling session to improve the knowledge of patients, change an attitude of certain group of patients especially an educated group and increase the compliance of phosphate binding medication, focusing on a specific ethnic group, young, unmarried, and employed patients. Further study is required with a bigger number of samples in the different settings that include public and private dialysis units throughout the country to investigate the compliance issues of phosphate binding medication in Malaysia.

Conclusion

Most patients in this hemodialytic unit were between 40 - 60 years and generally have a good knowledge of phosphate binding medication, having a positive attitude, and having good compliance to a medication. There was a significant association between knowledge of phosphate binding medication with race and employment status, attitude with race and education levels and, practice with age, marital status, and employment status. It is recommended that focus health education and counselling should be targeted to specific racial, employed people and unmarried patients to further improve the knowledge and compliance toward phosphate binding medication.

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Competing interests

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