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Research Article

THE SAFETY AND EFFICACY OF PHOSPHATE BINDERS IN DIALYSIS PATIENTS

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ABSTRACT

Hyperphosphatemia is an inevitable consequence of end stage chronic kidney disease and is present in the majority of dialysis patients. Oral phosphate binders are required by the majority of patients on dialysis, and all of these binders can control serum levels of phosphate to similar degrees. Patient preference and adherence to prescribed therapy is at least as important as the efficacy of the prescribed binder. Dietary restriction of phosphate and current dialysis prescription practices are not enough to maintain serum phosphate levels within the recommended range so that the majority of dialysis patients require oral phosphate binders. Objective: To compare the safety and efficacy of phosphate binders (Calcium acetate and Sevelamer) in dialysis patients. Methods: It was a prospective observational study carried out in SRM Medical College Hospital and Research Center. A total of 70 subjects were enrolled out of which 60 patients were completed the treatment sequence were divided into two groups each 30. Group A were treated with calcium acetate and group B with Sevelamer. Results: The serum phosphate level was measured at 0, 2 and 4 weeks respectively. Statistical analysis of data collected revealed that mean levels of serum phosphate projected a 't' value of 5.23 and 4.63 respectively which was found to be statistically significant at **p = 0.001. Conclusion: It study concluded that the Sevelamer was more effective and safer compared to that of calcium acetate and was advised to carry out the work in larger population to ensure quality of life.

Keywords: Phosphate binders, Sevelamer, Calcium acetate, Dialysis, Hyperphosphatemia, Chronic kidney disease.

INTRODUCTION

Hyperphosphatemia

Hyperphosphatemia, a nearly universal complication of kidney failure, is accompanied by hypocalcemia and low serum levels of vitamin D. Without treatment, lead to severe secondary hyperparathyroidism, this leads to painful fractures and generalized osteopenia. In hemodialysis patients, serum phosphate levels > 6.5 mg/dl are associated with significantly increased mortality risk.Dietary restriction of phosphate has been the cornerstone of therapy, but this measure is usually not sufficient to control within recommended ranges (2.7–5.5 mg/dl). As a result, oral phosphate binders are used in over 90% of patients with kidney failure undergoing haemodialysis. Treatment with oral phosphate binders was intended to prevent symptomatic secondary hyperparathyroidism and achieving tighter control of markers associated with abnormal mineral metabolism (e.g., serum phosphate, calcium, and parathyroid hormone levels) [1].

MATERIALS AND METHODS

It was a prospective observational study carried out in SRM Medical College Hospital and Research Centre, India from September 2011 to March 2012 in the nephrology department. It is a 750 bedded multispeciality tertiary care hospital. Patients above 18 years of both males and females, Patients undergone hemodialysis with elevated phosphate level (above 4.5mg/dl) were included. Pregnant women, Lactating women, Patients below 18 years, Patients undergoing other types of dialysis and normal level of phosphate levels were excluded from the study. Ethical committee approval was obtained from SRM Medical College Hospital and Research Centre (Ref no: 193/ IEC/ 2011). A total of 70 patients were enrolled and only 60 patients met the study criteria were divided into two groups (each group containing 30 patients) Group A were treated with Calcium acetate and Group B with sevelamer. The specially designed proforma were used to collect the data such as demographic details, laboratory data (serum phosphate, urea, creatinine, etc). Statistical analysis was performed by using graph pad prism.

RESULTS

A total of 70 patients were enrolled according to the study criteria. Out of which 60 patients completed both the treatment sequence (Calcium acetate N=30, Sevelamer N=30). Age ranged between 18-75 years, Majority of patients was in age between 50-59 as shown in Table1.

Table 1: Classification of patients with respect to age

S. No.	Age (years)	Number
1	18-20	1
2	20-29	2
3	30-39	7
4	40-49	16
5	50-59	17
6	60-69	14
7	>70	3

The study population consisted of 39 males (65%) and 21 female (35%) patients as shown in Table 2.

Table 2: Classification of patients with respect to sex

S. No.	Sex	Calcium acetate (N=30)	Sevelamer (N=30)
1	Male	20	19
2	Female	10	11

The most common co- morbidity was found to be anemia (90%), hypertension (78%), Coronary artery disease (18%), diabetes mellitus (5%) and hypothyroidism (6%) as depicted in Table 3.

Table 3: Classification of patients according to Co-morbidity (%)

S. No.	Co- morbidity	%
1	Hypertension	78.63 %
2	Coronary Artery Disease	18.0 %
3	Diabetes mellitus	5.0 %
4	Thyroiditis	3.0 %
5	Hypothyroidism	6.00 %
6	Seizure disorder	3.00 %
7	Pericarditis	1.6 %
8	Anemia	90%

The mean dose of Calcium acetate was 533 ± 134.73 and that of Sevelamer was 440 ±

122.05. Before intervention the baseline value of serum phosphate was 7.663 ±1.6215 for Sevelamer and for Calcium acetate 7.497 ± 1.1389. After 4 weeks of intervention the serum phosphate level was found to be decreased 4.673 ± 0.7037 while taking Sevelamer and for Calcium acetate 5.236 ± 0.5165. Statistical analysis revealed that

mean levels of serum phosphate after 4 weeks of treatment projected a 't' value of 5.23 (group A) and 4.67 (group B) respectively which was found to be statistically significant at **P = 0.001 as shown in Table 4

Table 4: Serum phosphate level for both sevelamer and calcium acetate

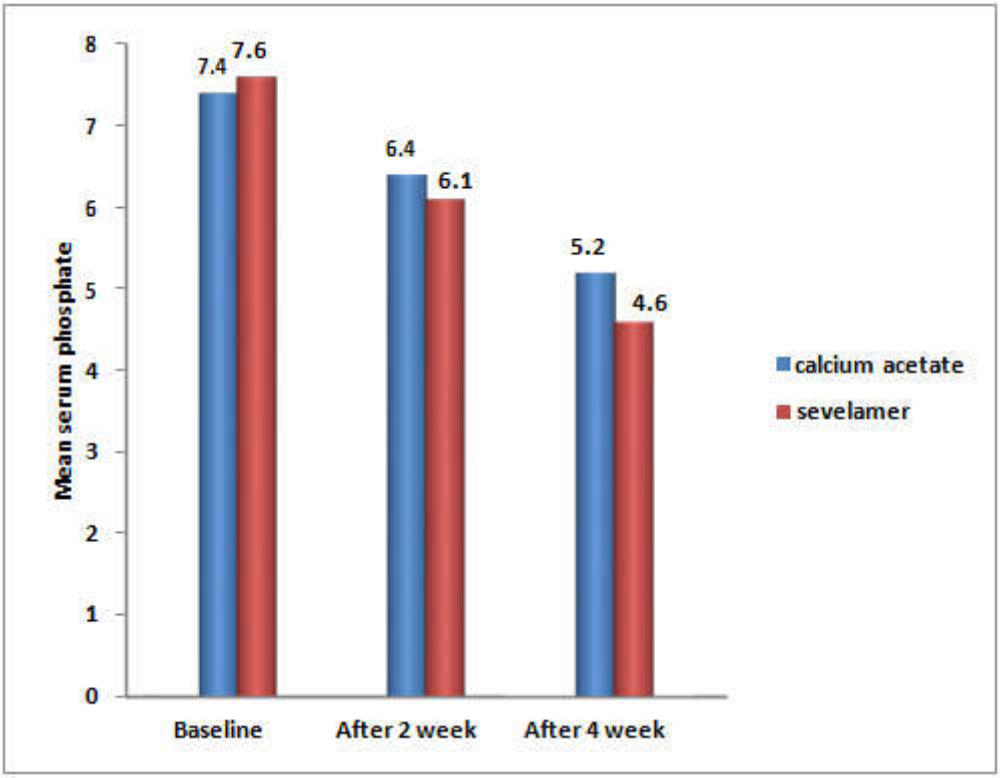
Serum phosphate	Calcium acetate Group A	Sevelamer Group B	P value
Baseline After 2 weeks After 4 weeks	7.497 ± 1.1389	7.663 ± 1.6215	-0.475 NS
	6.406 ± 0.7730	6.100 ± 1.1519	0.217 NS
	5.236 ± 0.5165	4.673 ± 0.7037	0.001S

NS: Not significant (there is no association between two groups)

S: Significant (there is association between two groups)

Graphical presentation

Comparison of Calcium acetate and Sevelamer with mean serum phosphate level (Baseline, after 2 week and after 4 week)



Both treatments are safe to use as there were mild side effects like hypercalcemia (12.2%), abdominal discomfort (15.1%) for Calcium acetate and nausea (10%) and vomiting (6%) for Sevelamer group as shown in **table 5**. This side effect can be treated with drugs or withdrawal of drug as incase of hypercalcemia. On the basis of safety profile also the sevelamer was safer than calcium acetate as it does not cause hypercalcemia which may lead to renal osteodystrophy.

Table 5: Side effects of calcium acetate and sevelamer

Calcium acetate	Sevelamer
Hypercalcemia (13.3%)	Nausea Mild: 6% Moderate:1%
Abdominal discomfort (16.6%)	Vomitting: 6%

DISCUSSION AND CONCLUSION

In this study, after 4 weeks of treatment the serum phosphate level was highly reduced in group B (Sevelamer) compared to that of group A (calcium acetate). Both the drugs reduce serum phosphate to higher extent only after 4 weeks of treatment. The present study revealed that Sevelamer was distinct advantage in efficacy and safety over calcium acetate. This study was limited as only phosphate level was noted and also carried out in smaller population. It was best advised to carry out this kind of work in larger population including other binding agents to achieve a better quality of life.

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