ORIGINAL ARTICLE (APMC – 534)

DOI: 10.29054/APMC/18.534

Frequency of Intradialytic Hypotension and Comparison of Serum Magnesium Levels in Patients Having Normal Blood Pressure During Dialysis Session Versus Patients Developing Hypotension During Dialysis

Bilal Javaid, Nosheen Adil, Muhammad Umar Farooq

ABSTRACT

Objective: The objective of the study was to determine the frequency of intradiaytic hypotension and compare baseline serum Magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis. **Study design:** Descriptive Case Series. **Settings:** Hemodialysis Unit, Allied Hospital Faisalabad. **Duration of study:** 6 months from May 2017 to November, 2017. **Results:** In this study, mean age was 49.04±10.48 years, 55%(n=66) were male and 45%(n=54) were females, frequency of intradialytic hypotension in haemodialysis was recorded to be 35.83%(n=43), comparison of baseline serum magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis was done which shows that 2.22±0.21 in normal blood pressure patients and 1.68±0.11 in patients having hypotension during analysis, (p=0.00). **Conclusion:** The frequency of intradiaytic hypotension is recorded higher among patients during dialysis while on comparison of baseline serum Magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis, magnesium levels are significantly lower in patients having intradialytic hypotension.

Keywords: Chronic renal disease, Haemodialysis, Intradialytic hypotension, Baseline serum magnesium levels.

Corresponding Author
Dr. Bilal Javaid
Assistant Professor, Nephrology
Faisalabad Medical University, Faisalabad
Contact: +92 321-7612484
Email: dr.bilaljavaid160@gmail.com

Submitted for Publication: 09-09-2018 *Accepted for Publication: 28-09-2018*

Article Citation: Javaid B, Adil N, Farooq MU. Frequency of Intradialytic Hypotension and Comparison of Serum Magnesium Levels in Patients Having Normal Blood Pressure During Dialysis Session Versus Patients Developing Hypotension During Dialysis. APMC 2018;12(3):223-5.

INTRODUCTION

End stage renal disease (ERSD)is known as a medical condition where the loss of endogenous renal function is irreversible and the patient become dependent on Renal Replacement therapy (RRT) which includes dialysis/transplantation of kidney.[1]

One of the most common complication encountered in dialysis patients is fall in their blood pressure occurring either during or after the dialysis procedure and it affects upto 20% to 30% dialysis sessions.[2] Intra dialytic hypotension episodes can lead to inadequate clearance of uremic toxins and an increased risk of vascular thrombosis thereby increasing morbidity and risk of mortality.[3,4] A low Mg is associated with several complications such as hypertension, and vascular calcification, and also associated with an increased risk for both cardiovascular disease (CVD) and non-CVD mortality.[5,6] Frequent IDH is associated with high IDWGs and a poor prognosis.[7] Imbalances in magnesium status primarily hypomagnesemia as it is seen more common than hypermagnesemia might result in unwanted neuromuscular, cardiac or nervous disorders.[8] Based on magnesium's many functions within the human body, it plays an important role in prevention and treatment of many disease.[9]

Intra dialytic hypotension is a common problem encountered in dialysis units in our country. Pakferat et al observed that intradialytic hypotensive episodes are significantly related to decrease in serum magnesium level[10] and it is the only international study available to date. No such study has been performed in our country and also serum Magnesium levels are not routinely checked in dialysis population of Pakistan.

The results of this study will emphasize the importance of measuring serum Magnesium level during dialysis session, thereby it will help in prevention of episodes of intra dialytic hypotension and as a result it will decrease the risk of morbidity & mortality.

OBJECTIVE OF THE STUDY

To determine the frequency of intradiaytic hypotension.

Compare baseline serum Magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis.

METHODOLOGY

Study Design: This descriptive Case Series

Place of Study: Hemodialysis Unit, Allied Hospital Faisalabad

Duration of Study: May 2017 to November 2017

Method:

We included 120 cases of male and female gender undergoing maintenance hemodialysis between age group 18-70 years.

Whereas those with pre-dialysis systolic blood pressure of <100 mm Hg, requiring ultrafiltration > 2 liters, Hemodialysis session length shortened by >25%, patients with history of cardiovascular disease, valvular heart-disease i.e. aortic regurgitation, stenosis, mitral regurgitation, left ventricular systolic dysfunction and congestive heart failure, BMI less than 18.5 kg/m^2 serum albumin less than 2.5 g/dl, having hemoglobin less than 8 g/dl were excluded from the study. The data was collected by the researcher through well-defined questionnaire after taking consent of the patient or his attendant in a language they can understand best. For serum magnesium levels, sampling was done immediately prior to dialysis session by the researcher. Serum magnesium levels were measured in biochemistry laboratory of Allied Hospital by Dimension RXL immunoassay machine using Siemen flex reagent kits. Serum Magnesium level of patients who developed hypotension during hemodialysis was compared with those patients who maintain normal blood pressure during hemodialysis. Systolic Blood pressure (SBP) was recorded immediately prior to dialysis and then continuously during dialysis session using mercury sphygmanometer by the researcher from non-atriovenous fistula arm. Version 21 of SPSS was used to analyze the data. For Quantitative variables like age, serum Magnesium level, systolic blood pressure reading mean and standard deviation were calculated. Qualitative variables like gender were explained using frequency and percentages. T-test was used to determine mean difference between serum magnesium level and systolic blood pressure level during hemodialysis session

RESULTS

Elderly age group i.e. 41-70 years was in majority in our study i.e. 64.17%(n=77) whereas age group of 18-40 years was recorded in 35.85%(n=43), mean age was 49.04±10.48 years. (Table 1)

Table 1: Age of the participants (n=120)

Age (in years)	No. of patients	%
18-40	43	35.83
41-70	77	64.17
Total	120	100

Mean±SD: 49.04±10.48

Regarding gender distribution, 55%(n=66) were male cases and 45%(n=54) were female cases. (Table 2)

Table 2: Gender distribution (n=120)

Gender	No. of patients	%
Male	66	55
Female	54	45
Total	120	100

Frequency of intradialytic hypotension in haemodialysis was recorded in 35.83%(n=43) while 64.17%(n=77) had no findings of the morbidity. (Table No. 3)

Table 3: Frequency of intradialytic hypotension in haemodialysis (n=120)

Intradialytic hypotension	No. of patients	%
Yes	43	35.83
No	77	64.17
Total	120	100

Comparison of systolic blood pressure in patients during dialysis was done which shows that 111.10±3.31 mmHg were recorded in normal blood pressure while 90.93±2.15 mmHg was calculated in patients with Hypotension during dialysis, p value was computed as 0.0001. (Table 4)

Table 4: Comparison of systolic blood pressure in patients during dialysis (n=120)

Mean Systolic blood pressure	Normal blood Pressure	Hypotension during dialysis
	111.10+3.31	90.93+2.15

P value=0.0001

Comparison of baseline serum magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis was done which shows that 2.22±0.21 in normal blood pressure patients and 1.68±0.11 in patients having hypotension during analysis. (Table 5)

Table 5: Comparison of baseline serum magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis (n=120)

Magnesium levels	Normal blood Pressure	Hypotension during dialysis
	2.22±0.21	1.68 ± 0.11

P value=0.00

DISCUSSION

We aimed to determine the frequency of intradialytic hypotension and compare baseline serum Magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis.

The frequency of intradialytic hypotension in haemodialysis was recorded in 35.83%(n=43), comparison of baseline serum magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis was done which shows that 2.22±0.21 in normal blood pressure patients and 1.68±0.11 in patients having hypotension during analysis.

Our findings are in agreement with other studies showing fall in the blood pressure occurring either during or after the dialysis procedure and it affects upto 20% to 30% dialysis sessions.[2,11] Magdy M Elsharkawy and colleagues[12] investigated the intradialytic changes of serum magnesium in chronic

hemodialysis patients with different hemodialysis modalities and also the relation to intradialytic hypotension, they recorded that hypotension was significantly higher in group I compared with group II (p=0.01), and this hypotension was positively correlated with a decrease in serum magnesium level in group I. It was significantly correlated with hypotension during the dialysis session, especially with acetate dialysate, our findings are constant with their findings.

Navarro-Gonzalez JF and others[13] are of the view that Hypermagnesemia also may retard vascular calcification. Low Mg levels have been associated with impairment of myocardial contractility, intradialytic hemodynamic instability, and hypotension.

Another study by Pakfetrat M et al[10] investigated the significance of intradialytic changes of serum magnesium (sMg) and its relation to intradialytic hypotension and recorded that Intradialytic hypotension episodes were significantly related to a decrease in serum Mg during dialysis (P=0.02). There was a significant decrease in serum Mg levels during dialysis. Intradialytic hypotension was significantly related to lowered serum Mg levels during dialysis.

It is pertinent to mention here, that we compared baseline serum magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis, the findings of our study show that in both groups, the serum magnesium levels were in normal range but in patients having IDH were closed to the lower level of normal range and the patients with normal blood pressure had higher level of normal magnesium levels but this difference was statistically significant.

However, the results of this study emphasize the importance of measuring serum Magnesium level during dialysis session, thereby it is helpful for the prevention of episodes of intra dialytic hypotension and as a result it may decrease morbidity and mortality in our dialysis patients.

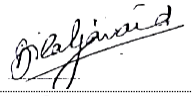
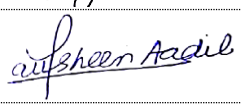
CONCLUSION

We concluded that the frequency of intradialytic hypotension is higher among patients during dialysis while on comparison of baseline serum Magnesium levels in patients having normal blood pressure during dialysis versus patients developing hypotension during dialysis, magnesium levels are significantly lower in intradialytic hypotension.

REFERENCES

1. Skoecki K, Green J, Brenner BM. Chronic Renal Failure. In: Harrisons Principles and Practice of Medicine. McGraw-Hill Medical Products. 2008;19thed pp1653-63.
2. Biff F, Palmer, William L. Henrich. Recent Advances in the Prevention and Management of Intradialytic Hypotension. J Am Soc Nephrol. 2008;19:8-11.
3. Li L, Streja E, Rhee CM, Mehrotra R, Soohoo M, Brunelli SM, Kovesdy CP, Kalantar-Zadeh K. Hypomagnesemia and Mortality in Incident Hemodialysis Patients. Am J Kidney Dis. 2015;66(6):1047-55.
4. Stefánsson BV, Brunelli SM, Cabrera C, Rosenbaum D, Anum E, Ramakrishnan K, Jensen DE, Stålhammar NO. Intradialytic Hypotension and Risk of Cardiovascular Disease. Clin J Am Soc Nephrol. 2014;9(12):2124-32.
5. van de Wal-Visscher ER, Kooman JP, van der Sande FM. Magnesium in Chronic Kidney Disease: Should We Care? Blood Purification. 2018;45:173-8.
6. João Matias P, Azevedo A, Laranjinha I, Navarro D, Mendes M, Ferreira C. Lower serum magnesium is associated with cardiovascular risk factors and mortality in haemodialysis patients. Blood Purif. 2014;38(3-4):244-52.
7. Gul A, Miskulin D, Harford A, Zager P. Intradialytic Hypotension. Current Opinion in Nephrology & Hypertension. 2016;25(6):545-50.
8. Alhosaini M, David J. Magnesium & Dialysis: The Neglected Cation. Am J Kidney Dis. 2015;66(3):523-31.
9. Gröber U, Schmidt J and Kisters K. Magnesium in Prevention and Therapy. Nutrients. 2015;7(9):1047-55.
10. Pakfetrat M, Roozbeh Shahroodi J, Malekmakan L, Zare N. Is there an association between intradialytic hypotension and serum magnesium changes? J Hemodial Int. 2010;14(4):492-7.
11. Richard A. Sherman JT, Daugirdas, Todd S. Complications During Hemodialysis. Lipponcott Williams & Wilkins. 2009;4 pp 170-91.
12. Elsharkawy MM, Youssef AM, Zayoon MY. Intradialytic changes of serum magnesium and their relation to hypotensive episodes in hemodialysis patients on different dialysates. Hemodial Int. 2006;10:S16-23.
13. Navarro-Gonzalez JF, Mora-Fernandez C, Garcia-Perez J. Clinical implications of disordered magnesium homeostasis in chronic renal failure and dialysis. J Semin Dial. 2009;22(1):37-44.

AUTHORSHIP AND CONTRIBUTION DECLARATION

AUTHORS	Contribution to The Paper	Signatures
Dr. Bilal Javaid Assistant Professor, Nephrology Faisalabad Medical University, Faisalabad	Principal Investigator, Article Author	
Dr. Nosheen Adil Post Graduate Trainee Registrar, Nephrology Allied Hospital, Faisalabad	Research Idea, Co-Author	
Dr. Muhammad Umar Farooq Post Graduate Trainee Registrar, Nephrology Allied Hospital, Faisalabad	Co-Author