

ROLE ON DIALYSATE MAGNESIUM LEVEL TO INTRADIALYTIC HYPOTENSION

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INTRODUCTION & AIMS

Intradialytic hypotension (IDH) could induce myocardial stunning & associated with adverse cardiovascular outcomes. Magnesium (Mg) is a critical ion that previously reported to maintain intradialytic blood pressure. The aim of study is to investigate the effect of dMg level to blood pressure during HD.

METHODS

This study was conducted from July 2011 to April 2012 in Mitra Keluarga Kemayoran Hospital, Jakarta. All of subjects are 18 yr-old or older who on stable HD procedure at least 3 months prior (2x weekly, 5 hours per session), and willing to participate. The exclusion criteria were history of myocardial infarction or cardiovascular intervention, symptomatic coronary heart disease, left ventricle ejection fraction 40% or less, arrhythmia, diabetes mellitus.

The subjects were divided into 3 groups who are dialyzed in the different dMg level. Group A used low dMg & dCa level (0.2 mmol/L & 1.3 mmol/L), group B used moderate dMg & dCa level (0.51 mmol/L & 1.54 mmol/L) and group C used high dMg & dCa level (1.0 mmol/L & 1.9 mmol/L). Group A, B & C respectively enclosed 15, 12 & 15 subjects that were followed up within 9 month forward.

The following blood pressure was measured at the time of dialysis and at one-hour intervals during the subsequent 5-hour dialysis period. IDH defined as a decrease in blood pressure necessitating fluid replacement therapy and or stopped the dialysis procedure for awhile or terminated dialysis at this time, and or when the SBP and or DBP less than 90 and or 60 mmHg respectively, or decreasing SBP more than 40 mmHg below the predialysis SBP.

RESULTS

The characteristics of subjects in 3 groups were not different statistically, enclosed age, gender, starting HD, frequency of HD, ultrafiltration per session, sMg, sCa, sAlb, Hb, cHt and cardiac status.

Group A was found sMg pre-post test, respectively 0.89 ± 0.22 mmol/L & 0.63 ± 0.11 mmol/L, sCa 2.21 ± 0.33 mmol/L & 2.10 ± 0.31 mmol/L, sAlb 3.42 ± 0.46 g/dL & 3.39 ± 0.43 g/dL. Analysis paired sample test, the decreasing sMg level was significant ($p < 0.05$), decreasing sCa level was not significant ($p = 0.267$).

Group B was found sMg pre-post test, respectively 0.87 ± 0.21 mmol/L & 0.86 ± 0.17 mmol/L, sCa 2.20 ± 0.36 mmol/L & 2.30 ± 0.25 mmol/L, sAlb 3.33 ± 0.57 g/dL & 3.50 ± 0.44 g/dL. Analysis paired sample test, the decreasing sMg level was not significant ($p = 0.749$), increasing sCa level was not significant ($p = 0.158$).

Group C was found sMg pre-post test, respectively 0.87 ± 0.18 mmol/L & 0.90 ± 0.16 mmol/L, sCa 2.22 ± 0.31 mmol/L & 2.43 ± 0.26 mmol/L, sAlb 3.42 ± 0.46 g/dL & 3.44 ± 0.42 g/dL. Analysis paired sample test, the increasing sMg level was significant ($p < 0.05$), increasing sCa level was significant ($p < 0.05$).

Mean arterial pressure (MAP) decreased significantly ($p < 0.05$) in group A by 14.7% compared to the other groups. Increasing significantly sMg in group C did not compromise blood pressure by vasodilatation. Inversely, 1.0 mmol/L dMg in group C was superior to the other groups regarding intradialytic morbidity ($p < 0.05$) and blood pressure stability ($p < 0.05$).

Table 1. Characteristic of the Subjects

	Group A n=15	Group B n=12	Group C n=15	p value
Age (yr)	51.6 ± 6.8	49.5 ± 7.4	50.7 ± 7.1	ns
Sex				
- Male	9 (60%)	8 (66.67%)	9 (60%)	ns
- Female	6 (40%)	4 (33.33%)	6 (40%)	ns
Hemodialysis				
- Starting HD (yr)	1.1 ± 0.6	1.2 ± 0.2	1.0 ± 0.7	ns
- Frequency HD/week	2	2	2	ns
- Ultrafiltration/session (mL)	2,875 ± 347	2,983 ± 324	3,072 ± 288	ns
Etiology				
- DM-ESRD	7 (46.67%)	6 (50%)	8 (53.33%)	ns
- non-DM-ESRD	8 (53.33%)	6 (50%)	7 (46.67%)	ns
Comorbid				
- Hb < 10 g/dL	3 (20%)	2 (16.67%)	3 (20%)	ns
- Dyslipidemia	8 (53.33%)	6 (50%)	8 (53.33%)	ns
- Hypertension	9 (60%)	8 (66.67%)	8 (53.33%)	ns
- CAD : PCI	3 (20%)	3 (25%)	3 (20%)	ns
- Congestive heart dis.	8 (53.33%)	6 (50%)	8 (53.33%)	ns
- Hemorrhagic Stroke	0 (0%)	0 (0%)	0 (0%)	ns
- Non-hemorrhagic stroke	2 (14.29%)	1 (8.33%)	1 (6.67%)	ns
- 2 nd hyperparathyroidism	3 (20%)	2 (16.67%)	3 (20%)	ns
Serum level				
- Magnesium (mmol/L)	0.89 ± 0.22	0.87 ± 0.21	0.87 ± 0.18	ns
- Calcium (mmol/L)	2.21 ± 0.33	2.20 ± 0.36	2.22 ± 0.31	ns
- Albumin (g/dL)	3.42 ± 0.46	3.33 ± 0.57	3.42 ± 0.46	ns
- Hemoglobin (g/dL)	9.7 ± 0.74	10.1 ± 0.37	9.8 ± 0.56	ns
- Hematocrite (%)	29.6 ± 0.55	30.3 ± 0.47	30.0 ± 0.71	ns

Abbreviation : HD= hemodialysis, non-/DM-ESRD= non/diabetes mellitus end stage renal disease, s= significant ($p > 0.05$), ns= non significant ($p > 0.05$), CAD= coronary artery disease, PCI= percutaneous coronary intervention

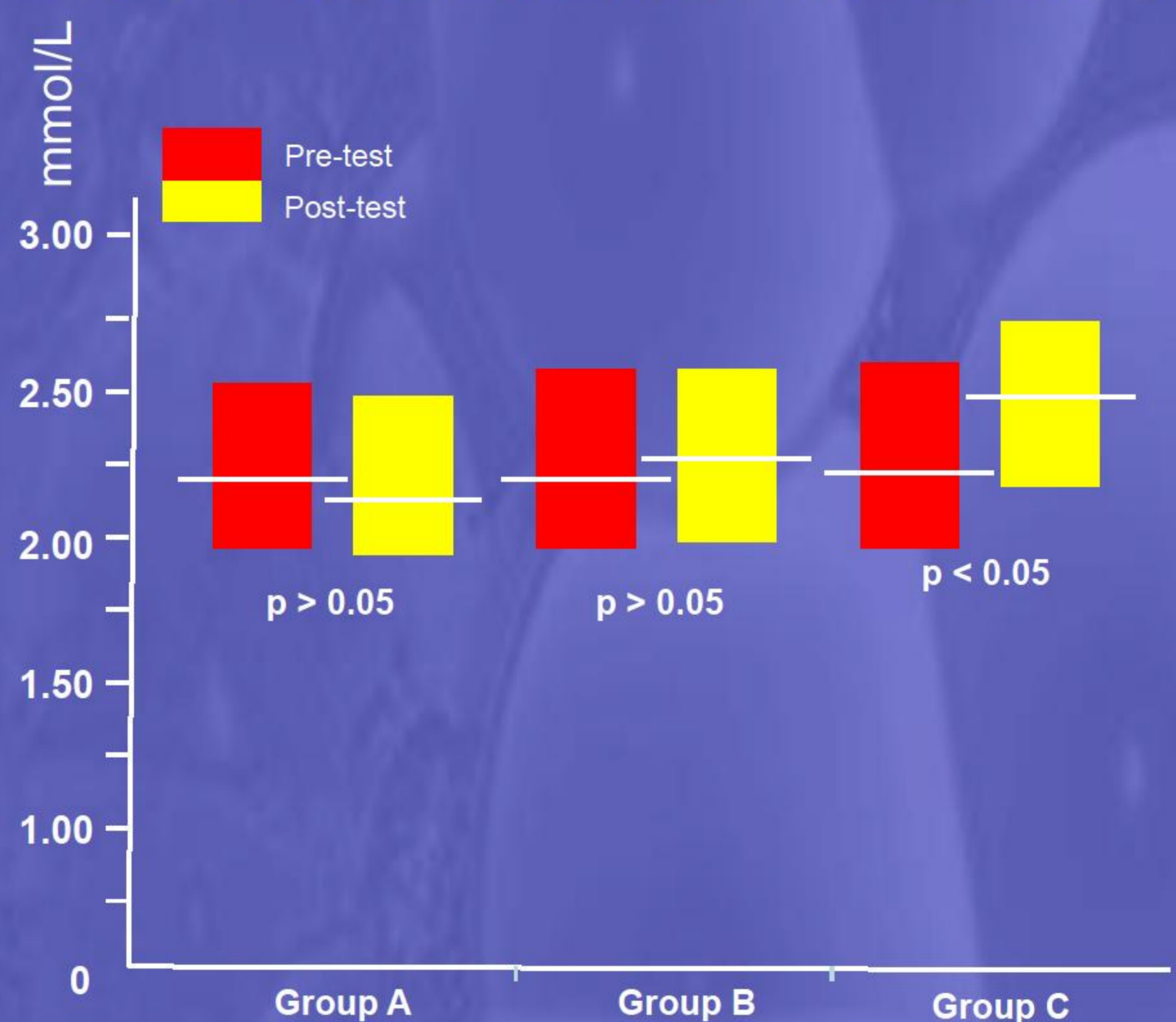


Figure 2. Changing Serum Calcium in Group A, B and C

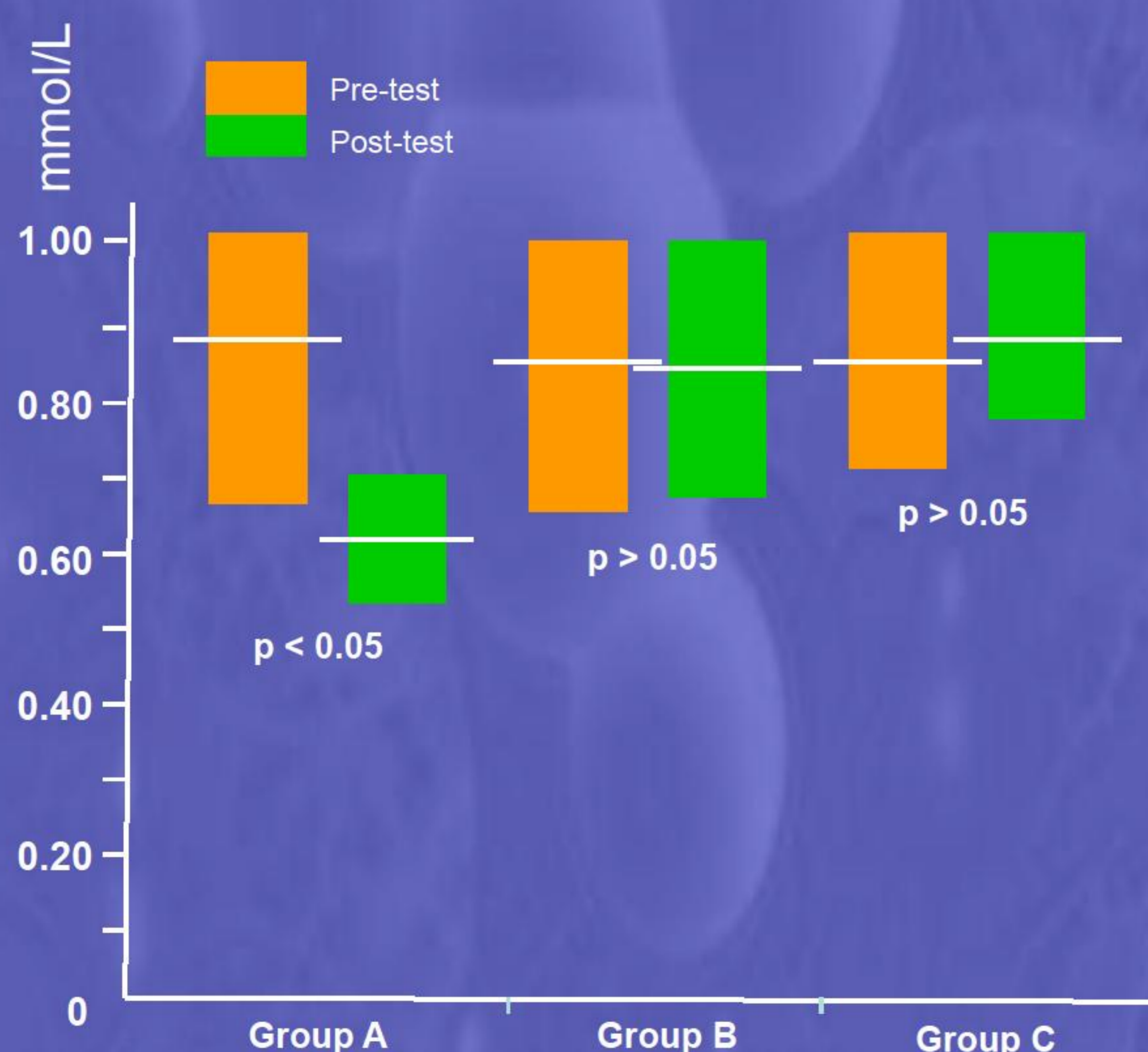


Figure 1. Changing Serum Magnesium in Group A, B and C

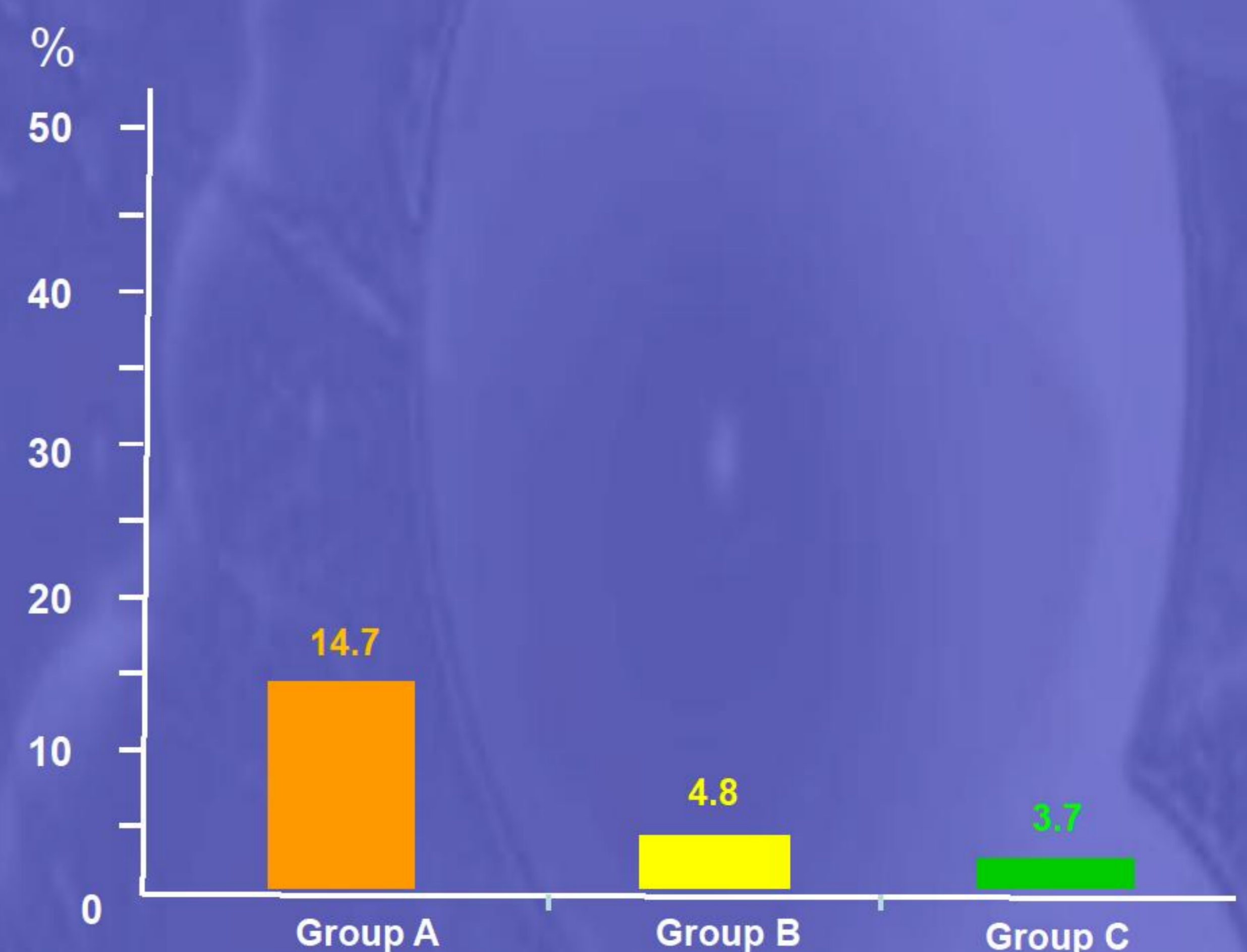


Figure 3. Decreasing Mean Arterial Pressure in Group A, B and C

CONCLUSIONS

A low dMg level proved contributing to IDH. Increasing dMg level could prevent IDH. dMg level independently or in dCa combining might has important implications to dialysis tolerance.

