

Abstract Submission No.: A-0369

Serum Magnesium Level and Blood Pressure in Hemodialysis Patients

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Objectives : Magnesium is associated with vascular calcification and cardiovascular disease in hemodialysis patients. The aim of this study was to investigate the magnesium level and blood pressure in hemodialysis patients.

Methods : A cross-sectional study was conducted in 114 maintenance hemodialysis patients with complete follow-up data from June 2020 to May 2021 in Beijing Tsinghua Changgung Hospital, Tsinghua University. Baseline data including gender, age, primary disease, biochemical parameters and pre- to post-hemodialysis blood pressure were recorded. Grouped with serum magnesium level and the correlation between magnesium and blood pressure were analyzed.

Results : 114 patients with hemodialysis were enrolled in the study . The primary disease was diabetic nephropathy (52.6%). Mean serum magnesium concentration was (1.11 ± 0.13) mmol/L, 36% patients with normal serum magnesium concentration (0.7-1.05mmol/L), 64% with hypermagnesemia (>1.05mmol/L) and no patients with hypomagnesemia (<0.7mmol/L). The results showed the systolic blood pressure, the diastolic blood pressure of pre-dialysis and parathyroid hormone level were lower in hypermagnesemia group. Hemoglobin, total protein, albumin, serum calcium and serum potassium level were higher in hypermagnesemia group. Correlation factor analysis showed that serum magnesium was positively correlated with hemoglobin, total protein, albumin, serum calcium and serum potassium (P < 0.05).

Conclusions : Magnesium were associated with nutrition, calcium phosphorus metabolism, anemia and blood pressure. These factors we should pay more attention in clinical practice.

Table1. Clinical and laboratory data of enrolled patients.jpg

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Items	Results
Male (%)	68 (59.6)
Age (years)	62.7±13.6
Dialysis age (months)	59.3±44.8
Diabetes (%)	60 (52.6)
Pre-dialysis systolic BP (mmHg)	155.7±16.0
Pre-dialysis diastolic BP (mmHg)	74.6±9.8
Intradialytic systolic BP (mmHg)	143.3±15.5
Intradialytic diastolic BP (mmHg)	72.9±11.1
post-dialysis systolic BP (mmHg)	150.5±16.4
Post-dialysis diastolic BP (mmHg)	76.7±10.7
Kt/V	1.40±0.27
eGFR (ml/min/1.73 ²)	4.8±1.5
Uric acid (μmol/L)	450.5±71.3
Serum Ca (mmol/L)	2.18±0.15
Serum P (mmol/L)	1.88±0.40
Serum K (mmol/L)	4.97±0.53
Serum Na(mmol/L)	139.6±2.6
Serum Mg(mmol/L)	1.11±0.13
WBC (10 ⁹ /L)	6.45±1.80
RBC (10 ¹² /L)	3.79±0.43
Hemoglobin (g/L)	117.1±10.4
HCT (%)	34.8±3.1
parathyroid hormone (ng/L)	277.4±158.2
ALT (U/L)	10.7±4.3
AST (U/L)	12.2±4.4
ALP (U/L)	83.0±34.8
Total protein (g/L)	65.4±4.6
Albumin (g/L)	39.9±2.9
Total bilirubin (μmol/L)	5.91±2.91
Direct bilirubin (μmol/L)	2.29±1.18

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Table 2. Comparison between the normal serum Mg group and the hypermagnesemia group.

Items	Normal magnesium group (n=41)	Hypermagnesemia group (n=73)	P value
Age (years)	61.9±14.5	63.2±13.2	0.641
Male (%)	30(73.2)	38(52.1)	0.027*
Dialysis age (months)	57.0±47.2	60.6±43.7	0.680
Diabetes (%)	26(63.4)	41(56.2)	0.450
Kt/V	1.3±0.3	1.4±0.2	0.348
Pre-dialysis systolic BP (mmHg)	159.6±12.8	153.6±17.3	0.038*
Pre-dialysis diastolic BP (mmHg)	77.2±10.6	73.2±9.2	0.037*
Intradialytic systolic BP (mmHg)	147.1±13.3	141.2±16.3	0.053
Intradialytic diastolic BP (mmHg)	75.3±12.7	71.6±9.8	0.083
post-dialysis systolic BP (mmHg)	152.9±13.8	149.1±17.6	0.236
Post-dialysis diastolic BP (mmHg)	78.8±12.1	75.5±9.7	0.120
parathyroid hormone (ng/L)	316.7±173.0	255.3±145.9	0.046*
Serum Ca (mmol/L)	2.13±0.15	2.21±0.15	0.001*
Serum P (mmol/L)	1.89±0.45	1.88±0.37	0.901
Serum K (mmol/L)	4.81±0.56	5.06±0.50	0.016*
WBC (10 ⁹ /L)	6.42±2.04	6.46±1.67	0.907
RBC (10 ¹² /L)	3.86±0.45	3.76±0.41	0.235
Hemoglobin (g/L)	114.2±11.1	118.6±9.7	0.027*
ALT (U/L)	11.0±4.5	10.5±4.3	0.565
AST(U/L)	12.8±4.3	11.9±4.4	0.293
Total bilirubin(μmol/L)	5.58±2.11	6.11±3.27	0.363
Direct bilirubin(μmol/L)	2.26±1.00	2.31±1.28	0.835
Total protein (g/L)	63.7±3.8	66.4±4.7	0.002*
Albumin (g/L)	39.1±3.1	40.5±2.7	0.014*

*P<0.05