Optimal Serum Potassium and Magnesium Levels in the Coronary Care Unit

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Background

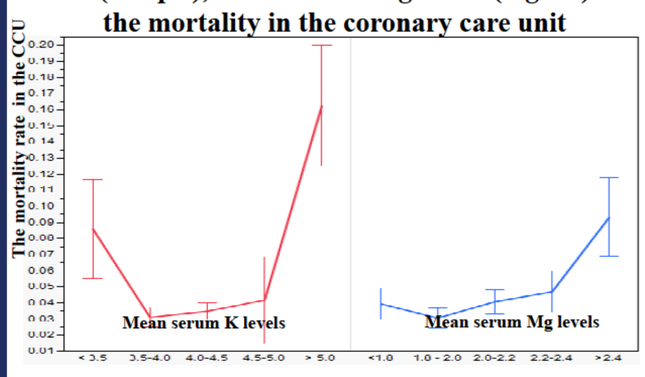
- A recent study suggested maintaining serum K levels 3.5-<4.5 mEq/L among patients with AMI
- However, the optimal serum K & Mg levels in the patients admitted to the CCU have not been investigated
- Objective: To determine the optimal serum K & Mg levels among the CCU patients

Methods

- Retrospective review of 8,649 consecutive patients who admitted to the CCU at Mayo Clinic between 2004 and 2013 were included
- All patients had at least one K and Mg level measurement during CCU admission
- K 4.0-<4.5 and Mg 2.0-<2.2 were the reference groups
- The primary outcome was the CCU mortality
- Multivariable analysis adjusted for age, sex, race, comorbidities, serum electrolyte , antiarrhythmics, and all prolonged QT medications was used to evaluate the association between serum K and Mg levels and the CCU mortality

Results

Figure 1: The relationship between mean serum K levels (mEq/L), mean serum Mg levels (mg/dL) and the mortality in the coronary care unit



- A U-shaped relationship between serum K, serum Mg levels and CCU mortality was demonstrated
- Compared with the reference group, K <3.5 mEq/L (OR 2.0, 95% CI, 1.2-3.2), 4.5-<5.0 mEq/L (OR 1.6, 95% CI, 1.2-2.3) and ≥5.0 mEq/L (OR 4.7, 95% CI, 3.1-6.9) were independently associated with an increase in CCU mortality
- Compared with the reference group, Mg >2.4 mg/dL was associated with an increase in mortality (OR 1.5, 95% CI, 1.0-2.2), whereas other Mg levels had a neutral effect on the mortality

Table 1: Baseline characteristics of patients by serum K levels

Mean serum potassium levels, mEq/L						
	< 3.5	3.5-<4.0	4.0-<4.5	4.5-<5.0	≥ 5. 0	P-value
Age, mean ± SD, y	69±15	67±15	67±15	69±15	70±16	< 0.0001
Male, %	55	57	66	66	64	< 0.0001
White, %	83	83	86	85	83	0.02
Diabetes mellitus, %	27	26	26	34	45	< 0.0001
Hypertension, %	66	62	60	66	76	< 0.0001
CKD, %	16	16	17	27	47	< 0.0001
AMI, %	44	52	54	48	34	< 0.0001
Cardiac arrest, %	20	10	7	7	12	< 0.0001
Cardiogenic shock, %	16	10	7	8	14	< 0.0001
ADHF, %	45	44	39	43	55	< 0.0001
Mg, mean ± SD , mg/dL,	2.0±0.3	2.0±0.3	2.0±0.2	2.1±0.3	2.2±0.4	< 0.0001
Ca, mean ± SD, mg/dL,	4.6±0.4	4.7±0.3	4.8±0.3	4.8±0.4	4.8±0.5	< 0.0001
Antiarrhythmic, %	27	29	27	25	24	0.06
Prolonged QTc meds, %	49	52	48	48	50	0.01

Table 2: Baseline characteristics of patients by serum Mg levels

Mean serum magnesium levels, mg/dL						
	< 1.8	1.8-<2.0	2.0-<2.2	2.2-<2.4	≥ 2. 4	P-value
Age, mean ± SD, y	67±16	67±15	67±15	68±15	70±16	< 0.0001
Male, %	54	62	66	68	67	< 0.0001
White, %	86	85	84	84	84	0.44
Diabetes mellitus, %	32	27	26	28	35	< 0.0001
Hypertension, %	66	62	61	64	63	0.01
CKD, %	19	17	18	23	36	< 0.0001
AMI, %	50	55	51	48	35	< 0.0001
Cardiac arrest, %	8	10	9	7	10	0.08
Cardiogenic shock, %	7	9	9	9	12	0.01
ADHF, %	37	39	43	48	63	< 0.0001
K, mean ± SD , mEq/L	4.1±0.4	4.1±0.4	4.2±0.4	4.3±0.4	4.4±0.6	< 0.0001
Ca, mean ± SD, mg/dL	4.7±0.4	4.7±0.3	4.8±0.3	4.8±0.3	4.7±0.4	< 0.0001
Antiarrhythmic, %	22	27	30	29	33	< 0.0001
Prolonged QTc meds, %	51	50	49	48	50	0.44

Conclusions

- Serum K < 3.5 and ≥ 4.5 mEq/L and serum Mg ≥ 2.4 mg/dL were independently associated with an increase in the CCU mortality
- This finding suggests that the optimal serum K and Mg in the patients admitted to the CCU setting are 3.5-<4.5 mEq/L and <2.4 mg/dL, respectively

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