

Admission serum magnesium levels associated with short- and long-term clinical outcomes in COVID-19 patients

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Introduction: In the face of the global pandemic coronavirus disease 2019 (COVID-19) has created, readily available prognostic markers may be of great use.

Purpose: To evaluate the association between serum magnesium levels (sMg) on admission and clinical outcomes in hospitalized COVID-19 patients.

Methods: We retrospectively analyzed all consecutive patients admitted to our medical center with a primary de novo diagnosis of COVID-19. Demographic, clinical and laboratory data were extracted from the electronic medical record. Clinical outcomes were compared between five groups of patients according to the quintiles of sMg on hospital admission.

Results: From 2,433 consecutive COVID-19 patients during the years 2020–2021, we included 1,522 patients with sMg on admission (1–3 day of hospitalization) (58% male, 69±17 years old). Patients were followed for

a mean of 10±7 months. A low sMg level (1st quintile) was associated with higher rates of diabetes and steroid use, whereas a high sMg level (5th quintile) was associated with dyslipidemia, chronic kidney disease, and higher levels of inflammatory markers (Table 1). Both low and high sMg levels were associated with lower oxygen saturation during hospitalization. All-cause in-hospital and long-term mortality was higher in patients with both low and high sMg levels, compared with mid-range sMg levels (2nd, 3rd and 4th quintiles; 19% and 30% vs. 9.5%, 10.7% and 17.8% and 35% and 45.3% vs. 23%, 26.8% and 27.3% respectively; p<0.001 for all) (Figure 1).

Conclusions: Both low and high sMg levels were associated with worse short- and long-term clinical outcomes and all-cause mortality in a large cohort of hospitalized COVID-19 patients. Thus, admission sMg levels may play a prognostic role in risk stratification of COVID-19 patients.

Characteristics of patients according to baseline magnesium, by quintile							
	Q1: Mg<1.8 (n=326)	Q2: Mg=1.9-2.0 (n=482)	Q3: Mg=2.1-2.1 (n=220)	Q4: Mg=2.2-2.3 (n=271)	Q5: Mg>2.4 (n=223)	Total (n=1522)	P
Age	69 ± 17	67 ± 17	68 ± 16	66 ± 17	70 ± 16	68 ± 17	0.039
Gender	166 (50.9)	254 (52.7)	133 (60.5)	181 (66.8)	153 (68.6)	887 (58)	<0.001
Diabetes	78 (23.9)	79 (16.4)	28 (12.7)	32 (11.8)	39 (17.5)	256 (16.8)	<0.001
CKD	20 (6.1)	19 (3.9)	11 (5.0)	9 (3.3)	21 (9.4)	80 (5.3)	0.017
Dyslipidemia	37 (11.3)	62 (12.9)	20 (9.1)	26 (9.6)	36 (16.1)	181 (11.9)	0.117
Hypertension	102 (31.3)	150 (31.1)	69 (31.4)	96 (35.4)	73 (32.7)	490 (32.2)	0.778
IHD	47 (14.4)	65 (13.5)	25 (11.4)	35 (12.9)	27 (12.1)	199 (13.1)	0.854
Steroid use	23 (7.1)	22 (4.6)	5 (2.3)	10 (3.7)	4 (1.8)	64 (4.2)	0.016
PPI use	92 (28.2)	109 (22.6)	52 (23.6)	48 (17.7)	49 (22.0)	350 (23)	0.049
Diuretic use	65 (19.9)	93 (19.3)	43 (19.5)	52 (19.2)	51 (22.9)	304 (20)	0.837
Hemoglobin	12.13 ± 2.18	12.46 ± 2.17	12.8 ± 2.05	12.6 ± 2.06	12.6 ± 2.14	12.5 ± 2.14	<0.001
Platelets	207 ± 109	207 ± 85	222 ± 103	209 ± 86	246 ± 118	215 ± 100	<0.001
Creatinine	1.24 ± 0.97	1.08 ± 0.86	1.11 ± 0.87	1.2 ± 1.14	1.88 ± 2.02	1.26 ± 1.2	<0.001
CRP	91.3 ± 86.4	86.9 ± 80.5	93.9 ± 85.2	121.1 ± 91.9	149.8 ± 104.2	104 ± 91	<0.001
LDH	344 ± 160	340 ± 155	399 ± 230	462 ± 481	517.5 ± 322	397 ± 286	<0.001
Troponin	149 ± 1057	122 ± 836	183 ± 1534	164 ± 898	96 ± 246	141 ± 975	0.904
INR	1.14 ± 0.26	1.14 ± 0.35	1.12 ± 0.18	1.18 ± 0.26	1.22 ± 0.48	1.16 ±0.32	<0.001
Minimal oxygen saturation	79.3 18.6	82.5 16.8	81.4 16.8	79.6 17.7	75.4 19.7	80.0 ±18.0	<0.001
ICU Admission	154 (10)	29 (8.9)	39 (8.1)	22 (10)	30 (11.1)	34 (15)	0.007
Length of stay	10.4 ±17.1	10.6 ± 21.3	12.9 ± 22.8	10.2 ± 16.6	13.4 ± 23.4	11.2 ± 20.3	0.274

Data are presented as mean±SD or numbers (%), when appropriate. CKD= chronic kidney Disease; IHD= ischemic heart disease; ICU=intensive care unit; LDH= lactate dehydrogenase; PPI= proton pump inhibitor

Table 1

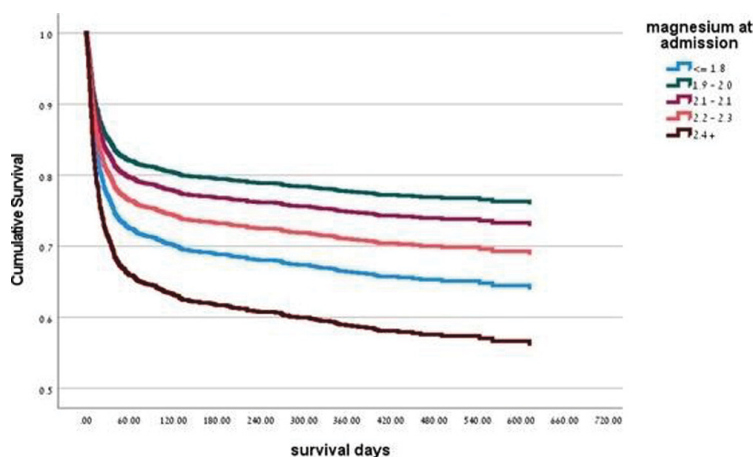


Figure 1