ANEMIA AS A PREDICTOR OF POOR CLINICAL OUTCOME IN PATIENTS ADMITTED FOR COVID-19

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BACKGROUND

- In respiratory infections, anemia is both a consequence of acute inflammation and a predictor of poor clinical outcomes. There are few studies investigating the role of anemia in COVID-19, suggesting a potential role in predicting disease severity.
- In this study, we aimed to assess the association between the presence of anemia at admission and incidence of severe disease and death in patients hospitalized for COVID-19.

METHODS

- Data from all adult patients admitted for COVID-19 in University Hospital "P. Giaccone" (Palermo) and University Hospital of Bari, Italy, were retrospectively collected from 1st of September 2020 and 31 August 2022.
- The association between anemia (defined as Hb <13 g/dl and <12 g/dl in males and females, respectively), in-hospital mortality and severe COVID-19 was tested using a Cox's regression analysis. Severe COVID-19 forms were defined as admission to intensive or sub-intensive care unit or a qSOFAscore ≥2 or CURB65scores ≥3.
- The association between anemia and the mortality was made using a Cox's regression analysis, adjusted, in two models, for the potential confounders and using a propensity score.

In patients hospitalized for COVID-19, anemia is both associated with higher incidence of in-hospital mortality and severe disease.

RESULTS

- Among the 1562 patients included in the analysis, prevalence of anemia was 45.1% (95%CI 43-48%),were significantly older (p<0.0001), reported more co-morbidities, and presented higher baseline levels of procalcitonin, CRP, ferritin and IL-6 as showed in Table 1.
- As shown in Figure 1, patients with anemia reported a higher crude higher incidence of mortality compared to patients without this condition.
- Overall, the crude incidence of mortality was about four times higher in patients with anemia compared to those without. After adjusting for 17 potential confounders, the presence of anemia significantly increased the risk of death (HR=2.68; 95%CI: 1.59-4.52) and of risk of severe COVID-19 (OR=2.31; 95%CI: 1.65-3.24) as showed in Table 2. The propensity score analysis substantially confirmed these analyses.

CONCLUSION

- Our study provides evidence that, in patients hospitalized for COVID-19, anemia is both associated with a more pronounced baseline pro-inflammatory profile and higher incidence of in-hospital mortality and severe disease.

Table 1. Descriptive characteristics at the baseline

Parameter (n = 1562)	No anemia (n=857)	Anemia (n=705)	p-value
Age, mean (± SD)	57.1 (16.0)	60.2 (16.4)	<0.0001
Females, n (%)	372 (43.4)	**312** (44.3)	0.74
Comorbidities, n (%)			
At least one comorbidity	339 (39.6)	416 (59.0)	<0.0001
Hypertension	360 (42.0)	351 (49.8)	0.002
Actual smoking	86 (10.0)	68 (9.7)	0.313
Previous smoking	32 (3.7)	17 (2.4)	
Dyslipidemia	99 (11.6)	80 (11.3)	0.9
Diabetes mellitus	161 (18.8)	176 (24.9)	<0.0001
Renal failure	32 (3.7)	223 (10.1)	<0.0001
Clinical presentation, n (%)			
Dyspnea	373 (43.5)	21 (31.6)	<0.0001
Anosmia	59 (6.9)	71 (3.0)	<0.0001
Dysgeusia	117 (13.7)	177 (25.1)	<0.0001
Fever	609 (71.1)	379 (53.8)	<0.0001
Cough	318 (37.1)	253 (35.9)	0.610
Gastrointestinal symptoms	179 (20.9)	238 (33.8)	<0.0001
Oxygen saturation <92% (%)	150 (17.5)	247 (35.0)	<0.0001
Laboratory parameters, n (%)			
Elevated Procalcitonin	148 (17.3)	253 (35.9)	<0.0001
Elevated D-Dimer	501 (58.5)	446 (63.3)	0.011
Elevated CRP	688 (80.3)	633 (89.8)	<0.0001
Elevated Troponin	97 (11.3)	120 (17.0)	<0.0001
Elevated Transaminases	132 (15.4)	107 (15.2)	0.99
Elevated IL6	372 (43.4)	293 (41.6)	<0.0001
Elevated Ferritine	294 (34.3)	331 (47.0)	<0.0001
Elevated LDH	252 (29.4)	252 (35.7)	<0.0001
Low platelets levels	122 (14.2)	96 (13.6)	0.725
Presence of pneumonia at the CT scan or chest X-ray, n (%)	803 (93.7)	675 (95.7)	0.074
Use of Venturi's mask during hospitalization, n (%)	440 (51.3)	568 (80.6)	<0.0001
Use of high flow oxygen, n (%)	156 (18.2)	456 (64.7)	<0.0001

Table 2. Association between anemia at hospital admission and outcomes of interest

		Anemia	
	No anemia	**All sample**	**Propensity score**
Mortality, incidence rate[1]	243 (135-439)	934 (610-1434)	-
Risk of mortality, model 1[2]	1, reference	3.19 (1.97-5.14)	-
Risk of mortality, model 2[3]	1, reference	2.68 (1.59-4.52)	1.91 (1.10-3.32)
Risk of severe COVID-19, model 1[2]	1, reference	6.59 (5.11-8.49)	-
Risk of severe COVID-19, model 2[3]	1, reference	2.31 (1.65-3.24)	1.77 (1.26-2.48)

curve

Figure1. Survival by presence of anemia at the hospital admission

