# Prevalence of iron deficiency as a potential cause of suboptimal response to cardiac resynchronization therapy in patients with heart failure

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**Introduction:** This study aimed to evaluate the presence of iron deficiency as a possible factor contributing to poorer outcomes in cardiac resynchronization therapy (CRT). It also sought to explore the relationship between sideropenia (iron deficiency) and the clinical characteristics of the patients.

**Patients and Methods:** In this cross-sectional study, 121 heart failure patients undergoing CRT were included after providing informed consent[1]. Each participant underwent a thorough clinical evaluation, including blood tests and collection of detailed demographic and medical history information.

**Results:** Sideropenia was observed in 55% of patients, while anemia of any cause was identified in 20.4%. The most frequent condition was prelatent sideropenia, affecting 27% of the cohort, with sideropenic anemia present in 4.5%. When comparing patients with and without sideropenia, no significant differences were noted in demographic factors (such as age, BMI, gender) or general clinical characteristics (e.g., duration of CRT therapy, type of implanted device, baseline heart rhythm, hospitalization history, and blood pressure). However, those with sideropenia exhibited higher rates of arterial hypertension (P=0.001), type II diabetes (P=0.011), and ischemic cardiomyopathy (P=0.011), and were more likely to be on statin therapy (P=0.030). Optimal medical therapy was reached in 69.4% of participants. Additionally, patients with sideropenia were more commonly classified in the higher functional classes of the New York Heart Association (NYHA) (P=0.024, **Figure 1**) and exhibited elevated NT-proBNP levels (P=0.034). Poorer clinical status correlated with reduced hemoglobin, hematocrit, and serum iron levels, along with increased RDW and the proportion of hypochromic red blood cells. Marginal significance was noted in the reduced transferrin saturation levels in patients belonging to the higher NYHA classes. Moreover, anemia and sideropenia were more prevalent in higher NYHA classes, while patients in lower classes predominantly had neither condition (P=0.011, **Figure 2**)[1].

**Conclusion:** The findings highlight a considerable prevalence of sideropenia, which may be a modifiable cause of suboptimal CRT response[2]. Its strong association with worsened cardiopulmonary function underscores the need for prompt diagnosis and treatment of sideropenia to improve CRT outcomes in heart failure patients[3,4].

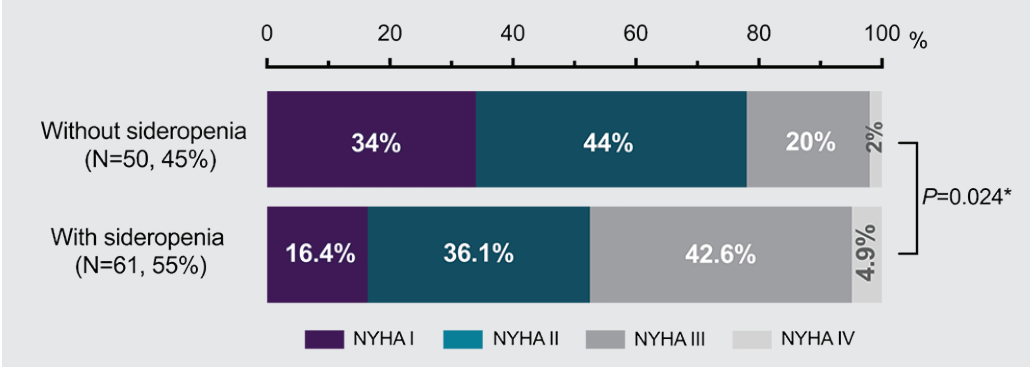


**FIGURE 1. Differences in the distribution of patients in NYHA classes depending on iron deficiency status.**
*Fisher's test; NYHA – New York Heart Association functional class.

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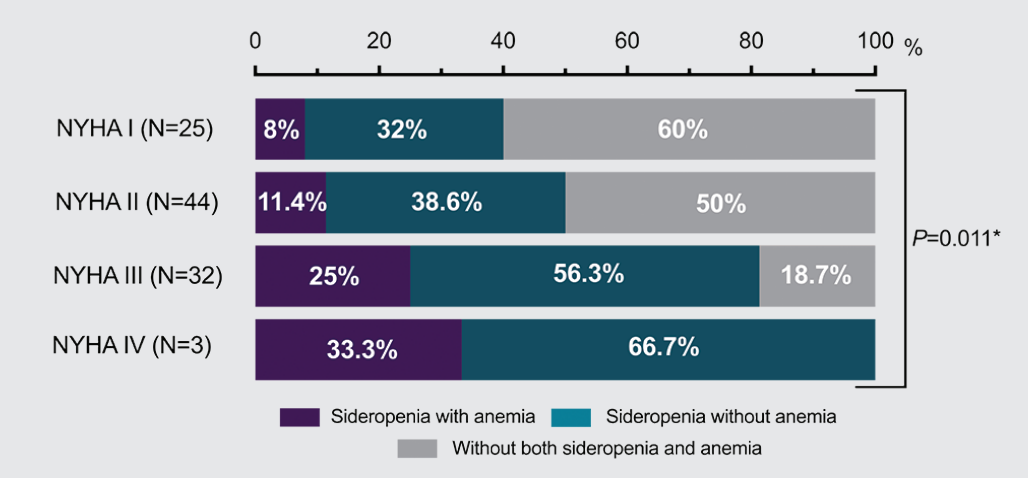


**FIGURE 2. Prevalence of anemia and/or iron deficiency in patients of different NYHA classes.**
*$\chi^2$ test; NYHA – New York Heart Association functional class.

## LITERATURE


1. Aranza I. Prevalencija deficijencije željeza kao mogućeg uzroka suboptimalnog odgovora resinkronizacijskog liječenja u bolesnika sa srčanim zatajenjem [Diplomski rad]. Split: Sveučilište u Splitu, Medicinski fakultet; 2023. Available at: https://urn.nsk.hr/urn:nbn:hr:171:733939
2. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Böhm M, et al; ESC Scientific Document Group. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2021 Sep 21;42(36):3599-3726. https://doi.org/10.1093/eurheartj/ehab368
3. Martens P, Dupont M, Dauw J, Somers F, Herbots L, Timmermans P, et al. Rationale and design of the IRON-CRT trial: effect of intravenous ferric carboxymaltose on reverse remodelling following cardiac resynchronization therapy. ESC Heart Fail. 2019 Dec;6(6):1208-1215. https://doi.org/10.1002/ehf2.12503
4. Martens P, Dupont M, Dauw J, Nijst P, Herbots L, Dendale P, et al. The effect of intravenous ferric carboxymaltose on cardiac reverse remodelling following cardiac resynchronization therapy-the IRON-CRT trial. Eur Heart J. 2021 Dec 21;42(48):4905-4914. https://doi.org/10.1093/eurheartj/ehab411