Poster

Impact of a ferrotherapy intervention on the immune system

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ABSTRACT

Motivation: Absolute iron deficiency is a prevalent condition among women, characterized by low iron levels that can precede the onset of iron-deficiency anemia. Research utilizing animal models indicates a potential influence on the immune system (IS), although evidence from human studies remains limited. We hypothesized that the restoration of normal iron levels could favorably modified the immunological profile of iron-deficient patients.

Methods: This study included 42 non-obese, menstruating adult women devoid of comorbidities, all presenting with ferritin levels below 30 ng/mL, who received supplementation with ferric carboxymaltose. Out of the initial cohort, 32 patients completed the treatment protocol. Blood samples were collected prior to and following the therapy. Additionally, a control group consisting of 3 individuals with ferritin levels exceeding 65 ng/mL was recruited. We evaluated parameters related to iron metabolism, complete blood counts, lymphocyte subpopulations, immunoglobulin levels, inflammatory markers (including DD, B2M, hsCRP), and complement components (C3, C4). Statistical analyses employed Wilcoxon tests for longitudinal data and Mann-Whitney U tests for comparisons against the control group.

Results: The patient cohort had a median age of 43 years and a body mass index (BMI) of 24.8 kg/m². Clinical symptoms were reported by 90% of participants, with 44% meeting the diagnostic criteria for anemia. Menorrhagia was identified as the primary etiology of iron deficiency. Treatment resulted in the correction of iron metabolism parameters and a reduction in leukocyte, neutrophil, monocyte, and platelet counts. Percentages of %B and %T lymphocytes increased, concomitant with a reduction in the CD4/CD8 T-cell ratio, while the percentage of %NK decreased. IgM levels increased, whereas IgG, C3, and DD levels demonstrated a decrease; C4 and other inflammatory markers showed no significant changes. Importantly, iron-deficient patients did not exhibit pathological alterations in immune parameters, since both, pre- and post-treatment values remained within the normal range.

Conclusions: Ferric carboxymaltose treatment was effective and revealed effects on the IS, including changes in leukocyte subpopulations, a potential benefit in humoral response, and activation of the alternative complement pathway.

REFERENCES

Iriarte-Gahete, M., Tarancon-Diez, L., Garrido-Rodríguez, V., Leal, M., & Pacheco, Y. M. (2024). Absolute and functional iron deficiency: Biomarkers, impact on immune system, and therapy. Blood Reviews, 68, 101227.

Vogt, A. S., Arsiwala, T., Mohsen, M., Vogel, M., Manolova, V., & Bachmann, M. F. (2021). On Iron Metabolism and Its Regulation. International Journal Of Molecular Sciences, 22(9), 4591. https://doi.org/10.3390/ijms22094591

Cronin, S. J. F., Woolf, C. J., Weiss, G., & Penninger, J. M. (2019). The Role of Iron Regulation in Immunometabolism and Immune-Related Disease. Frontiers in molecular biosciences, 6, 116.