The Relationship Between Nutritional Status, Micronutrient Deficiency, and Disease Activity in Inflammatory Bowel Disease: A Multicenter Cross-Sectional Study

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Background and Aim

Inflammatory bowel diseases (IBD) are associated with malnutrition and micronutrient deficiencies, which may influence disease activity and outcomes. This study aimed to evaluate the relationship between nutritional status, micronutrient deficiencies, and clinical as well as biochemical disease activity in IBD patients.

Methods

This cross-sectional study included adult patients with a confirmed diagnosis of IBD. Clinical and biochemical evaluations were performed, and micronutrient assessment comprised iron, ferritin, vitamin B12, vitamin D, and folate, together with hemoglobin and albumin. Disease activity was defined according to validated clinical scores and fecal calprotectin levels. Pearson correlation and ROC analyses were conducted to assess associations and discriminatory accuracy.

Results

A total of 110 patients were enrolled (40 Crohn's disease, 70 ulcerative colitis). Twenty-two percent showed clinical activity, and 34% had elevated calprotectin. Patients with active disease had significantly lower hemoglobin, iron, ferritin, and vitamin D levels compared to inactive patients ($p = 0.007$, $p < 0.001$, $p = 0.005$, and $p = 0.003$, respectively). No significant differences were observed for folate, vitamin B12, or albumin. ROC analyses showed that iron (AUC 0.76, $p < 0.001$) and vitamin D (AUC 0.68, $p = 0.013$) had the highest discriminatory power, though suboptimal. Multivariate analysis confirmed ferritin as independently associated with disease activity (OR 0.98; $p = 0.015$).

Conclusion

Hemoglobin, iron, ferritin, and vitamin D correlate with disease activity in IBD, but their discriminatory accuracy remains limited. Folic acid, vitamin B12, and albumin do not appear reliable markers of activity. Larger prospective studies are warranted to better define the role of micronutrient assessment in disease monitoring.

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Table 3. Normal levels of micronutrients and relative Odds Ratio and Area Under the Curve in active group (both clinical and calprotectin activity)

	Clinical activity		**Calprotectin**	
Micronutrients and Hemoglobin	Odds ratio (95% CI)	AUC	Odds ratio (95% CI)	AUC
Hemoglobin	0.80 (95% CI: 0.62–1.03)	0.70 (p = 0.06)	0.69 (95% CI: 0.51 – 0.93)	0.64; p=0.01
Iron	0.97 (95% CI: 0.95–0.98)	0.76 (p < 0.001)	0.98 (95% CI: 0.97 – 1.00)	0.68; p=0.05
Ferritin	0.98 (95% CI: 0.97-1.00)	0.68 (p=0.018)	0.94 (95% CI: 0.89 – 0.99)	0.66; p=0.19
Vitamin D	0.92 (95% CI: 0.86–0.99)	0.68 (p = 0.013)	0.98 (95% CI: 0.97 – 0.99)	0.68; p<0.001

Figure 1. The boxplot shows the mean serum level of ferritin, iron, vitamin D and Hemoglobin among active and inactive groups.