

Special article

Iron supplementation after blood donation: adherence, challenges, and future directions

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Introduction

Blood donation results in a substantial loss of body iron, typically in the range of 210-240 mg per 450-mL donation, which may lead to iron depletion and deficiency, especially in frequent donors, if not adequately supplemented.¹⁻³ This issue is particularly relevant in repeat donors, where cumulative iron depletion may occur despite normal hemoglobin levels.^{1,2}

The REDS-II Donor Iron Status Evaluation (RISE) study demonstrated that iron supplementation reduces iron depletion in frequent donors, while recovery through dietary intake alone may require more than 24 weeks. This underscores the importance of iron supplementation in this population.^{4,5}

In Thailand, the National Blood Centre routinely provides iron supplementation in the form of 200 mg of ferrous fumarate (66 mg elemental iron) once daily for 50 days following each whole blood donation. However, anemia remains the most common cause of donor deferral, suggesting a persistent gap between supplementation policy and clinical outcomes. To address this gap, a questionnaire-based survey was conducted between January 30 and March 31, 2026, among 5,854 blood donors attending the National Blood Centre, Thai Red Cross Society. The survey was administered electronically using Google Forms. The questionnaire assessed adherence to prescribed iron supplementation, reasons for non-adherence, patterns of intake, adverse effects, and patient-reported suggestions.

Adherence to iron supplementation

Adherence to iron supplementation was suboptimal (Figure 1). Only 51.1% of participants reported completing the full recommended course, while 13.8% took at least

half of the prescribed amount and 24.5% took less than half. Notably, 10.7% did not take the supplements at all. This falls short of the amount required to replace iron lost after whole-blood donation and is consistent with prior studies showing poor adherence to oral iron therapy.^{3,6,7} The observed rate reflects a global pattern, with potentially greater impact in Thailand due to a higher baseline prevalence of donor anemia.

Barriers to adherence

The primary reasons for non-adherence were largely behavioral. Forgetfulness was the most common factor (68.6%), followed by the perception that supplementation was unnecessary (24.7%). Adverse effects were reported by 14.4% of participants.

While gastrointestinal adverse effects are well recognized as a major limitation of oral iron therapy,^{6,8}

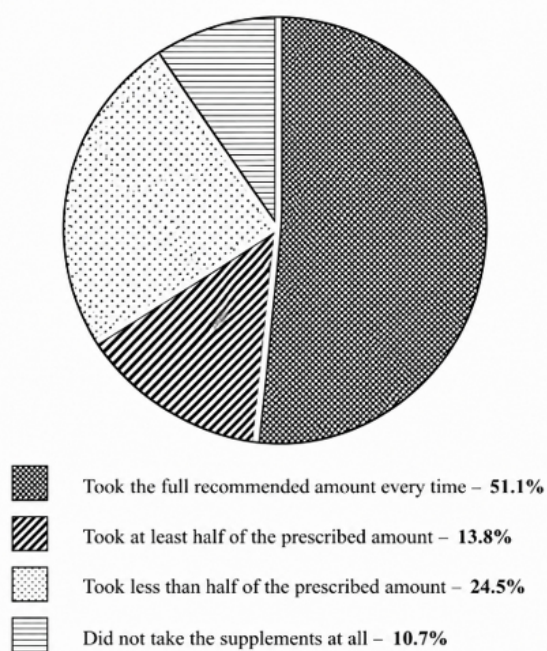


Figure 1 Adherence to iron supplementation

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the predominance of behavioral factors in the Thai population suggests that adherence may be improved through targeted behavioral interventions, such as reminder systems, donor education, and structured monitoring rather than knowledge-based strategies alone⁹⁻¹¹.

Patterns of iron intake

Timing of iron supplementation varied. Most participants reported taking iron supplements after meals (47.8%), followed by before bedtime (28.9%), while only 10.1% took iron before meals.

Oral iron is best absorbed when taken on an empty stomach; however, taking it with food reduces gastrointestinal side effects at the expense of decreased absorption^{12,13}.

Adverse effects

Black stools, an expected pharmacological effect of oral iron supplementation, were reported by 475 participants. Adverse effects were reported by 843 participants (14.4% of all survey respondents). The most common adverse effects were constipation (435 participants, 51.6% of those reporting adverse effects) and nausea (289 participants, 34.3%). Less frequent adverse effects included abdominal pain (55 participants, 6.5%), dizziness (20 participants, 2.4%), and diarrhea (11 participants, 1.3%). Symptom frequencies are presented in Figure 2.

Patient-reported suggestions

Participants proposed several strategies to improve adherence. These included the use of formulations with fewer gastrointestinal side effects, improving the taste and odor of supplements, and providing alternative formulations for those with intolerance. Practical measures such as blister packaging and simplified dosing regimens were also suggested. Additionally, some participants recommended co-supplementation with vitamin B or folic acid to enhance perceived benefits for donor health. Given that forgetfulness was the most commonly reported reason for non-adherence, digital reminder systems such as SMS reminders, smartphone applications, electronic medication trackers, and emerging artificial intelligence (AI)-assisted health applications may enhance adherence to iron supplementation.

These findings underscore the importance of dosing strategies. Emerging evidence demonstrates that alternate-day dosing may enhance iron absorption by reducing hepcidin-mediated inhibition, while also potentially improving tolerability.^{14,15} However, because forgetfulness was the leading cause of non-adherence in our study, the potential benefits of non-daily dosing should be balanced against the increased risk of missed doses, highlighting the importance of reminder-based adherence support.

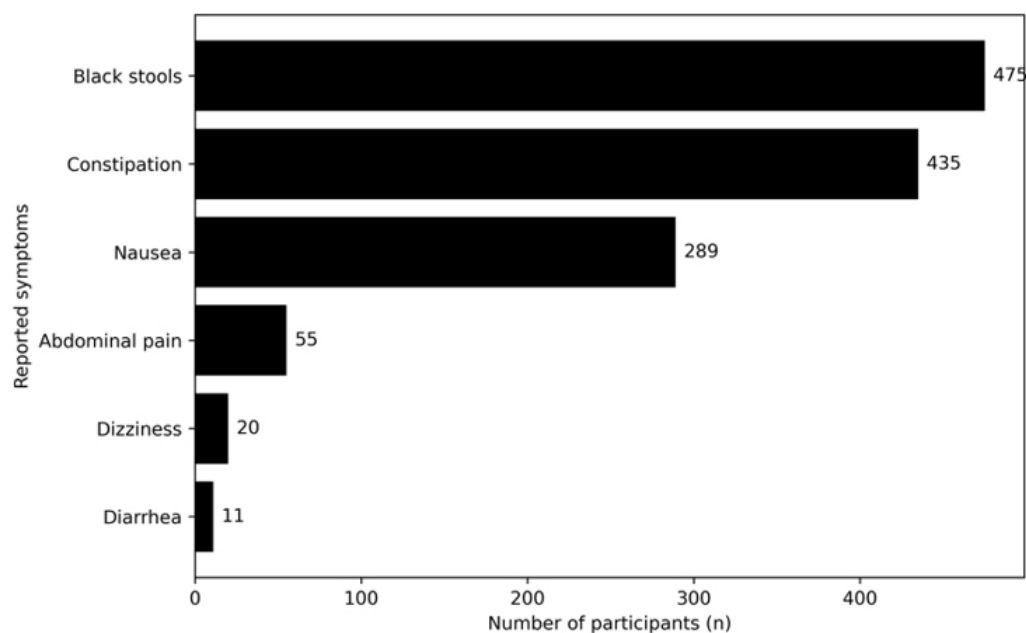


Figure 2 Reported symptoms associated with iron supplementation

In addition, formulation selection plays a critical role. Patients who experience intolerance to conventional ferrous salts may benefit from switching to better-tolerated formulations, such as iron polymaltose complex, carbonyl iron preparations, or liquid iron formulations that allow individualized dose adjustment. Lower-dose regimens providing approximately 18-30 mg of elemental iron daily may improve tolerability and are below the tolerable upper intake level of approximately 45 mg per day, thereby potentially reducing the risk of adverse effects while maintaining adequate iron replacement.^{1,8,16,17}

Conclusion

Iron supplementation following blood donation is essential for maintaining iron balance and preventing deficiency. However, adherence remains suboptimal due to both behavioral and pharmacologic factors. Addressing these challenges requires a multifaceted approach, including improved patient education, adherence-enhancing strategies, and optimization of dosing regimens and formulations. Future efforts should focus on integrating these measures into routine donor care to improve outcomes and ensure sustainable blood donation practices.

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