



# Changes in Bone Turnover, Inflammatory, Oxidative Stress, and Metabolic Markers in Women Consuming Iron plus Vitamin D Supplements: a Randomized Clinical Trial

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## Abstract

We aimed to investigate whether combination of vitamin D and iron supplementation, comparing vitamin D alone, could modify bone turnover, inflammatory, oxidative stress, and metabolic markers. Eighty-seven women with hemoglobin (Hb)  $\leq 12.7$  g/dL and 25OHD  $\leq 29$  ng/mL vitamin D deficiency/insufficiency aged 18–45 years were randomly assigned into two groups: (1) receiving either 1000 IU/day vitamin D3 plus 27 mg/day iron (D-Fe); (2) vitamin D3 plus placebo supplements (D-P), for 12 weeks. In D-Fe group, significant decrease in red blood cells (RBC) ( $P = 0.001$ ) and hematocrit (Hct) ( $P = 0.004$ ) and increases in mean corpuscular hemoglobin concentration (MCHC) ( $P = 0.001$ ), 25OHD ( $P < 0.001$ ), osteocalcin ( $P < 0.001$ ), high-density cholesterol (HDL) ( $P = 0.041$ ), and fasting blood sugar (FBS) ( $P < 0.001$ ) were observed. D-P group showed significant decrease in RBC ( $P < 0.001$ ), Hct ( $P < 0.001$ ), mean corpuscular volume (MCV) ( $P = 0.004$ ), mean corpuscular hemoglobin (MCH) ( $P < 0.001$ ), MCHC ( $P = 0.005$ ), serum ferritin ( $P < 0.001$ ), and low-density cholesterol (LDL) ( $P = 0.016$ ) and increases of 25OHD ( $P < 0.001$ ), osteocalcin ( $P < 0.001$ ), C-terminal telopeptide (CTX) ( $P = 0.025$ ), triglyceride (TG) ( $P = 0.004$ ), FBS ( $P < 0.001$ ), and interleukin-6 (IL-6) ( $P = 0.001$ ) at week 12. After the intervention, the D-P group had between-group increases in mean change in the osteocalcin ( $P = 0.007$ ) and IL-6 ( $P = 0.033$ ), and decreases in the RBC ( $P < 0.001$ ), Hb ( $P < 0.001$ ), Hct ( $P < 0.001$ ), and MCV ( $P = 0.001$ ), compared with the D-Fe group. There were significant between-group changes in MCH ( $P < 0.001$ ), MCHC ( $P < 0.001$ ), ferritin ( $P < 0.001$ ), and serum iron ( $P = 0.018$ ). Iron–vitamin D co-supplementation does not yield added benefits for improvement of bone turnover, inflammatory, oxidative stress, and metabolic markers, whereas, vitamin D alone may have some detrimental effects on inflammatory and metabolic markers. IRCT registration number: IRCT201409082365N9

**Keywords** Vitamin D · Iron · Bone turnover · Inflammation · Oxidative stress

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