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The Promising Way to Minimize the Negative Effects of Iron Fortification

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Abstract : Background: Iron fortification is one potential way to overcome anemia but it can cause gut microbiota imbalance. Probiotics addition can increase the growth of good gut bacteria while prebiotics can support the probiotics growth. Tempeh is rich in nutrients required for hemoglobin synthesis, such as protein, vitamin B12, vitamin C, zinc, iron and copper. Objective: To know the efficacy of fermented tempeh extract fortified with iron and synbiotic in maintain gut microbiota balance. Methods: Fermented synbiotic tempeh extract was made using Lactobacillus plantarum Dad13 and Fructo-oligosaccharides. A total of 32 anemic Wistar rats underwent the iron repletion phase then divided into 4 groups, given: 1) Fermented synbiotic tempeh extract with 50 ppm Fe/NaFeEDTA (Na), 2) Fermented synbiotic tempeh extract with 50 ppm Fe/FeSO4 (Fe), 3) Fermented synbiotic tempeh extract (St), and 4) not receive any interventions (Co). Rats were feed AIN-93 free Fe during intervention. Gut microbiota was measured with culture technique using selective media agar while hemoglobin concentration (Hb) was measured with photometric method before and after intervention. Results: There were significant increase in Hb after intervention in Na, Fe, and St, 6.85 to 11.80; 6.41 to 11.48 and 6.47 to 11.03 mg/dL, respectively ($p < 0.05$). Co did not show increase in Hb (6.40 vs. 6.28 mg/dL). Lactobacilli increased in all groups while both of Bifidobacteria increased and E. coli decreased only in Na and St groups. Conclusion: Iron fortification of fermented synbiotic tempeh extract can increase hemoglobin concentrations in anemic animal, increase Lactobacilli and decrease E. coli. It can be an alternative solution to conduct iron fortification without deteriorate the gut microbiota.

Keywords : tempeh, synbiotic, iron, haemoglobin, gut microbiota
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