

Red foxtail millet upregulates brain-derived neurotrophic factor levels in vitro and in vivo.

Abstract

Upregulation of the brain-derived neurotrophic factor (BDNF) in the brain can help in the prevention and treatment of depression. BDNF is synthesized in various peripheral tissues, as well as in the brain, and can reach the brain via the blood-brain barrier. Therefore, foods that upregulate peripheral BDNF levels may aid in depression management. We previously showed the BDNF-upregulating effect of white foxtail millet (WFM) using the human renal adenocarcinoma ACHN cell line, capable of producing and secreting BDNF. However, whether other varieties of foxtail millet can also upregulate BDNF is unclear. Herein, we examined the effects of red foxtail millet (RFM) on BDNF production in vitro and in vivo. RFM methanol extracts significantly increased BDNF levels in the culture medium of ACHN cells, and the levels were higher than those with WFM treatment. Serum BDNF concentrations in rats fed a standard diet containing 20% RFM for 5 weeks were significantly higher than those in the control. Furthermore, the butanol fraction of the RFM methanol extract significantly increased BDNF levels in the culture medium of ACHN cells and upregulated BDNF mRNA expression in ACHN cells. Our results suggest that RFM has potential as a food material with BDNF-inducing activity.