

Brewers' rice induces apoptosis in azoxymethane-induced colon carcinogenesis in rats via suppression of cell proliferation and the Wnt signaling pathway

Abstract

Background: Brewers' rice is locally known as temukut, is a byproduct of the rice milling process, and consists of broken rice, rice bran, and rice germ. Unlike rice bran, the health benefit of brewers' rice has yet to be fully studied. Our present study aimed to identify the chemopreventive potential of brewers' rice with colonic tumor formation and to examine further the mechanistic action of brewers' rice during colon carcinogenesis. Methods: Male Sprague-Dawley rats were randomly divided into five groups: (G1) normal; (G2) azoxymethane (AOM) alone and (G3), (G4), and (G5), which were AOM fed with 10%, 20%, and 40% (w/w) of brewers' rice, respectively. Rats in group 2 to 5 were injected intraperitoneally with AOM (15 mg/kg body weight) once weekly for two weeks. Colon tumor incidence and multiplicity was assessed by hematoxylin and eosin (H&E) staining. The expression of β -catenin, cyclooxygenase-2 (COX-2), and Ki-67 was evaluated by immunohistochemical staining. The apoptosis-inducing activity was analyzed using a TUNEL assay. The data were analyzed using a one-way analysis of variance (ANOVA) with P-value<0.05 was considered significant. Results: Overall analyses revealed that brewers' rice reduced colon tumor incidence and multiplicity. The results from immunohistochemistry analysis also showed that brewers' rice decreased the expression of β -catenin, COX-2, and Ki-67 in a dose-dependent manner. Furthermore, TUNEL analysis demonstrated that administration of brewers' rice in AOM-induced rat colorectal cancer resulted in a dose-dependent increase in cell apoptosis. Conclusions: Taken together, our data suggested that brewers' rice can inhibit cell proliferation, induce apoptosis, and suppress COX-2 and β -catenin expression via the Wnt signaling pathway and holds great promise in the field of chemoprevention as a dietary agent.

Keyword: Brewers' rice; Colon cancer; Beta-catenin; Ki-67; Apoptosis