The chemopreventive potential of *Curcuma purpurascens* rhizome in reducing azoxymethane-induced aberrant crypt foci in rats

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Abstract: *Curcuma purpurascens* BI. rhizome, a member of the Zingiberaceae family, is a popular spice in Indonesia that is traditionally used in assorted remedies. Dichloromethane extract of *C. purpurascens* BI. rhizome (DECPR) has previously been shown to have an apoptosis-inducing effect on colon cancer cells. In the present study, we examined the potential of DECPR to prevent colon cancer development in rats treated with azoxymethane (AOM) (15 mg/kg) by determining the percentage inhibition in incidence of aberrant crypt foci (ACF). Starting from the day immediately after AOM treatment, three groups of rats were orally administered once a day for 2 months either 10% Tween 20 (5 mL/kg, cancer control), DECPR (250 mg/kg, low dose), or DECPR (500 mg/kg, high dose). Meanwhile, the control group was intraperitoneally injected with 5-fluouracil (35 mg/kg) for 5 consecutive days. After euthanizing the rats, the number of ACF was enumerated in colon tissues. Bax, Bel-2, and proliferating cell nuclear antigen (PCNA) protein expressions were examined using immunohistochemical and Western blot analyses. Antioxidant enzymatic activity was measured in colon tissue homogenates and associated with malondialdehyde level. The percentage inhibition of ACF was 56.04% and 68.68% in the low- and high-dose DECPR-treated groups, respectively. The ACF inhibition in the treatment control group was 74.17%. Results revealed that DECPR exposure at both doses significantly decreased AOM-induced ACF formation, which was accompanied by reduced expression of PCNA. Upregulation of Bax and downregulation of Bel-2 suggested the involvement of apoptosis in the chemopreventive effect of DECPR. In addition, the oxidative stress resulting from AOM treatment was significantly attenuated after administration of DECPR, which was shown by the elevated antioxidant enzymatic activity and reduced malondialdehyde level. Taken together, the present data clearly indicate that DECPR significantly inhibits ACF formation in AOM-treated rats and may offer protection against colon cancer development.

Keywords: colon cancer, PCNA, Zingiberaceae

Introduction

Diagnosis of more than 1 million new cases suffering from colorectal cancer worldwide each year has made colon cancer the fourth most prevalent cause of cancer mortality and third most common malignancy throughout the world.1,2 Environmental factors are established as the main cause of colorectal cancer incidence, and only 20% of cases have been linked to heritable genetic changes.3 The risk factors for the development of colorectal tumors include chronic intestinal inflammation, environmental and food-borne mutagens, and specific intestinal commensals and pathogens.4,5 Alcohol consumption, obesity, physical inactivity, smoking, diets high in fat and red meats, and inadequate intake of dietary fiber, fruits, and vegetables are other risk factors that contribute to colorectal cancer.6 Due to the widespread occurrence of the risk factors