ABSTRACT

YUSZDA K. SALIMI. The Role Sorghum Extract and Flour (*Sorghum bicolor* L.) in Cancer Inhibition *in vitro* and *in vivo* in BALB/c mice. Under direction of FRANSISKA R. ZAKARIA, BAMBANG PONTJO PRIOSOERYANTO, and SRI WIDOWATI.

Sorghum is a rich source of various phytochemicals including tannins, phenolic acids, anthocyanins, phytosterols and policosanols. These phytochemicals have potential to significantly impact human health. The aims of this study were extraction of sorghum bioactive compounds, evaluation of the extract activity in enhancing lymphocyte cell proliferation and cancer cell inhibition by *in vitro* test, and evaluation of sorghum flour activity in cancer inhibition on the mice induced by azoxymethane (AOM) and dextran sulfate sodium (DSS). Degree of polishing affected the chemical composition and phytochemicals where the content in 50% polished sorghum was higher than in 100%. The bioactive compounds of sorghum was extracted from whole and half polished sorghum (S50) by using hexane, ethyl acetate and ethanol. The result showed that sorghum contained flavonoids, phenol hydroquinones, sterols, and tannins, while sorghum extract mainly contained phenolic compounds that were higher in ethyl acetate extract than in ethanol extract or hexane extract. Total phenol content correlated with their ability as free radicals scavenger based on DPPH analysis. The sorghum extracts were tested on mouse lymphocytes and cancer cells *in vitro* using cell culture and MTT methods. The result showed that sorghum extract enhanced cell proliferation of lymphocyte but inhibited proliferation of cancer cells. The level of cancer cell inhibition was depended on the concentration of sorghum extract that was added on cancer cell culture. Sorghum extracts inhibited proliferation of A 549 cancer cells ≤ 24 %, HCT 116 ≤ 22%, Hela ≤ 25 %, and Raji cancer cells ≤ 80 %. Sorghum flour activity was tested on BALB/c mice induced with azoxymethane (AOM) and dextran sulfate sodium (DSS). BALB/c mice (n = 24) were divided into 4 groups of 6. Group A is the standard negative control diet treated with cornstarch as the carbohydrate source. Group B is the positive control treated with standard diet, C is a group treated with source of carbohydrate from 50% sorghum and 50% cornstarch and D is the group treated with 100% sorghum. Group B, C, and D were intraperitoneal injection of AOM (10 mg/kg body weight), followed by 1% (weight/volume) DSS in drinking water for 7 days. The result showed that sorghum flour can inhibit carcinogenesis on the mice which were induced by AOM and DSS. The body weight and diet consumption of mice group B < C < D. Mice group diet with sorghum flour as 50% and 100% source of carbohydrate (C and D) showed higher levels on cancer inhibition based on the histopathological profile than the group without sorghum (B). The results were supported by the COX-2 expression that was observed by DAB immunohistochemical staining. It is assumed that phytochemical compounds and fiber in sorghum work synergically on the mice group diet with sorghum flour in inhibiting colon cancer.

Keywords: sorghum, phytochemicals, cancer, mice, AOM, DSS