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GELAM HONEY PROTECTS AGAINST RADIATION DAMAGE IN HUMAN DIPLOID FIBROBLASTS

Tengku Ahbrizal FTA¹, Zakiah J¹, Norfadilah R², Norimah Y³, Suzana M¹

¹Department of Biochemistry, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia

²Department of Biomedical Sciences, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia

³Division of Agrotechnology and Biosciences, Malaysian Nuclear Agency, Bangi, 43000 Kajang, Malaysia

Background:

Ionizing radiation has been found to induce lesion in the cells by triggering the formation of free radicals and altered cell antioxidant defence system. Although cell possess an effective antioxidant mechanism, the presence of free radicals may result in adverse effects especially when the defence mechanisms are overwhelmed. To overcome this problem, free radical scavenger is needed and previous study has shown that honey possessed antioxidant property. The aim of this study was to determine the antioxidant enzymes specific activities and gene expression of related enzymes in human diploid fibroblasts (HDFs) when exposed to gamma-irradiation. Furthermore, the ability of gelam honey to protect the HDFs from radiation damage will determine the role of honey as radioprotectant agent.

Materials and Methods:

HDFs were treated with 6 mg/ml of irradiated gelam honey for 24 hours pre-, during and post-exposure to 1 Gy of gamma-ray using Cobalt-60 machine with dose rate of 0.26 Gy/min. The antioxidant enzymes specific activities i.e. superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) were determined. The gene expression of related enzymes was determined by measuring the relative expression value (REV) of *SOD1*, *SOD2*, *CAT* and *GPx1* using quantitative real-time PCR (RT-PCR) analysis.

Results:

Our results showed that the activities of SOD, CAT and GPx decreased with exposure to 1 Gy of gamma-ray ($p < 0.05$). However SOD, CAT and GPx activities increased in HDF pre-treated with gelam honey. In addition, HDFs treated with gelam honey during gamma irradiation also showed increased SOD activity ($p < 0.05$). No similar effects were observed for the post-treated group. Similarly, *SOD1*, *SOD2*, *CAT* and *GPx1* were down regulated with exposure to gamma-radiation and up regulated in HDFs pre-treated with gelam honey ($p < 0.05$). During- and post-treatment with gelam honey however did not exert similar up regulation in antioxidant genes expression.

Conclusion:

Gamma radiation decreased antioxidant enzymes specific activities and down-regulated the expression of *SOD*, *CAT* and *GPx* genes in HDFs. Pre-treatment with gelam honey protects against radiation damage in HDFs as indicated by increased in

antioxidant enzymes activities and genes expression. This finding suggested that gelam honey can act as radioprotectant agent.

Keywords:

HDFs, enzyme specific activity, gene expression, gamma-irradiation