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The Inhibitory Effects of Heterotrigona Itama Honey Marinades on the Formation of Carcinogenic Heterocyclic Amines in Grilled Beef Satay

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Abstract

Heterocyclic amines (HCAs) are carcinogenic food toxicants formed in cooked meats, which may increase the risk of cancer development in humans. Therefore, in this study, the effect of stingless bee honey from different botanical origins on the formation of HCAs in grilled beef satay was investigated. HCAs concentration in grilled beef satay was determined by using high performance liquid chromatography (HPLC). In total, six of the most toxicogenic HCAs representing aminoimidazo-azaarenes (AIAs) (MeIQx, 4,8-DiMeIQx, and PhIP) and amino carbolines (norharman, harman, and AαC) groups were identified in all the beef samples investigated. A significant reduction in HCAs was observed in grilled beef marinated in honey as compared to beef samples marinated in table sugar (control), in which the reduction of 95.14%, 88.45%, 85.65%, and 57.22% was observed in gelam, starfruit, acacia, and Apis honey marinades, respectively. According to the partial least squares regression (PLS) model, the inhibition of HCAs in grilled beef was shown to be significantly correlated to the antioxidant activity (IC50) of the honey samples. Therefore, the results of this study revealed that the addition of stingless bee honey could play an important role in reducing HCAs in grilled beef.

Author keywords

antioxidant activity (IC50) botanical origin grilled beef heterocyclic amines (HCAs) partial least squares (PLS) stingless bee honey

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