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Probabilistic dietary based estimation of the burden of aflatoxin-induced hepatocellular carcinoma among adult Malawians

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Abstract

The risk of aflatoxin-induced hepatocellular carcinoma (HCC) among adults (average body weight of 60 kg) in Malawi was assessed based on aflatoxin B1 (AFB1) exposure through groundnut and maize consumption, by Monte Carlo simulation. The risk (cases per year per 100,000 people) of aflatoxin-induced HCC was estimated based on the AFB1 exposures estimated by this study and hepatitis B virus infection prevalence published for Malawi. AFB1 exposures were estimated by probabilistically combining data of AFB1 contamination in 338 groundnut and 604 maize samples with data of per capita groundnut and maize consumption in 274 households. Aflatoxins in the samples were analysed using validated LC-MS/MS, HPLC and VICAM based methods. The groundnut and maize consumption survey was based on household expenditure technique. The simulated mean AFB1 exposures through consumption of groundnuts, maize, and combination thereof were 28 ± 65 , 42 ± 174 , and 71 ± 211 ng/kg. body weight (bw)/day, respectively. The estimated HCC risks were 1.26 ± 2.72 , 1.86 ± 6.66 and 3.10 ± 6.85 cases per 100,000 persons per year, respectively. Further, hypothetical eradication of hepatitis B virus (HBV) reduced the risk of HCC by 78%. This reaffirms the need for integrating HBV vaccination in the fight of aflatoxin induced HCC.

Keywords: aflatoxin B1, maize, groundnut, dietary exposure, HCC, HBV, Malawi