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Dietary Exposure to Mycotoxins and Risk Assessment for Adult Consumers of Locally Processed Rice from Nigeria

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Abstract

Exposure to mycotoxins is associated with life threatening disease conditions. In this study, locally processed rice collected from five agro-ecological zones (AEZ) of Nigeria were analysed for some important mycotoxins by a liquid chromatography tandem mass spectrometric method. The data obtained was subsequently used to determine the probable dietary intakes (PDIs) and to carry out a risk characterisation of the mycotoxins. The range of mycotoxin contamination was between 0.27 ng g⁻¹ for sterigmatocystin and 464 ng g⁻¹ for zearalenone. The PDIs of the mycotoxins varied significantly ($p < 0.05$) across the zones and the mean national PDIs for total fumonisin (FBT), ochratoxin A (OTA), deoxynivalenol (DON), zearalenone (ZEA), sterigmatocystin (STE), beauvericin (BEA), nivalenol (NIV) and moniliformin (MON) was estimated to be 19.13, 1.50, 5.97, 157.36, 24.85, 15.19, 20.81 and 39.77 ng kg⁻¹ BW d⁻¹ respectively while that of aflatoxins was 5.20 ng kg⁻¹ BW d⁻¹. The mean national margin of exposure (MoE) to aflatoxin was 42.78 which was below 10000, thus indicating a public health concern. The co-occurrence of ZEA, STE, BEA and MON occurred most frequently and was about three and a half times more than the maximum % relevant tolerable daily intake (TDI). The study showed that daily intake of mycotoxins especially aflatoxins and zearalenone from the locally processed rice may predispose consumers to harmful health effects of mycotoxins. The continual monitoring of mycotoxin levels in rice will have significant impact on intervention strategies along the value chain.

Keywords: Aflatoxin, agro-ecological zone, probable daily intake, rice, zearalenone