

Monitoring of fungi producing aflatoxins, and dietary intake of aflatoxins in food consumed by Egyptian infants and young children

M.A.M. El-Sawi, S.A.M. El-Sawi

Acta Horticulturae 963: 221-230. 2012.

Abstract

Fungi producing aflatoxins B₁, B₂, G₁ and G₂ are common contaminants of cereals and corn-based products. A monitoring study of fungi producing aflatoxins in baby corn-based products was carried out in Great Cairo Governorate during the year 2008. One hundred (100) samples of cereal based product (50 samples of each are cereal-based infants food and corn-based snacks) were purchased from supermarkets and small shops. The samples were subjected to isolation and identification of fungi producing aflatoxins, five genera of filamentous fungi were isolated from the cereal-based infants food samples. The most fungi found in samples were *Aspergillus* spp. followed by *Penicillium* spp., *Alternaria* spp., *Fusarium* spp. and *Cladosporium* spp. and the numbers of contaminated samples were 18, 6, 2, 2 and 1 samples respectively. The same five genera were isolated from corn-based snacks samples, *Aspergillus* spp. was the most frequent and abundant genus and the number of contaminated samples was (23), then *Penicillium* spp. (10), *Alternaria* spp. (8), *Fusarium* spp. (6), and *Cladosporium* spp. (2). Prepared samples were extracted with methanol: water (80+20) and cleaned up with 0.5 g silica gel column while detection was with liquid chromatograph using fluorescence detector. Only samples which contain corn or maize were contaminated when the others were free from any detected amount of aflatoxins. Seven samples of 50 cereal-based infant food were contaminated with aflatoxin B₁ and total aflatoxins the mean minimum and maximum amounts were (1, 38, 0.54, 2, 22) and (2.42, 0.54, 6.9), respectively. However, the numbers of contaminated samples with B₂, G₁ and G₂ were 1; 3 and 2 respectively. Mean, minimum and maximum were (0.5), (1.66, 0.8, 2.98) and (0.9, 0.6, 1.2), respectively. The monitored corn-based snacks samples have corn as the main component in addition to different types of flavors including cheese, chili, peanut, tomato, salt,

ketchup, honey, kabab, par pique and spices that increase the numbers of contaminated samples with aflatoxins B₁, B₂, G₁, G₂ and total which were 17, 7, 9, 4 and 17 samples respectively. Also the means were high, they recorded 4.43, 0.51, 3.74, 1.55 and 6.7 µg/kg, respectively. However, the minimum were almost near to the data of cereal-based infant food (0.59, 0.51, 1.1, 0.92 and 0.59 µg/kg, respectively) but the maximum amounts were clearly higher (15.83, 2.01, 8.1, 2.42 and 18.84 µg/kg, respectively), thus according to the present study 12 samples of corn-based snacks surpassed the established limit (2 µg/kg) for B₁ with violation percentage 71%, and 7 samples surpassed the limit established for total aflatoxins (4 µg/kg) with violation percentage 41%. As a second tool of risk assessment, estimated daily Intake (EDI) and (EWI) of aflatoxin B₁ and total aflatoxins were calculated from the mean of contaminated samples of cereal based infant food. EDI and EWI of aflatoxin B₁ due to consuming cereals-based infant food by babies were 4.14 and 28.7 ng/kg b.w., however, EDI and EWI of total aflatoxins were 7.26 and 50.82 ng/kg b.w. Moreover, ratio percentages of EDI and EWI were calculated for only B₁, the calculated results were 41.40% for both, which means that the babies consumed 14-fold higher than the PMTDI that, subject babies to health risk. Also only EDI and EWI were calculated from the mean of contaminated corn-based snacks samples for total aflatoxins for babies, adolescent and adults and the results are for EDI (20.1, 8.37 and 5.58 ng/kg b.w./day, respectively) and for EWI (140.7, 58.59 and 39.06 ng/kg b.w./week, respectively). While EDI and EWI were calculated with aflatoxin B₁ and the values are, EDI (13.29, 5.54 and 3.69 ng/kg b.w./day, respectively) and EWI (93.07, 38.78 and 25.83 ng/kg b.w./week, respectively). Ratio percentages of EDI and EWI were also calculated for aflatoxin B₁ and the percentages are 8860, 3693 and 2460%, respectively.