ASSESSMENT OF ADULTS AND CHILDREN EXPOSURE TO PESTICIDE RESIDUES THROUGH APPLE CONSUMPTION

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Abstract

Nutritionists recommend changing people's dietary habits and increasing the prevalence of fruits and vegetables in the human diet because of the numerous benefits they provide in preventing weight gain and improving the situation of people suffering from chronic diseases. But as their dietary prevalence increases, exposure to pesticide residues that have a significant impact on human health also increases. An acute and chronic risk assessment was performed as part of this research, regarding children and adults exposed to pesticide residues through fresh apples consumption.

Representative samples of apple were collected from areas of Resen region. Apple pesticide residues were analyzed with ultra-performance liquid chromatography-triple quadruple mass spectrometry (UPLC-TQ/MS) and extracted with QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) method. Risk assessments were performed using the established Acceptable Daily Intake (ADI) and the Estimated Daily Intake (EDI).

After statistical processing of the data, the results show that in the chlorpyrifos EDI of children is 1.5 x 10^{-3} - 3 x 10^{-3} mg x day^{-1} and for adults, it is 3.8 x 10^{-4} - 7.6 x 10^{-4} mg x day^{-1}. Children have a 153% hazard quotient (HQ) for chlorpyrifos, while for adults it is 38 - 76%. The average trifloxystrobin content is 0.05 mg/kg, with an 1.6 x 10^{-4} - 8.0 x 10^{-5} mg x day^{-1} EDI in adults and 3.3 x 10^{-4} - 6.6 x 10^{-4} mg x day^{-1} in children. Trifloxystrobin HQ for adults ranges from 0.08 to 0.16% and for children is 0.33 to 0.66 % of the ADI. Fenbuconazole concentration ranges from 0.01 - 0.07 mg/kg, and the EDI for adults is 5 x 10^{-5} mg x day^{-1} and in children it is 2 x 10^{-5} mg x day^{-1} for consumption of 100 g apples. Long term exposure to fenbuconazole for adults is 0.83 - 1.66%, and in children 3.33 - 6.66% of ADI's. A preliminary long-term exposure assessment for the detected pesticides in apples showed that HQ was in the range of 0.08 - 300% of the ADI's.

After statistical processing of the data, the results show that in the chlorpyrifos EDI of children is 1.5 µg x day^{-1} and for adults, it is 0.37 - 0.75 µg x day^{-1}. Children have a 150% hazard quotient (HQ) for chlorpyrifos, while for adults it is 37 - 75%. The average trifloxystrobin content is 0.05 mg/kg, with a 0.08 - 0.1 µg kg^{-1} x day^{-1} EDI in adults and 0.33 µg x day^{-1} EDI in children. Trifloxystrobin HQ for adults ranges from 0.08 to 0.1% and for children is 0.33% of the ADI. Fenbuconazole concentration ranges from 0.01 - 0.07 mg/kg, and the EDI for adults is 0.05 - 0.1 µg µg x day^{-1} and in children it is 0.02 µg x day^{-1}. Long term exposure to fenbuconazole for adults is 0.83 - 1.66%, and in children 0.333 - 66% of ADI's. A preliminary long-term exposure assessment for the detected pesticides in apples showed that HQ was in the range of 0.08 - 150% of the ADI's.

The results indicated that apple consumption with chlorpyrifos residue represents a risk for children's health and monitoring of pesticide residues must be recommended to improve food safety and protect the consumer.

Key words: *Risk assessment, Apple, Nutrition, Pesticide residues.*