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Title: Ochratoxin A in milk, urine and serum, and zearalenone in urine of lactating women

Key words: Mycotoxins, ochratoxin A, zearalenone, milk, urine, blood serum

Abstract:

The subject of the research described in this dissertation was the analysis of the frequency and amount of occurrence of ochratoxin A in milk, urine and blood serum samples and of zearalenone in the urine of lactating women.

An additional aim of the study was to determine possible correlations between the presence of mycotoxins (ochratoxin A and zearalenone) and the diet of women in the study group. Moreover, the author investigated the correlation between the presence of ochratoxin A in breast milk and the basic perinatal information such as the length of pregnancy, the weight of the newborn, the mother's age, the type of feeding (direct breastfeeding or pumped milk feeding) or tandem feeding (simultaneous feeding of more than one child). Another object of the study was to determine the composition of breast milk and its correlation with the occurrence of ochratoxin A in it. Additionally, the effect of pasteurization of breast milk on the occurrence of ochratoxin A in it was determined. The microbiological purity of breast milk from donors in the Breast Milk Bank, who partly constituted the research group (19 donors out of 60 women examined), was also tested. The composition of breast milk and its correlation with the occurrence of ochratoxin A in it were analyzed, and the effect of pasteurization of breast milk and its influence on the occurrence of ochratoxin A in it were determined.

Breast milk banks are institutions that collect breast milk from lactating women (who become donors after passing examinations to rule out certain diseases and after passing a health examination). Since this milk is given to children, who are often born prematurely or ill, it is extremely important that the food they consume is as safe as possible for nutritional therapy. In addition, children, due to their faster metabolism, are more susceptible to certain harmful substances. Mycotoxins can be considered as one of such factors. Analyzing the mechanism of their penetration into human organisms, it should be noted that after the consumption of contaminated food by a woman, mycotoxins can get into her milk, and with the milk into the body of the child. Ochratoxin A and zearalenone are mycotoxins found almost worldwide. The

prevalence of ochratoxin A and zearalenone in the environment and their toxicity (especially affecting newborns) were the motivation for the present study.

The study material consisted of 60 breast milk samples, 60 urine samples and 60 blood samples. Each of the 60 women completed a questionnaire regarding her general health and diet. The questionnaire included foods commonly recommended for breastfeeding women whick could potentially contain ochratoxin A or zearalenone and adapted to the diet of breastfeeding women. To study the influence of pasteurization of breast milk on ochratoxin A occurrence in it, milk samples were collected from 23 donors from the Breast Milk Bank in Toruń.

Ochratoxin A in milk and urine was determined by liquid chromatography with fluorescence detection (HPLC - FLD), while liquid chromatography coupled with double mass spectrometry (LC MS/MS) was used to determine ochratoxin A in blood serum and zearalenone in urine. The composition of breast milk was determined at the Breast Milk Bank in Toruń using the MIRIS breast milk composition analyzer.

The study showed the presence of ochratoxin A in 4 breast milk samples with a maximum level of 0.0180 ng/ml, in 40 urine samples with a maximum level of 0.1170 ng/ml and in all 60 blood serum samples with values ranging between 0.0820 ng/ml and 0.8050 ng/ml. In addition, the study revealed the presence of zearalenone and its major metabolites in all urine samples tested. . ZEN value ranged from <0.006 ng/ml (<LOD) to 0.48 ng/ml, α-ZEL from <0.012 ng/ml (<LOD) to 0.668 ng/ml, β-ZEL from <0, 015 ng/ml (<LOD) to 0.0441 ng/ml, α-ZAL from <0.012 ng/ml (<LOD) to 0.08 ng/ml, and ZAN from 0.07 ng/ml (<LOD) to 0.055 ng/ml.

These considerations allowed the author to draw the conclusion that the examined body fluids of lactating women constituting the research group are to a small extent contaminated by the examined mycotoxins - ochratoxin A and zearalenone, and their amount does not differ significantly from the results of studies conducted all over the world. Women's milk is safe for nutritional therapy Additionally, the author concluded that the pasteurization process of breast milk does not affect the occurrence of ochratoxin A in it, while higher ochratoxin A concentrations were observed in milk that contained a higher amount of protein (total and nutritional). Unfortunately, due to lack of comparative data, it is difficult to estimate the correlations of ochratoxin A occurrence in body fluids with anthropometric, social data, tandem feeding, or perinatal information.