Melamine Contaminated Food: Serious Threat to Our Health

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Commentaries

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Recently, an outbreak of kidney stones affected 6240 infants in China, with 4 deaths. The cases increased rapidly to 53,000 with 12,900 cases hospitalized.[1–3] The outbreak was first reported by WHO on 18 September 2008, while the cases were detected a long time before,[1] i.e. since December 2007.[3] The report was finally submitted to WHO after a New Zealand company, the Fonterra, as one of the share holder of the Sanlu group (one of the manufacturer of the contaminated infant formula), has reported the case to New Zealand authority.[4]

To WHO, the Ministry of Health of China confirmed that the outbreak was related to melamine-contaminated infant formula.[1,2] China's national inspection agency found that some of the 22 dairy manufacturers' products were proven to contain melamine with levels varied between 0.09 mg/kg and 2.560 mg/kg.[1]

The melamine (C3H6N6), which has 6 nitrogen atoms, was intently added to falsely increase the protein content,[5] as protein content was analyzed by measuring nitrogen level. The worst, the melamine added was supposed to be the cheap one that contained melamine contaminants such as cyanuric acid.[6] Coexistence of melamine and cyanuric acid will form insoluble crystals that obstruct the distal and collecting tubules of the kidney, and finally lead to renal failure.[7] To diagnose melamine ingestion, a method has been developed to analyze melamine and its contaminants (ammeline, ammelide, and cyanuric acid) using high-performance liquid chromatography/tandem mass spectrometry. The method was shown to detect melamine and its contaminants in fresh as well as paraffin-embedded tissue.[8]

Further, Singapore reported the finding of melamine in dairy products imported from China,[2] and WHO announced that two China companies exported their dairy products to Bangladesh, Burundi, Myanmar, Gabon and Yemen. Though melamine contamination in those products was unconfirmed, a recall was ordered from China.[1]

Globalization diminishes the boundaries between countries, and food can be imported or exported from and to anywhere in the world. China exports huge amount of food, but their exported food was proven to be unsafe at least for milk and dairy products, and vegetable protein concentrates.[1–4,6,7,9] The concentrates (wheat gluten, rice protein, and corn gluten) were used to make pet food by several major commercial pet food companies in Canada and caused an outbreak of nephrotoxic renal failure in dogs and cats in 2007.[7] Actually, the contaminated wheat gluten that caused the outbreak in 2007 was a human food–grade product,[7] which might be used to make food products for human. Therefore, people that consumed a sub lethal amount of melamine in the food product might develop chronic renal obstruction that might either resolve spontaneously, or develop into a renal failure without knowing the cause, though no such incident in human was reported at that time.

In addition to legal export and import activity, illegal activities might be present especially in developing countries. Exporting of an imported product to a secondary destination might happen, and tracing the first source of the imported product might be difficult. Difficulties in tracing the source of an imported product are supported by an incident in Panama in 2006. In the incident, cough syrups were contaminated by diethylene glycol and killed 21 people.[10] Later, the number of the victim rose to 120, and the source

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of the toxic material was revealed. It was China that sold the glycerin labeled diethylene glycol to a Spanish company, which later sent it to Panama.[11]

Health hazards due to melamine contaminated food might be extended to other than milk and dairy products, as contaminated vegetable protein concentrate might be added to farm-animal feeds. Experimental feeding using combination of melamine and cyanuric acid was proven to cause both chemicals to be present in edible tissues of fish.[12] Therefore, threat to our health might also come from other farm products, where the animals are fed using contaminated feeds. Indeed, recently in Hong Kong melamine was found in eggs imported from China, and it was due to melamine contaminated poultry feed.[13]

Codex alimentarius commission for diary products has published a standard operating procedure in relation to food safety testing. However, melamine is not included as the chemical contaminant to be tested.[14] Therefore, as a preventive measure, it is urgent to update the standard operating procedure, and to disseminate it to all countries to avoid more victims.

Recently, the FDA has developed standard protocols to test melamine and cyanuric acid in infant formula.[15] However, as melamine contamination may be extended to other food products, the standard protocols should be revisited once more.

In conclusion, globalization may cause spreading of health hazard due to contaminated food. Therefore global preventive measures should be initiated.

Disclosure

The author reports no conflicts of interest.

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