Essential and Toxic Metals in Canned Food in Lebanon: Impact of Metal Cans

Samira Ibrahim Korfali[1] and Weam Abou Hamdan[2]

[1] Natural Science Department, Lebanese American University, E-mail: skorfali@lau.edu.lb
[2] Natural Science Departments, Lebanese American University, E-mail: weam_abou_hamdan@hotmail.com

Canned food is popular food sources all around the world, because they are inexpensive and affordable. For most people, the main route of exposure to toxic elements is through the diet. Food safety is a worldwide major public concern, and the increasing worry about food safety stimulated research regarding the risk associated with the consumption of food contaminated by heavy metals. The ingestion of fresh or canned food is an obvious cause to exposure to metals, not only because many metals are natural components of food stuffs, but also due to environmental contamination and contamination related to food packaging and processing. Trace metals are significant in nutrition either for their essential nature or their toxicity. Iron, copper and zinc are essential micronutrients consumed in adequate amounts, but these same essential metals become toxic when consumed excessively. In contrast Cd, Pb, and Hg are toxic metals. They are harmful at low concentration and they are not easily biodegradable. Metallic cans are generally composed of tinplate and/or aluminum. The use of tinplate will ultimately result in some tin dissolving in food. Aluminum is also widely used in food contact material such as cans and can ends. Additionally, other metals like Fe, Cr, Cu and Zn might leach into food especially in non-lacquering steel containers. Lead might exist in canned food stuff due the leaching from the soldering materials. The objective of this study is to assess metal content of different canned food types local and imported sold in Lebanese market and the impact of metal cans on food quality. Forty five samples of canned food of different types, brands, and different manufacturing countries were purchased from local supermarkets. The metals in cans were determined by ED-XRF technique, while metals in food were analyzed after digestion and consequent metal analysis (Fe, Cr, Cd, Cu, Zn, Pb by Thermal AAS technique; Al, Sn, As, Hg by ICP-MS). The statistical analysis of the data was performed using SigmaStat statistical package software. Results indicated that Fe has the highest percentage of metals in cans, some cans the % of Al was comparable to Fe and 50% of cans had Sn up to 12%. The analysis of variance (ANOVA) of each metal indicated statistically significant difference of metal levels in the different food categories, except for Cr. In food Fe, Zn, Cu, Al, and Sn levels were below the international permissible levels. But in some canned vegetables Sn levels were close to EU permissible limit. Furthermore, a correlation existed between levels of Sn and Al in cans and respective food indicating leaching of Sn and Al from metal cans into food. The concentrations of Pb and Hg (toxic metals) in canned food were below PTWI levels. While, 31 % of canned vegetables and legumes samples (40 % of these manufactured in Lebanon), and 45% of canned fish samples had Cd concentration levels above the EU permissible (0.1 µg/g). This finding necessitates continuous monitoring of Cd levels in canned food for providing citizens with safe food.