



## Bisphenol A and Melamine: The Toxins of the Modern Civilization

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Received: April 25, 2022

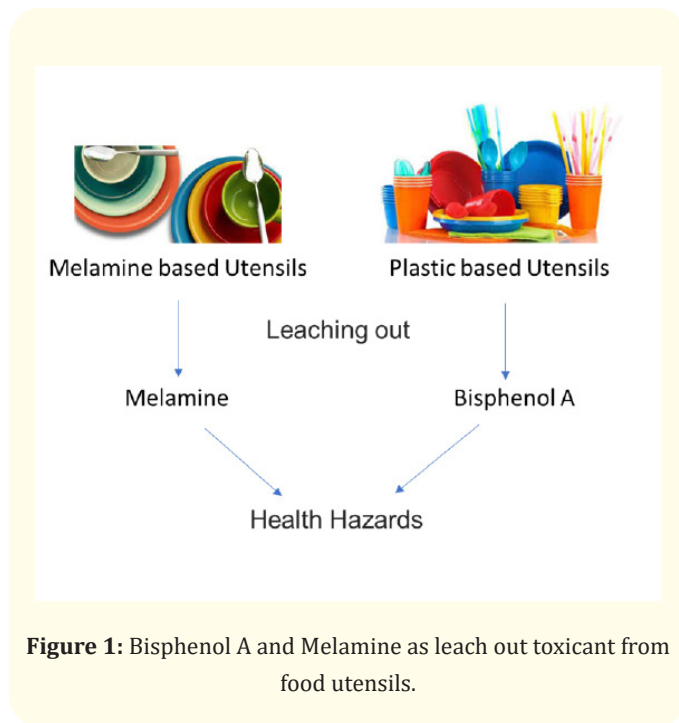
Published: April 29, 2022

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Bisphenol-A is one of the most common chemicals produced in the highest volume worldwide with over 6 billion pounds production annually [1]. It is a synthetic chemical used in the manufacturing of polysulfone, polycarbonate, polyacrylate, epoxy resins, flame retardant tetrabromobisphenol-A and polyvinyl chloride plastics [2]. The polymers like polycarbonate and epoxy resins are dangerously associated with food items as they are used in food containers, reusable plastic bottles, baby feeders, dinner wares and internal coating of packaged food cans [3]. Today, the use of these polymers is not only limited to food industry but has extended to medical and dental devices, building materials, thermal papers, sunglasses, CD-ROM etc [2]. The production and usage have been so high that Bisphenol A is now ubiquitously present in the environment and a study has estimated that over 90% of people have considerable levels of Bisphenol A in the body [4]. The widespread exposure of Bisphenol A has made it a major health threat due to its potential toxicity in humans. Accumulating evidence suggests that Bisphenol A causes endocrine toxicity by mimicking estrogen compounds and disrupts circulating levels of hormone [5]. It is also reported to accumulate and severely affect vital organs like Kidney, testis, brain, heart, liver and pancreas [6-11]. Further there are reports that oxidative stress and mitochondrial dysfunction may be underlying cause of Bisphenol A associated toxicity. Among several sources of Bisphenol A exposure, foodstuff are considered as the primary one [12]. Bisphenol A may leach out from the food cans and contaminate the food item which are then ingested by humans. For example, a study reported that water incubated in polycarbon-

ate plastic bottle at room temperature for 5 days have 0.234 ng/ml (~1 nM) of Bisphenol A and the levels got elevated when hot water was used [13]. Further, Bisphenol A based food containers are often heat sterilised or heated before use which may increase the leaching process and worsening the condition.

Now, the increasing research study on the toxic effect of Bisphenol A is demanding the use of alternative plastic wares. One of the major alternative suggested is melamine based plasticwares. However, melamine is also a toxic chemical widely known as a culprit in Chinese milk scandal [14]. Melamine or 1,3,5-triazine-2,4,6-triamine is a common food adulterant and adversely affect all the organs especially kidney [15]. Its acute exposure is known to cause nephrotoxicity in humans. The illegal adulteration of raw milk used for infant formula, feed for livestock and poultry fish feeds with melamine has resulted in illness and demise of infants and animals due to the nephrotoxicity [16]. With the melamine based plasticwares proposed as alternative to Bisphenol A based plastic wares, there is a high chance that similar to Bisphenol A, melamine may also leach out for the food container and contaminate the food items. Infact, a study reported that there is continuous migration of formaldehyde and melamine from melamine-based utensils takes place throughout the lifetime of these articles [17]. So, research studies must focus on finding an alternative of bisphenol A and melamine based plastic wares and mankind must avoid the usage of these hazardous chemical-based utensils.



**Figure 1:** Bisphenol A and Melamine as leach out toxicant from food utensils.

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