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Opinion

Non-Thermal Decontamination of Food

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Opinion

In today's generation the demand of fresh food with absence of harmful micro-organisms is increasing with world-wide awareness of the health benefits and risks associated with consumption of food. Meeting consumers' expectation is necessity of the food industry. Food borne illness as a result of either post contamination or inefficient processing of food with pathogenic bacteria is a world-wide concern in this millennium. The European Food Safety Authority (EFSA) reported and documented *Salmonella* as the most common cause of food-borne outbreaks in the EU 3. Numbers of outbreaks of foodborne diseases due to *salmonella spp*., *L. Monocytogens* and *E. coli* have been reported and documented worldwide which caused loss of many lives in last few decades. United States Centers for disease control and prevention, reported that two-thirds of foodborne illness is caused by human enteric viruses i.e. nor virus (NoV), hepatitis A and E.

So, questions arise about production of safe food and decontaminated food with scrutinized materials and reduction or elimination of harmful micro-organisms with advanced post-processing will be beneficial? Now, on subject of advanced technologies, many have been developed or being in development stages by the industries. Most of the techniques involves heat treatment, though heating is one of the best way to kill the harmful micro-organisms but application is limited when think about on other aspects like keeping nutrient safe and where food is packed or in case contamination is happening during storage and transportation. To overcome all this kind of problems the food industry scientist and technologist worked hard for producing fresh like products from technologies like High Pressure Processing (HPP), Pulsed Electric Field (PEF), Ionizing Radiation (IR), Ultra-Sonic and Thermosonication (US/UT), Pulsed Light (PL). These technologies are designed to produced safe food with fresh like nutritional and sensorial attributes. Destruction of bacteria through almost all techniques is mostly occurred due to damage of DNA of bacterial cell. The efficacy against the pathogenic and spoilage foodborne micro-organisms is reported satisfactory. But sometimes these treatments only damage the cells not destruct.

Destruction in HPP involves exposure of food to high hydrostatic pressure up to 1000MPa. PEF treatment is basically application of high voltage pulses of 80KV/cm for a very short duration. Irradiation is done by giving 2-10kGy doses to food. Ultra sound treatment is by generating high sound waves of 10-15kHz in food and PL is a sterilization cum decontamination technique for inactivating surface micro-organisms on foods, packages and equipment with high light energy.

However, many inactivation studies of pathogens were reported on juices, fruits & vegetables, fish, meat, milk & milk products. Studies reported on how various parameters and operating conditions of different technologies effect the micro-organisms inactivation. In case of HPP 6.5 to 8.2 log reduction of *salmonella* spp. at 600MPa for 10 min (21.5 °C) in UHT milk and 7 log (20 °C) reduction in orange juice was reported [1-4]. Also, HPP established its importance in inactivating hepatitis virus and feline calicivirus in shellfish. The most heat resistant spore i.e. *C. boltulinum* was also reported inactivated at 500-700MPa. Similarly, PEF has showed good effect in inactivation of *S. Enteritidis* in melon juice and many other fruit juices. 4.27 log and 3.75log reductions were observed at 2000μs (100Hz) and 1250μs (175Hz) [5]. Electron beam of 2kGy inactivated the *S. typhimurium* by 3.78 log in sliced ham [6,7]. PL of 1000 pulses for 200 reduced viability of *S.typhimurium* and *L.monocytogenes* when inoculated on the surface of chicken with 2-2.4CFU/ml [6]. Also, murine norovirus and Tulane virus were positively inactivated by PL [4]. Ultrasonication treatment for juices have been deeply investigated and reported success against inactivation of *E.coli, S. enterica serotypes, L. monocytogenes*. The application of all technologies not just applicable to food and food surface but successful studies were also investigated on the surface in contact with food like stainless still contains, packaging materials and knives. Inactivation was done by pulsed light and UV light mainly for decontamination through any micro-organism like *E.Coli, Aspergillus niger, Aspergillus repens. L. monocytogens.*

So, now when there are uncountable applications, studies and effects of all processing technologies have been reported then why there are still issues in commercial applications. Where the industries and technologist are lacking? Still most of the industries are following traditional methods for treating and processing of food with better conditions. Opting for novel technologies are still

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looks problematic. Studies are required for large number of samples and for different stages of processing with high output rates. In short non thermal techniques have huge industrial potential for decontamination of food and food processing equipment's. Commercially energy saving, convenient and product friendly non-thermal techniques can be explored for more micro-organisms which causes foodborne disease by getting in contact with food at different stages of food chain.

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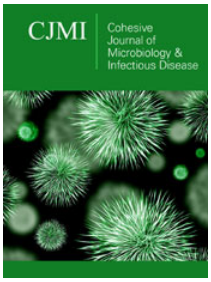

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