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Using LEDs to destroy salmonella

NUS study found the blue light could kill most of the bacteria cells in orange juice

Carolyn Khew



The team of scientists that did the study was headed by Prof Yuk (far left) and Dr Ghate. The study findings were published in April this year in the Journal Of Food Protection. PHOTO: DANIEL NEO FOR THE STRAITS TIMES

In the future, fruit-juice dispensers could be fitted with blue light emitting diodes (LEDs) to stave off the nasty salmonella bacteria that makes you sick.

A study has revealed promising results with LEDs showing an ability to kill strains of salmonella bacteria in unpasteurised orange juice.

Heading the team of scientists that did the study was Assistant Professor Yuk Hyun-Gyun and his former PhD student, Dr Vinayak Ghate, who graduated from the Food Science and Technology Programme at the National University of Singapore (NUS) last month.

Researchers used LEDs of wavelength 460 nanometers to illuminate orange juice that was artificially contaminated with five strains of salmonella. It was then observed that the lights could kill off almost all the salmonella cells. When the bacteria absorbs the blue LEDs, it sets off a process where free radicals are produced to break down the bacterial cells, explained Prof Yuk.

"It took about four to 11 hours to kill 99.9 per cent of salmonella in the orange juice at different temperatures," said Prof Yuk, who added that a longer time was needed to kill the bacteria under conditions which were below room temperature. "Right now there is no other technology that can kill off the bacteria in juice dispensers. Refrigeration merely prevents the bacteria from growing."

The study findings were published in April this year in the Journal Of Food Protection.

Food science experts said that bacteria can grow easily in fruit juice unless it is pasteurised or treated using heat. Refrigeration merely stops the bacteria from growing but does not kill it.

Salmonella bacteria can cause vomiting, diarrhoea and even typhoid fever very soon after it enters the body. There are more than 1,000 species of salmonella and some strains have been identified in outbreaks involving orange juices, said Dr Desmond Wai, a gastroenterologist at Mount Elizabeth Novena Hospital.

"But overall, salmonella outbreaks from juices are still rare and most salmonella outbreaks are caused by contaminated meat or vegetables," said Dr Wai, adding that salmonella can contaminate ice and fruits, among others.

But while the approach of using blue LEDs is interesting, Professor William Chen, director of Nanyang Technological University's Food Science and Technology Programme, said that further investigations would be needed to see if it can be adopted on a commercial scale. "Currently, most fruit juices are pasteurised (short-time heating at high temperature to inactivate bacteria and other pathogens) before reaching retail shelves, and the proportion of unpasteurised juice remains relatively small," he added.

Dr Ritu Bhalla, senior manager at Republic Polytechnic's School of Applied Science, said that heat pasteurisation can affect the taste and colour of orange juice.

In the meantime, food science experts say that, to minimise bacterial contamination, consumers should look for pasteurised fruit juice, adopt proper handling practices and avoid leaving fruit juice at room temperature for too long.

Dr Ritu added: "Consumers need to be vigilant and any change in colour, appearance or taste, irrespective of the expiry date, should be taken as a warning sign."

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