Developing a Spectroscopy Technique to Determine Nitrate in Milk, which can be used as Confirmatory Test for Water Adulteration

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Cow milk contains numerous nutrients, therefore, it is identified as one of the most important food nutrient source besides breast feeding for infants and babies. Additionally, it is a good source to fulfill the nutrients for adults to meet their body requirements. However, farmers augment milk with water to surge the quantum of yield to get a better income. To mitigate the issue and to maintain the quality of milk, a simple spectrophotometric method was developed to assess the nitrates in milk and to use as a confirmatory test for water adulteration. Preliminary test was conducted at Veterinary Research Institute, Gannoruwa with thirty total milk samples (n=30) from Kandy district. It was observed that in15 ordinary milk samples,nitrate concentration ranged from lOppm 4Oppm. Whereas, pre identified water adulterated 15 samples gave nitrate concentration more than 4Oppm. The concentrations were statistically analyzed using paired t-test with a hypothesis to identify the nitrate difference of ordinary milk and water adulterated milk, this gave ap value of 0.000 which is less than 95% significance level and can conclude that with the water adulteration nitrate concentration in milk samples increase. Correlation between water adulteration and nitrate concentration was identified using Pearson Correlation. As a preliminary step Jaffna deep well water (130.0ppm) and Anuradhapura deep well water (20.18ppm) were added to a nitrate concentration known milk sample (28.96ppm). For Jaffna well water there was a strong positively correlation (R= 0.995). However for Anuradhapura well water, there was a negative correlation (It= -0.898). According to the present study, we were able to identify that, nitrate concentration in milk changes with water adulteration. Therefore, this method can be used as an accurately and prompt method to determine water adulteration in milk. Nitrate has an impact on human health as it is carcinogenic and also can cause bluebaby syndrome in babies. Therefore this technique can be used to determine nitrate in milk throughout the country, with that the government can make a Sri Lankan standard for the nitrate amount in fresh milk.

Keywords: Nitrate, Cow Milk, Spectrophotometer, Water adulteration