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Assistant Professor Dr. Theeranat Suwanaruang
Kalasin Rajabhat University, Thailand

Dear author(s),

We are pleased to inform you that your paper entitled FORMALIN CONTAMINATION IN FRUITS AND VEGETABLES AT KALASIN FRESH MARKET, THAILAND has been double-blind peer reviewed and accepted for presentation at the Prachachuen Research Network International Conference in Bangkok, 28 May, 2015. The paper will be included in the conference proceedings that will be posted on the conference website shortly.

Do not hesitate to contact us if you have further questions on the paper or the conference. Thank you for your contribution to the conference.

Best regards,

Dolly Samson, Ph.D.
Program Chair
ABSTRACT
Formalin is also used for preserving and including fresh vegetables and fruits. Formalin is dangerous for children and older people are affected easily and badly. Ministry of Public Health issued Act No.151 (B.E.2536) specified the use of formalin in food is prohibited. The aim of this study was detected formalin in fruits and vegetables at Kalasin fresh market. The method was random fresh fruits and vegetables samples that sold in the morning market. Target samples were tomato, green onion, small green grape, Chinese bamboo shoot, lettuce, parsley, canton, Chinese broccoli, celery, ocimum, dragon fruit, orange, big purple grape, small purple grape, apple, banana and long-kong. The chemical analysis used formalin test kit from department of medical science. Sensitivity of test kit detection limit was 0.5 mg/kg (ppm). The results found that four samples were contaminated with formalin such as small green grape, apple, big purple grape and small purple grape. Nonetheless, formalin has still been found in many kinds of foods. The rapid screening on formalin should be applied to control the use of this toxic substance.

KEYWORDS: Formalin, fruits. vegetables, fresh market and Kalasin
by the inhalation route (nasopharyngeal cancers and sinonasal cancers) (W. Claeyse et al., 2009).

Characteristically, formaldehyde is a colorless, strong-smelling, irritating, poisonous, and flammable gas and its chemical formula is CH₂O which is also known as methanol, commonly produced by the oxidation of methanol. However, for fresh fish, the permitted amount of formaldehyde presented in fish is not specified. Formaldehyde does not accumulate in the fish tissues due to subsequent conversion of formaldehyde to other chemical compounds. Besides natural formation of formaldehyde in fish and seafood by enzymatic reaction, other biochemical reactions can also occur such as oxidation of lipids as a result of microorganism activities. This will eventually result in physical damage of fish or production of chemical metabolites such as biogenic amines or other unpleasant compounds (Noordiana, N, et al., 2011).

The additive formaldehyde is an aqueous solution containing 35% formaldehyde and 14% methanol. It is intended for use in all animal species at concentration between 200 and 1,000 mg formaldehyde (active substance)/kg complete feed. Free and reversibly bound formaldehyde, when ingested, is readily absorbed in the gastrointestinal tract and joins the pool of endogenous formaldehyde. It is rapidly oxidised to formic acid, which enters the one-carbon pool of the body and is further oxidised to carbon dioxide and water. The additive contains also methanol, which is oxidised to formaldehyde (European Food Safety, 2014).

Although formaldehyde is a natural metabolic product of the human body, high-dose exposure increases the risk of acute poisoning, while prolonged exposure can lead to chronic toxicity and even cancer (IARC, 2006 and Xiaojiang Tang et al., 2009).

Fruits and vegetables are highly nutritious and form as key food commodity in the human consumption. They are highly perishable due to their low shelf life. These food commodities are reported to be contaminated with toxic and health hazardous chemicals. The aim of this study was detected formalin in fresh fruits and vegetables at Kalasin fresh market, Thailand.

2. MATERIAL AND METHOD

Sampling Method
The method was random fresh fruits and vegetables samples that sold in the morning. The target samples were tomato, green onion, small green grape, Chinese bamboo shoots, lettuce, parsley, cantt, Chinese broccoli, celery, ocimum, dragon fruit, orange, big purple grape, small purple grape, apple, banana and long-kong.

Chemical Analysis Method
The chemical analysis used formalin test kit of department of medical science. Sensitivity of Test Kit detection limit was 0.5 mg./kg (ppm). Sample preparation and analysis: Liquid sample, pour 5 mL sample in beaker. If sample is solid, rinse sample with 10 mL water and pour rinsed-water into beaker. Drop 1 mL Formalin reagent 1 and mix. Drop 1 mL Formalin reagent 2 and mix. Next, drop 1 mL Formalin reagent 3 and mix. Formalin reagent 3 is acid, rinse with water and soap if spill to skin or body. Interpretation: If the solution turns to pink-red, food sample is contaminated with formalin.

3. RESULTS AND DISCUSSION

Four samples were contaminated with formalin such as small green grape, apple, big purple grape and small purple grape. Fourteen samples were not contaminated with formalin such
as tomato, green onion, Chinese bamboo shoot, lettuce, parsley, canton, Chinese broccoli, celery, ocimum, dragon fruit, orange, banana and long-kong.

Consumption of formalin contaminated food is health hazard. Ministry of Public Health issued Act No.151 (B.E.2536) specified the use of formalin in food is prohibited. Formalin has still been found in many kinds of foods. The rapid screening on formalin should be applied to control the use of this toxic substance. Health impact consuming formalin contaminated food causes abdominal pain, vomiting, diarrhea, unconscious, or even death. Target Sample were fresh vegetables and fruits. Sensitivity of Test Kit Detection limit was 0.5 mg/kg (ppm).

Formalin is widely used as a disinfectant in many human medicines, cosmetics, antiseptic in veterinary drugs, in fungicides, textiles and embalming fluids (P. Feick et al., 2006 and Md. Faruque Miah et al., 2013). Formaldehyde is a carcinogen by inhalation. While local irritation is expected to strongly promote carcinogenesis, lower local concentrations of formaldehyde are known to produce DNA adducts. Moreover, on the basis of the present knowledge, a causal association between formaldehyde exposure and leukaemia cannot be ruled out. The FEEDAP Panel estimated the oral intake of formaldehyde of consumers from food of animal origin to be 4 mg per person per day. A reliable additional exposure of consumers to formaldehyde from supplementing feeding stuffs cannot be calculated. (European Food Safety Authority: EFSA, 2014).

Formalin has been used as preservatives in fish, seafood fresh vegetable and fruits to prevent microbial spoilage and prolong the storage time by fishermen or traders before distribution and marketing the fish to consumers. Moreover, it affected the food qualities such as unacceptable texture, undesirable flavour, odour, colour and can even be harmful to consumers as formaldehyde residues are retained in the fish muscles although it has been roasted, cooked and boiled (Nur Indang Marzuki et al., 2012). However, chemical contamination is still one of the most significant sources of food borne diseases (Jianrong Li, et al, 2007). Recently, few media reports have brought increased attention to the problem of wholesalers and venders treating fish, meat, fruits and vegetables with formalin for long shelf life, which is harmful to human health and continuous using this contaminated food can develop respiratory and neurological problems, along with cancer, liver cirrhosis, kidney, lung, allergy, asthma and other health hazards (P. F. Ross, H. Draayer and O. Itoh, 2002).

4. CONCLUSION

Fourteen samples (77.78%) were not contaminated with formalin such as tomato, green onion, Chinese bamboo shoot, lettuce, parsley, canton, Chinese broccoli, celery, ocimum, dragon fruit, orange, banana and long-kong. Only four samples (22.22%) were contaminated with formalin such as small green grape, apple, big purple grape and small purple grape.

The toxicity of formaldehyde is well known, but their effects on reproduction and development have received little attention (Md. Faruque Miah et al., 2013). Formalin is still one of the most effective and widely used compounds in fish culture for therapeutic and prophylactic treatment of fungal infection and external parasites of fish egg. Considerable information is available on the shelf life of fish under various storage conditions by determining organoleptic and physical characteristics (M. M. Rahman, et al, 2012). Formaldehyde through the edible items in human body may cause uncontrolled cell growth or cancer in any part of body like stomach, lung and respiratory system P. F. Ross, H. Draayer and O. Itoh., 2002).
5. REFERENCES


