



Formaldehyde in Fruits at Local Markets in Kalasin Thailand

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Abstract

The main objective was to investigate the province of Kalasin's formalin-contaminated fruit supply. The approach was used to measure the formalin concentration in four fruit varieties: bananas, oranges, green apples, and red apples. obtaining samples from the four Kalasin markets in the area. The formalin levels in different fruits and vegetables were found to range from 6.4 ppm in bananas (n=10) to 2.2 ppm in oranges(n=10) to 5.8 ppm in green apples(n=10) to 2.5 ppm in red apples(n=10), according to the research. The creation of formaldehyde naturally was the second objective. Samples of orange, green, and red apples, bananas, and apples of all hues showed progressively higher levels of formaldehyde on Days 0, 3, and 9 than they did on Day 0. Natural production of formaldehyde may make it more challenging to detect foods that have been artificially tainted with the compound. The amount and mechanisms by which naturally occurring formaldehyde is created in food products must therefore be thoroughly studied. Given that formaldehyde has the potential to be harmful, this is regarded as a misuse. Foods containing formaldehyde are bad for people's bodies.

Keywords: harmful, formaldehyde, fruits

Introduction

Formaldehyde and other natural substances have the chemical formula HCHO. It has an unpleasant flavor and is usually bought as formalin, which contains 37% formaldehyde. A high level of accumulated formaldehyde in food, according to Li et al. (2007), is dangerous for human health because formaldehyde is poisonous, allergenic, and carcinogenic and can produce symptoms including migraines, throat burning, and breathing problems. (Herschkovitz et al. 2000).

Formaldehyde can take on many forms as shellfish tissue deteriorates and matures. In addition to the typical enzymatic response that results in the generation of formaldehyde in shellfish and fish, additional biochemical events, such as the oxidation of lipids due to microbial activities, can also take place. Fish will eventually suffer physical harm as a result of this, or chemical metabolites like biogenic amines and other unpleasant combinations will be produced. (Gram et al. 2002; Arashisar et al. 2004) Moreover, fish diseases caused by protozoa and other organisms are treated with formalin. Formalin has been approved for use in aquaculture as a fungicide and a parasiticide by the US Food and Drug Administration. However, due to its association with cancer development and malignancy, it is not approved for use in aquaculture in Europe or Japan. (Riaz Uddin et al, 2011). Formaldehyde has just been classified as a Category 1 human carcinogen by the International Agency for Research on Cancer (IARC, 2004). The United States Environmental Protection Agency (EPA) has

stated that the most extreme daily portion reference for formaldehyde is 0.2 g/g body weight daily. (Noordiana et al., 2011 Riaz Uddin et al, 2011). Indeed, even those who shower or inhale formalin for an extended period of time are likely to experience health problems like asthma, lung cancer, and even sight impairment. (Hossain, 2011, Riaz Uddin et al, 2011).

It has been announced a potential cancer-causing agent and mutagen (Cui et al. 2007) Formaldehyde is conceivably cancer-causing to people at LD50 30 gm for human (WHO 1989) Formaldehyde happens normally in fish and fish. When fish experience after death, trimethylamine oxide (TMAO) is separated to dimethylamine and formaldehyde as its primary item. TMAO is principally found in marine fish (Jiang et al. 2006).

The aim of this investigation was to evaluate the formalin levels in fruits in the Kalasin Province. Analysis of formalin in several fruits, including bananas, oranges, green apples, and red apples, was the main purpose. The second aim was to determine how formaldehyde is produced naturally.

Materials and methods

Selected fruits Samples

Bananas (n=10), oranges (n=10), green apples(n=10), and red apples (n=10) were used in the study to determine how much formalin was present in each type of fruit at Local Kalasin Markets.

The natural formation of formaldehyde

This study looked at Day 0, Day 3, and Day 9 to determine the time-dynamic behavior of formaldehyde found naturally in fruits. The formaldehyde contents of fruit samples (banana, orange, green apple, and red apple) were held in frozen storage for 9 Days (at a temperature of 4 °C) in order to understand the time dynamic behavior of the natural synthesis of formaldehyde. Following the same procedure described in the previous section, samples of the frozen items were prepared, and the formaldehyde contents were measured.

Analysis samples

The samples under verification were cut into small pieces. Then samples were taken into blender for homogenization and blended for 10 minutes. Then a 60 ml of 6% tri-chloro-acetic acid was added for extraction of formaldehyde from the samples. The extracted solution was then filtered by a Whatman No.1 of filter paper. The samples were adjusted between 6 and 6.5 (with potassium hydroxide or nitric acid) Jaman Niloy, et al 2014, Farrhin Nowshad, Nazibul Islam and Mohidus Samad Khan 2018. Then 5 ml of sample solution was taken in a 50 ml of volumetric flask. Then the sample was kept in a freeze (- 20°C) for 1 h. Then it came time to analyze the samples, 2 ml of previously prepared Nash's reagent was added as an indicator. After that, the fruit sample was cooked for 30 minutes in a water bath at 60 °C. A spectrophotometer was used to detect the sample's absorbance at 415 nm right away. When it came time to analyze the samples, 2 ml of previously prepared Nash's reagent was added as an indicator. After that, the fruit sample had been heated for 30 minutes in a water bath at 60 °C. Immediately after, a UV/V spectrophotometer obtained a reading at 415 nm to measure the sample's absorbance.

Results and Discussion

The results of the investigation offer baseline information on the quantity of formaldehyde that occurs naturally in the studied fruits. Formaldehyde generation behavior can vary depending on the type of fruit, storage temperature, storage time, and aging pattern of the

fruit items. According to the findings in Table 1, the amounts of formalin in bananas, orange, green, and red apples were 6.4 ppm, 2.2 ppm, 5.8 ppm, and 2.5 ppm, respectively.

Table 1 Formalin content in Fruits Samples

Fruits Samples	Formaldehyde (ppm) Day Zero	Formaldehyde (ppm) Day 3	Formaldehyde (ppm) Day 9
Bananas	6.4	12.7	21.3
Oranges	2.2	4.6	8.6
Green Apples	5.8	9.7	19.4
Red Apples	2.5	5.2	10.1

On Day 0, Day 3, and Day 9, samples of orange, green, and red apples, bananas, and apples of all colors exhibited progressively higher amounts of formaldehyde than they did on Day 0 (Figure 1).

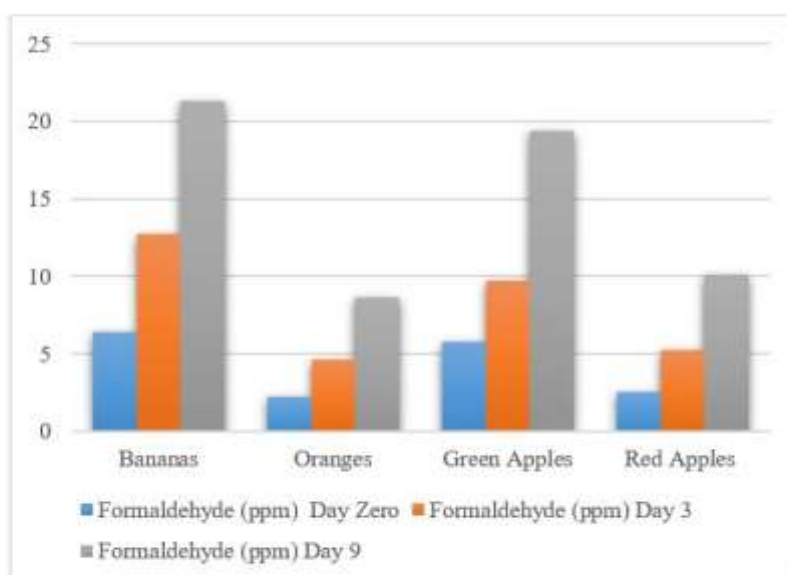


Figure 1 Formaldehyde (ppm) in Fruits at Day Zero, Day 3 and Day 9

The constant rise in formaldehyde concentration may be due to the production of S-adenosyl-L-methionine that occurs as fruits and vegetables ripen, which is connected to the production of endogenous formaldehyde. Ethylene is produced as fruits ripen and undergo this process. One reason could be the ongoing production of formaldehyde in an acidic environment. Numerous sulfur compounds present in fruits are potential starting materials for the synthesis of formaldehyde. On Day 0, Day 3, and Day 9, samples of orange, green, and red apples, bananas, and apples of all colors exhibited progressively higher amounts of formaldehyde than they did on Day 0. As a result of their usual digestion, many animal and plant species produce formaldehyde. While ingesting little amounts of formaldehyde is unlikely to have a significant negative effect, ingesting large amounts of formaldehyde can frequently result in severe stomach pain, regurgitation, trance states, kidney damage, and even death. The World Health Organization (WHO) notes that "everyone is introduced to formaldehyde mostly by

inward breath," though. The main health concern with formaldehyde is its ability to cause cancer. The WHO's International Agency for Research on Cancer classified formaldehyde as "cancer-causing to persons," believing that there was solid but insufficient evidence that it caused leukemia and other diseases associated to the term. Nonetheless, the WHO considered that the evidence indicated that ingesting formaldehyde did not cause cancer. Formaldehyde is a poisonous and risky compound (Yasri, N.G.,etal 2015)that is still regularly utilized unreservedly by untrustworthy by merchants or makers. Formaldehyde is regularly utilized as a germ executioner with the goal that it is utilized for cleaning, additives, beauty care products and nourishment added substances. The utilization of formaldehyde in nourishment added substances by makers is planned to expand the life of capacity, since formaldehyde is an adaptable antimicrobial intensify that can eliminate microscopic organisms, parasites, and even infections. Moreover, the cooperation among formaldehyde and protein in nourishment delivers a non-fragile surface Antora, R.A. et al 2018 Formaldehyde is a combustible, exceptionally receptive and promptly polymerizing dismal gas at typical temperature and weight. It has a sharp, particular smell and may create a consuming uproar to eyes, nose, and lungs at high focuses Farrhin Nowshad, Nazibul Islam and Mohidus Samad Khan 2018, IARC, 2010, Wilbur S, Harris MO, McClure PR, Spoo W. 1999 IARC: Lyon; 2004) There are immediate and aberrant wellbeing perils related with formaldehyde and formalin utilization. Utilization of formalin all the time can be harmful to the sensory system, kidney and liver, and may cause asthma, aspiratory harm and malignant growth. Formaldehyde and malignancy hazard; 2011, Songur An, Ozen OA, Sarsilmaz M. 2010, Mamun MAA, et al.2014).

Conclusion

In the conclusion, it is shown how much formaldehyde naturally occurs in the fruits that were the subject of the study. Depending on the fruit variety, storage conditions, duration, and aging pattern of the fruit products, formaldehyde generation behavior may change. The investigation's findings provide a baseline for understanding how much formaldehyde naturally appears in the fruits under study. Depending on the fruit variety, storage conditions, duration, and aging pattern of the fruit products, formaldehyde generation behavior may change. Bananas had the highest formaldehyde levels, followed by green apples. Red Apple came in third place, and orange was last.

Some fruits naturally contain formalin. In Figure 2, the banana had the highest formalin level, followed by the green apple, the red apple, and the orange.

Bananas, apples of all hues, and samples of orange, green, and red apples all showed progressively higher levels of formaldehyde on Days 0, 3, and 9 than they did on Day 0. As fruits, S-adenosyl-L-methionine is produced, which is related to the production of endogenous formaldehyde and may be the cause of the ongoing increase in formaldehyde concentration. As fruits mature and go through this process, ethylene is produced. Formaldehyde is still being produced in an acidic environment, which could be one of the causes. Numerous sulfur compounds found in fruits can serve as precursors in the synthesis of formaldehyde.

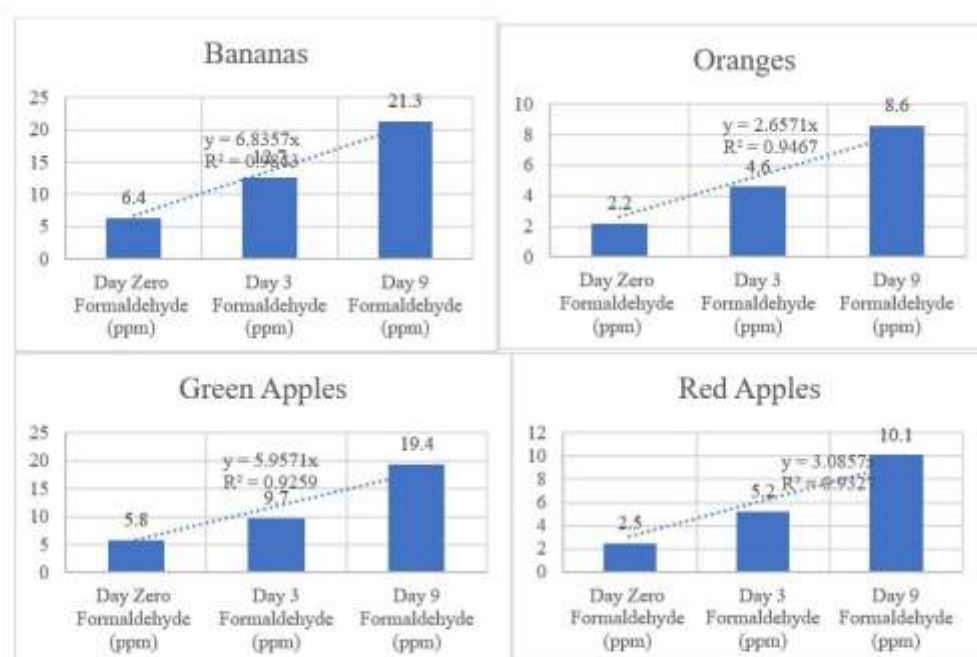


Figure 2 The levels of formaldehyde on Days 0, 3, and 9 in fruits samples

Formaldehyde is a chemical compound that is frequently used in manufacturing to assemble plastic polymers for use in the wood, paper, and material industries. Formalin, an approximately 37% formaldehyde solution, serves as a disinfectant and additive for household objects. Because it is produced from both natural and synthetic sources, formaldehyde is present almost everywhere on earth. Most living things include it as a metabolic stabilizer at low levels. The main synthetic sources of formaldehyde include ignitions (such as those caused by burning wood, trash, or fuel in power plants, etc.), construction materials, and tobacco smoke. Customers are advised to wash all food thoroughly under running water from the faucet because formaldehyde can dissolve in water and washing can aid in the removal of formaldehyde. Fruits should be washed with regular water after spending an hour in salt water. - Use salt water with a 10-90 salt-to-water ratio for plants. Before washing with regular water, dip them in it for 15 minutes. - Before consuming produce with possible contamination, peel the produce. Before cooking, thoroughly drench dry food ingredients, such as dried mushrooms, in clean water and discard the water. Every food should be thoroughly cooked to an internal temperature of 75°C or above because cooking heat can also aid in the formaldehyde release process. For fish, check the substance to see whether it has turned misty and can be isolated without any problem. Guidance to the Trade Source nourishment items from trustworthy sources. Try not to add formaldehyde to nourishment.

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Conflict of Interest

The authors have no conflicts of interest.

Data Available

The author confirms that the data were significant in obtaining to this finding.

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