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# The Effect Of Immersion Water Temperatures Toward Decreasing Levels Of Formalin In Tuna (*Euthynnus affinis).*

**Devi Arifatin Giyanti** [1]
*Master of Environmental Health Program Study, Environmental Health Departement, Public Health Faculty, University of Airlangga, Surabaya, Indonesia*
*Email: giyanti.devi@gmail.com*

**Abstract** : Fish is one example of raw food material that quickly decay (Perishable food). In extending the shelf life of people's food often misuses formalin as a food preservative. Formalin itself is prohibited in the use of food because it can endanger human health. This research is an experimental research with one group pretest posttest design to know the influence of temperature of immersion water to decreasing formalin content in tuna. The sample used was 36 samples with repetition 6 times each treatment group. Data analysis in this research use paired t test. The results showed that water taps could decrease the level of formalin in fish by 53.7% with $p < \alpha$ (0.05) and water heated with 50 $^0$C temperature could decrease by 62.6% with $p < \alpha$ (0.05). Based on paired t test in two treatment groups have $p > \alpha$ (0.05), it means there is no significant difference of decrease level of formalin in tuna between two treatment groups. The conclusion of the study was that there was no effect of immersion water temperature toward decreasing levels of formalin in tuna. However, there was a significant decrease in formalin levels before and after the immersion treatment.

Keywords: Formalin, water temperature immersion, tuna

## 1. INTRODUCTION

Fish is one example of raw food materials that quickly experience decay (perishable food), In order for fish does not quickly decompose it needs to be handled during storage to prolong a longer shelf life, one of which is by addition of preservatives (Mukono, 2010: 152 ).Tuna is one of the fish with high economic value. This can be seen from the number of catches in Indonesia in 2006 and 2007 reached 650,655 tons and 750,734 tons respectively, the high increase of fish catch was not balanced with the consumption of fish in the community, in 2006 and 2007 of 580,733 tons and 522,393 tons (Center for Agricultural Data and Information, 2009). The number of fish caught higher than the consumption level resulted in the accumulation of tuna catch, so storage handling is required to have a longer shelf life.

According to the Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012 on Food Additives there are several types of supplementary ingredients that are prohibited in the use of food because it can endanger human health, as well as formalin. Due to the nature of formalin as an anti microbial that can kill bacteria, viruses, fungi, and parasites that are effective at high concentrations (Cahyadi, 2009: 256) so that people abuse formalin to preserve food to have a longer shelf life, this is clarified by research has been done by Teddy (2007) that meatballs without the addition of formalin has a shelf life of 1 day, but in meatballs boiled with formalin 250 ppm has a shelf life of 6 days.

The results of the Bangka Belitung police investigation on the fishing boat found that from 7 types of fish samples obtained 4 types of fish containing formalin, including tuna fish, mackerel fish, fish selayang and reef fish babai (Indosiar.com, 2009). Given the fact that the use of formalin in foodstuffs continues to be done, it is therefore necessary to reduce the formalin content in food, such as by soaking the food in the bath water. This is based on the nature of water-soluble formalin (Sanger, 2008). the process of dissolving formaldehyde in the water more quickly with increasing temperature soaking by Budiarti (2009). The purpose of this study was to calculate and compare the decrease level of formalin in tuna before and after immersion in PDAM water and water heated to 50 $^0$C, and analyzing the effect of immersion water temperature toward decreasing levels of formalin in tuna (*Euthynnus affinis).*

## 2. RESEARCH METHODS

This research is an experimental research with one group pretest posttest design. The sample used was 36 samples with repetition 6 times each treatment group. Sampling by purposive consideration of fresh tuna fish used as sample has weight of ± 500 gram and condition of fresh tuna for all samples are considered equal.

The dependent variable in this study was formalin level in tuna. The independent variables are the type of water immersion (unheated water taps and water temperature 50 $^0$C) with soaking treatment for 30 minutes. Data collection techniques based on laboratory results on formalin content in tuna before and after soaking treatment. Data analysis in this research using paired t test.

## 3. RESEARCH RESULT AND DISCUSSION

From the results of formalin examination on tuna before and after soaking treatment on 2 types of water immersion (PDAM water, Hot Water temperature 50 $^0$C) can be described as follows:

### 3.1Differences to the decreased levels of formalin in tuna on PDAM water immersion

Tabel 1. Decreased Levels Of Tuna Formalin Before And After Immersion With PDAM Water

| No. | Levels of formalin in tuna(mg/Kg) | | Decrease in Formalin Levels Before and After Immersion (%) |
|---|---|---|---|
| | Before (A) | After (A1) | |
| 1. | 212.00 | 86.24 | 59.4 |
| 2. | 131.20 | 57.28 | 56.3 |
| 3. | 174.56 | 129.92 | 25.5 |
| 4. | 196.00 | 107.54 | 45.1 |
| 5. | 209.60 | 81.76 | 60.9 |
| 6. | 196.08 | 48.00 | 75.5 |
| mean | 186.88 | 85.12 | 53.7 |

Source : primary data

Based on Paired t test, P = 0.001 <α (0.05) showed that there was a significant decrease between levels of tunaformalin before and after treatment of PDAM water immersions.

PDAM water can reduce formalin content in tuna because water can dissolve organic compounds having carboxyl / amino groups and polar functional groups (Lehninger, 1982 in Sanger, 2008) and formaldehyde have polar properties (Teddy, 2007) so that the formaldehyde is soluble in water , so that water PDAM can be used as alternative in decreasing formalin level.

### 3.2 Differences to the decreased levels of formalin in tuna on hot water temperatur 50 $^0$C immersions.

Table 2. Decreased Levels Of Tuna Formalin Before And After Immersions

| No. | Levels of formalin in tuna(mg/Kg) | | Decrease in Formalin Levels Before and After Immersion (%) |
|---|---|---|---|
| | Before (B) | After (B1) | |
| 1. | 98.24 | 53.92 | 45.1 |
| 2. | 213.92 | 116.00 | 45.8 |
| 3. | 208.80 | 73.44 | 64.8 |
| 4. | 257.76 | 92.96 | 63.9 |
| 5. | 198.76 | 48.80 | 75.5 |
| 6. | 262.24 | 51.36 | 80.4 |
| mean | 206.56 | 72.80 | 62.6 |

With Hot Water Temperatur 50 $^0$C
Source : Primary Data

Based on Paired t test, the result of p = 0.002 <α (0.05) showed that there was significant difference of decrease between formalin content before and after soaking treatment at hot water temperature 50$^0$C.

The ability of hot water temperature 50 $^0$C in reducing the levels of formalin due to the process of immersion in hot water, protein binding to formaldehyde or called methylene compounds can break down into protein and formalin in the presence of heat in water (Purawisastra, 2011). This is also confirmed by Budiarti (2009) that the process of dissolving formaldehyde in water is increasing rapidly with increasing immersion temperature.

### 3.3 The effect of immersion water temperature toward decreasing level of formalin in Tuna

The effect of immersion water temperatur toward decreasing level of formalin in tuna by paired t test was obtained p = 0.331> α (0.05) which showed that there was no significant difference between the two treatment groups which means that there was no effect of immersion water temperature toward decreasing level of formalin in tuna.

This is because the type of water immersion that used the main material is water that is water PDAM and Water that is heated to 50 $^0$C. Where from the explanation of Lehninger (1982) in Sanger (2008) that water can dissolve organic compounds having carboxy / amino groups and polar functional groups and Teddy (2007) explains that the nature of formaldehyde is polar, so formalin is soluble in water. Based on the reaction between formaldehyde and proteins that form methylene compounds can break down into protein and formalin through hydrolysis reaction. The hydrolysis reaction in protein and formaldehyde decomposition in methylene compounds does not occur spontaneously so that an additional energy is needed, and the additional energy here is hot (Purawisastra, 2011). This is the basis that immersion using water that is heated to 50 ° C can lower the level of formalin more than the water of the PDAM.

Therefore, the difference of immersion water temperature has no significant difference to the decrease of formalin level, so that both types of water soaking can be used as an alternative by society to decrease formalin content in fresh fish, especially tuna. This is because of each type of water immersion has a significant decrease between formalin levels before and after treatment decrease.

## 4. CONCLUTION

The percentage decrease of formalin content in tuna that was soaked in 2 groups of water immersion for 30 minutes got different result that is, in group A1 water immersion PDAM able to decrease level of formalin equal to 53.7% and in group B1 hot water immersion temperature 50 0C can decrease formalin level by 62.6%. Based on the paired t test, each of the soaking water immersion group had significantly decreased difference (p <α (0.05) between formalin levels before and after the immersion treatment. In the paired t test between the two treatment groups, the results obtained p = 0.331> α (0.05) showed that there was no significant difference to the decrease of formalin level in the tuna among the two treatment groups, so that the community could use the three types of water immersion in decreasing level of formalin in tuna.

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