

The Effect of Pineapple Juice on Lead Levels (Pb) In Sepat Salted Fish

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Abstract. Salted fish is one of the processed fish products with a fairly simple manufacturing process that is only by soaking or applying salt or saline solution and then dried under the sun's heat until the salt soaks and dries. In making salted fish, there are several ways that can cause the fish to be contaminated with heavy metals such as Lead (Pb). One of them is when drying fish placed on the side of the road, if the fish is consumed by humans can be harmful to human health. The purpose of this study was to determine the effect of pineapple juice on lead levels in sepat salted fish. The research method used in this study is the Experiment Laboratory with post test only control design. This study used an experimental method with a laboratory analysis method with a two-time repetition (duplo) technique. Pineapple juice is an independent variable and lead content in salted fish is the dependent variable. The results showed lead levels in salted fish after being treated with pineapple juice 100%, 75%, 50% and 25% had decreased lead levels in salted fish, this was due to the presence of citric acid content in pineapple levels of lead in salted fish. The results showed the effect of pineapple juice on lead levels in sepat salted fish. Decreased levels of lead metals in salted fish sepat caused by a solution of citric acid contained in pineapple fruit extracts.

1. Introduction

Fish as a source of animal protein that is widely consumed by people, especially in the area of Palembang, South Sumatra, fish is also easily available and the price is quite cheap. Therefore, in addition to its fresh form of fish is also consumed in preserved form such as salted fish. One of the most popular processed fish products is salted fish. Salted fish is one of the processed fish products with a fairly simple manufacturing process that is only by soaking or applying salt or saline solution and then dried under the sun's heat until the salt soaks and dries. Good quality and safety of dried salted fish are those that meet the requirements of the Indonesian National Dried Salted Fish Standard (SNI 01-2721-2009) which includes water content, salt content, sensory properties and total plate figures. Salted fish that uses pure salt will be yellowish white and soft. Substances that are mixed in salt (especially Mg, Ca, Sulfate, Mud, etc.) cause poor properties in salted fish. The existence of 1% Mg and Ca makes the fish color white hard, brittle and bitter [1]. In general, the salt produced contains a lot of dirt in the form of sludge containing organic material and other types of salt. In making salted fish, there are several ways that can cause the fish to be contaminated with heavy metals such as Lead (Pb). One of them is when drying fish placed on the side of the road. According to Irfandi research [2] the lead content contained in salted fish is 0.097. Heavy metal is widely used in various purposes, especially for industrial sectors whose industrial activities are continuous. If these heavy metals



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pollute the water which is then contaminated by organisms such as fish, it will collect in tissues that cause toxicity and accumulative properties (cannot be broken down by the body). Heavy metals that often contaminate water are lead. Fish that consume lead cannot describe it, so if the fish is consumed by humans it can be harmful to human health[3]. Lead (Pb) is very popular and widely known by ordinary people because this metal is often used in factories and most causes poisoning in living things.

2. Literature Review

Lead (Pb) is a type of heavy metal that is often also referred to as lead. Lead has a low melting point, is easily formed, has active chemical properties so it is commonly used to coat metals to prevent rusting. Lead is a soft, shiny bluish gray metal that has an oxidation number of +2 [4]. The high content of heavy metals in a number of fish in Palembang makes the fish in the river not safe for consumption. Sepat fish which is a species of fish inhabiting the river is not safe to eat. Based on the research, it has been found that the fish sepat in the Palembang river polluted with lead was 1.81 mg / kg. This value indicates that the levels of lead heavy metals found in fish sepat in the musu river in Palembang have exceeded the maximum threshold of heavy metal pollution in food that has been set by the Indonesian National Standard Agency, which should not be more than 0.4 mg / kg. Lead (Pb) is a type of heavy metal that is often also referred to as lead. Lead has a low melting point, is easily formed, has active chemical properties so it is commonly used to coat metals to prevent rusting. Lead is a soft, shiny bluish gray metal that has an oxidation number of +2 [5]. The high content of heavy metals in a number of fish in Palembang makes the fish in the river not safe for consumption. Sepat fish which is a species of fish inhabiting the river is not safe to eat. Based on the research, it has been found that the fish sepat in the Palembang river polluted with lead was 1.81 mg / kg. This value indicates that the levels of lead heavy metals found in fish sepat in the musu river in Palembang have exceeded the maximum threshold of heavy metal pollution in food that has been set by the Indonesian National Standard Agency, which should not be more than 0.4 mg / kg. Because of the danger posed by heavy metals, it is necessary to decrease against heavy metals that exist in organisms waters so it is safe for human consumption. One of them by using sequestrants (metal binder) in the form of acids such as acids citrate [6]. Citric acid is an organic acid water soluble. Citric acid is able to form complex compound with metals. Citric Acid metal binding (chelating agent) so that can free food from metal contamination . Besides oranges, fruits that have high citric acid content is a pineapple [7].. Pineapple besides consumed in the form of fruit Fresh is also widely used in industry household for example making syrup, jams, chips and canned fruit. The acids contained in pineapple are citric acid, malic acid, and oxalic acid. The most dominant type of acid is acid citrate which is 78% of total acid [8].

3. Methods

The research method used in this study is the Experiment Laboratory with post test only control design. This study used an experimental method with a laboratory analysis method with a two-time repetition (duplo) technique. Pineapple juice is an independent variable and lead content in salted fish is the dependent variable.

The research method is made in the form of flowcharts

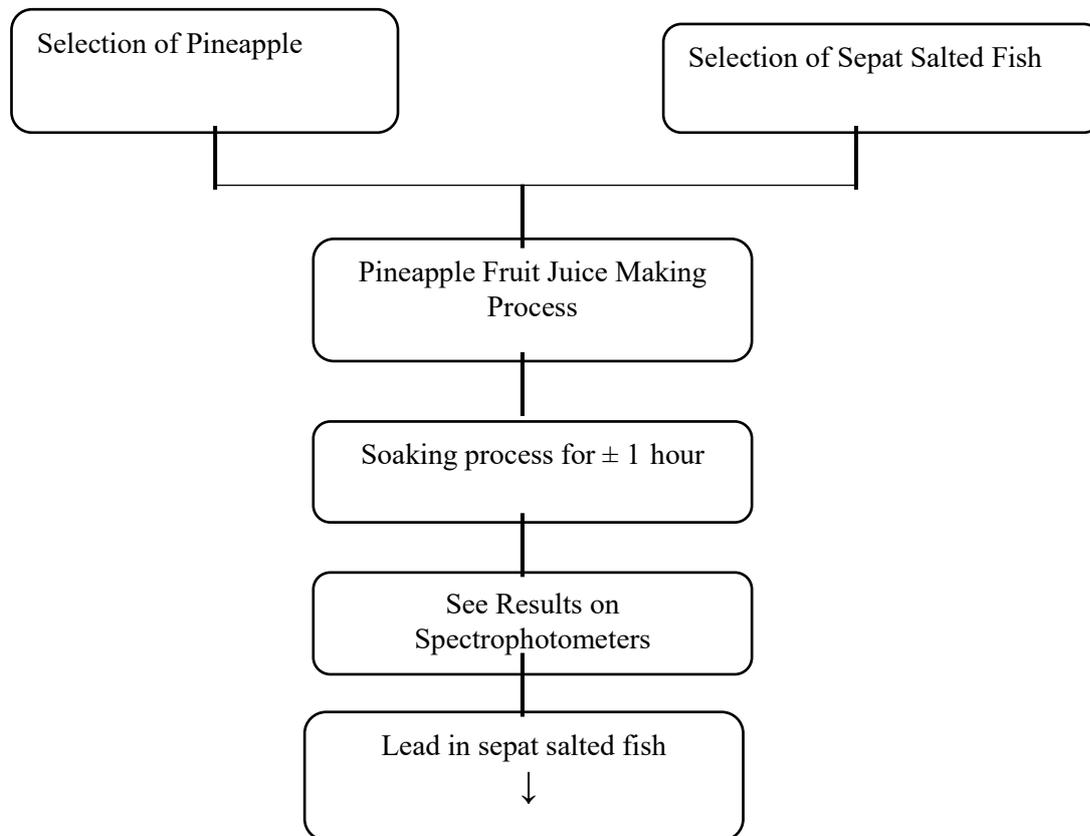


Figure 1. The research method

4. Result

Table 1. Lead (Pb) Test Results in Salted Fish

Sample	Soaking Time	Concentration
Salted Fish Without Treatment	0	0.4604
Salted Fish Without Treatment	0	0.3765
Pineapple Juice 100%	30 Minutes	0.1006
	60 Minutes	0.1006
Pineapple Juice 75%	30 Minutes	0.1666
	60 Minutes	0.1156
Pineapple Juice 50%	30 Minutes	0.2745
	60 Minutes	0.1486

Pineapple Juice 25%	30 Minutes	0.2325
	60 Minutes	0.1725

From the above table the results of the study show lead levels in salted fish after being treated with pineapple juice 100%, 75%, 50% and 25% have decreased lead levels in salted fish so that the results of the effect of pineapple juice on lead content in salted fish sepat. Decreased levels of lead metals in salted fish sepat caused by a solution of citric acid contained in pineapple fruit extracts. The immersion of salted fish meat exposed to lead metal with acidic solutions such as pineapple extract aims to reduce the pH so that it can reduce the presence of heavy metals in organisms. An increase in acid concentration affects the decrease in heavy metal content. The higher the concentration of acid used, the more the amount of hydrogen that competes with metal ions so that the strength of metal bonds so that the strength of metal bonds in proteins decreases and is easily released [9]. The results of the study showed that in the treatment of 100% lead levels were high compared to concentrations of 75%, 50%, and 25% ie mg / l. Citric acid is a metal binding. Syukri (2012) [10] say that as a metal binder, chelating citric acid can bind divalent metals such as Pb^{2+} , Cu^{2+} , Mn^{2+} , Mg^{2+} , and Fe^{2+} . Metal binding process is a process of balancing the formation of metal ion complexes with spare parts. In general, the balance can be written as follows:

$L + S \rightleftharpoons LS$ with L = metal ion, S = Tribe, and LS = ligand complex.

Citric acid is easily mixed with other polar or non-polar solvents such as water, chloroform, and hexane so that the solubility and ease of mixing of citric acid are used as solvents for heavy metals such as lead in living things such as aquatic biota such as fish. A reaction between a metal binding agent and metal ions causes the lead metal to lose most of its toxicity (Alpatih, 2010). The decrease in lead metal content is also due to acid solution which can damage the binding of protein metal complexes. In addition, lead metal is a type of metal that can dissolve in fat. In soaking with an acid solution, the fat will form a smooth and soluble emulsion in the acid solution so that by dissolving the fat will also dissolve the lead metal in salted fish. At each balance of metal ions and proteins, metal ions compete with hydrogen for their binding sites. So that in an equilibrium, metal bonds with proteins are greatly reduced in an acidic atmosphere. This can occur because under acidic conditions the metal bonds bound to proteins compete with hydrogen in acids to bind to proteins. An increasingly acidic atmosphere shows the increasing number of metal bonds with proteins is reduced. The results of the decrease in lead metal at various concentrations of pineapple skin filtrate showed very little difference and showed no difference in treatment. The absence of this significant difference is because the concentrations of 100%, 75%, 50%, and 25% have almost the same acidity. At 100% concentration there is no addition of distilled water so that it has the lowest pH value and more citric acid content. pH has an important role in metal absorption. This is because pH can affect the solubility of metal ions in solution, the ability of other metal ions to bind to the surface of the biomass, and influence the charge on the surface of the biomass during the reaction. At acidic pH, hydraulic reaction can cause changes in components and the state of the cell's active surface. This results in an increase in sorbent absorption of metals. At alkaline pH, the cell surface is slowly negatively charged so that the ability to bind the lead ions becomes less and the ability to absorb metals is also getting smaller [11].

5. Conclusion

Lead levels in salted fish sepat before being treated with concentrations of 0.4604 and 0.3765. Lead levels in salted fish after being squeezed pineapple fruit 100% with a duration of 30 minutes has decreased by 0.1006, lead content with pineapple juice 75% with a duration of 30 minutes has decreased 0.1666, lead content with pineapple juice 50% decreased by 0.2745, lead content with 25% pineapple juice decreased by 0.2325. The results above indicate the effect of pineapple juice on lead content in salted fish salted sepat.

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