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Identification of Formalin Content in Food Products (Salted Fish, Processed Chicken, Wet Noodles) at Pagesangan Traditional Market

Wulan Ratia Ratulangi [1], Adriyan Suhada[1], Roushandy Asri Fardani [2], Reni Juniatun Aini[1],
[1]Program Studi D3 Farmasi, Politeknik Medica Farma Husada Mataram, Indonesia
[2] Program Studi D3 Teknologi laboratorium Medis, Politeknik Medica Farma Husada Mataram, Indonesia
Corresponding e-mail: ratiaratulangiw@gmail.com

ABSTRACT

Food Additives (BTP), such as preservatives, are increasingly used in line with advances in synthetic food production technology—one of which is formalin or formaldehyde. Formalin is hazardous when inhaled, comes into contact with skin, or is ingested. Its adverse effects include skin burns, respiratory tract irritation, allergic reactions, and carcinogenic risks. Processed food products commonly found to contain formalin include salted fish, processed chicken, shrimp paste, tofu, and fresh (wet) noodles. These foods are sold by vendors in traditional markets, such as Pagesangan Market. Therefore, research is necessary to determine the presence and concentration of formalin in food products (salted fish, processed chicken, and wet noodles) sold at Pagesangan Market. This study is an experimental research. The sampling technique used is random sampling. Samples were collected from 17 vendors, consisting of 3 salted fish, 12 processed chicken, and 2 wet noodle samples from Pagesangan Market. The criteria for sample selection, based on organoleptic assessment, included: unnatural odor, artificial color, firm texture (not easily broken), and absence of flies. The identification of formalin content in samples was conducted through a qualitative test using a formalin rapid test kit, and a quantitative test using acid-base titration. The qualitative test results showed that one salted fish sample (IK 3) and one processed chicken sample (AP 5) tested positive for formalin, while both wet noodle samples tested negative. The samples that tested positive were further analyzed through quantitative testing. The acid-base titration results showed that IK 3 contained 25.43% formalin, while AP 5 contained 33.06%.

KEYWORDS : Formalin, Food products, Qualitative test, Quantitative test, Pagesangan Traditional Market

INTRODUCTION

Food Additives (BTP), such as preservatives, are increasingly used in line with advances in synthetic food production technology. One commonly used chemical is formalin or formaldehyde, a prohibited food additive (Jamlean, 2021).

Formalin is a toxic substance that poses serious health risks when present in excessive amounts in the human body. It chemically reacts with nearly all components within cells, suppressing cell function and causing cell death, which may lead to poisoning (Cahanar, 2022). Formalin is highly hazardous when inhaled, comes into contact with skin, or is ingested. The resulting health effects can include skin burns, respiratory tract irritation, allergic reactions, and carcinogenic risks (Rahmawati, 2022).

According to the Indonesian National Agency of Drug and Food Control (BPOM), laboratory sampling and testing conducted in December 2017 across several regions in Indonesia revealed that 34.55% of tofu, 64.32% of wet noodles, and 6.36% of fish samples contained formalin. These findings suggest that certain food producers continue to use the banned preservative formalin. Furthermore, a case in Malang City in 2018 revealed that 14% of tested yellow wet noodle samples contained formalin, and 100% of those yellow wet noodle samples tested positive for formalin (Rezania, 2022).

Pagesangan Market is one of the traditional markets in the city of Mataram, where essential food items such as rice, vegetables, fruits, spices, tofu, meatballs, meat, fresh fish, salted fish, processed chicken, and wet noodles are sold. Some of these food items require safety testing to ensure they are safe for human consumption. Based on a preliminary survey, several food products sold at Pagesangan Market displayed characteristics typical of formalin contamination. Organoleptic signs of formalin-contaminated food include unnatural odor, artificial color, unusually firm texture, and abnormal taste. According to Suwartiningsih & Asfawi (2020), salted fish containing formalin typically has a clean, bright appearance, lacks the typical salted fish smell, and does not attract flies. Similarly, processed chicken contaminated with formalin often appears pale white, has little to no fishy odor, a firmer texture, and longer shelf life, and is not surrounded by flies.

A previous study titled “Formalin Identification in Wet Noodles at Pagesangan Market Using Color Reaction Method” conducted by Hudainiyah (2013) found that all tested samples were negative for formalin, as indicated by the absence of purple color change. However, other than wet noodles, no formalin detection studies have been conducted on salted fish and processed chicken sold at Pagesangan Market.

Based on these considerations, the researcher is interested in conducting a study entitled: **“Identification of Formalin Content in Food Products (Salted Fish, Processed Chicken, Wet Noodles) at Pagesangan Market.”**

METHOD

This study is experimental research. The sampling technique employed is random sampling. Samples were collected from 17 vendors at Pagesangan Market, consisting of 3 salted fish samples, 12 processed chicken samples, and 2 wet noodle samples. The samples were selected organoleptically based on the following criteria: unusual odor, unnatural color, firm texture (not easily broken), and absence of flies.

The identification of formalin content in salted fish, processed chicken, and wet noodles was conducted using: a qualitative test with a formalin rapid test kit, and a quantitative test using the acid-base titration method.

1. Qualitative Test. **Equipment:** Mortar and pestle, Test tubes, Filter paper, Test tube rack. **Materials:** Salted fish, processed chicken, wet noodles, Distilled water (aquadest), Formalin reagent I and II. **Procedure:** Weigh 5 grams of the food sample, add sterile distilled water, then grind until smooth. After that, take 1 mL of the sample solution and transfer it into a test tube. Add 3–5 drops of Formalin Reagent I, then add 3–5 drops of Formalin Reagent II. Shake gently and let the solution stand for 5 minutes. **Observe for colour changes:**
   a) If the solution turns purple, the sample is positive for formalin.
   b) If no colour change occurs within 5 minutes, the sample is negative for formalin.
2. Quantitative Test. **Equipment:** Clamp and stand, Erlenmeyer flask, Electric balance, Dropper pipette, Measuring cylinder, Burette, Hot plate. **Materials:** 6% hydrogen peroxide (H_2O_2) solution, 1 N sodium hydroxide (NaOH) solution, 1 N hydrochloric acid (HCl) solution, Phenolphthalein indicator (pp), Salted fish, processed chicken, wet noodles. **Procedure:** 1) Standardization of 1 N HCl using 1 N NaOH: Pipette 50 mL of 1 N NaOH, add 25 mL of 6% H_2O_2, and 3 drops of phenolphthalein indicator. Heat the solution until foaming stops. Cool the solution, then titrate with 1 N HCl until a pale pink endpoint is reached. Record the volume of HCl used. 2) Determination of Formalin Content in Samples: Weigh 3 grams of the food sample, grind it finely, and place it in an Erlenmeyer flask. Add 25 mL of 6% hydrogen peroxide (H_2O_2) solution and stir until evenly mixed, then add 50 mL of 1 N sodium hydroxide (NaOH) solution. Heat the mixture on a hot plate until bubbling stops, stirring occasionally. Cool the mixture to room temperature, then add 3 drops of phenolphthalein indicator (pp). Titrate the mixture with standardized 1 N hydrochloric acid (HCl) until a pale pink endpoint appears. Record the titration volume. Repeat the titration three times (in triplicate) for accuracy.

   Formula for Standardization of 1 N HCl with 1 N NaOH

   $N1 \times V1 = N2 \times V2$

   Where:
   - N1 = Normality of HCl
   - V1 = Volume of HCl used in titration
   - N2 = Normality of NaOH (1 N)
   - V2 = Volume of NaOH

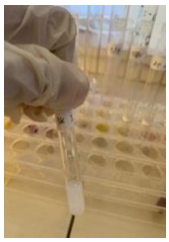
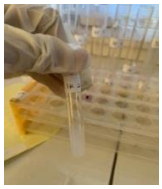
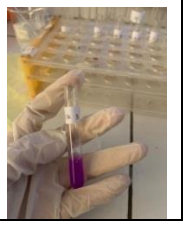
RESULT AND DISCUSSION

RESULTS

Based on the results of the qualitative and quantitative tests conducted on 3 salted fish samples, 12 processed chicken samples, and 2 wet noodle samples, two samples were found to be positive for formalin: salted fish sample 3 (IK 3) and processed chicken sample 5 (AP 5).

This was indicated by a color change from white to purple. The results of the qualitative and quantitative tests are summarized as follows:

Tabel 1. Qualitative Test Results for Formalin in Salted Fish

Kode sampel	Warna awal	Warna akhir	Keterangan	Gambar
IK 1	Putih	Putih	Negatif	
IK 2	Putih	Putih	Negatif	
IK 3	Putih	Ungu	Positif	

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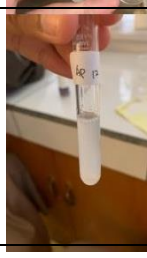
Tabel 2. Qualitative Test Results for Formalin in Chicken

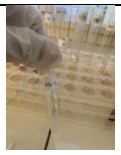
Kode sampel	Warna awal	Warna akhir	Keterangan	Gambar
AP 1	Putih	Putih	Negatif	
AP 2	Putih	Putih	Negatif	
AP 3	Putih	Putih	Negatif	
AP 4	Putih	Putih	Negatif	
AP 5	Putih	Ungu	Positif	
AP 10	Putih	Putih	Negatif	
AP 11	Putih	Putih	Negatif	
AP 12	Putih	Putih	Negatif	

Ket: AP 1 = Ayam Potong 1
AP 2 = Ayam Potong 2
AP 3 = Ayam Potong 3
AP 4 = Ayam Potong 4
AP 5 = Ayam Potong 5
AP 6 = Ayam Potong 6

AP 6	Putih	Putih	Negatif	
AP 7	Putih	Putih	Negatif	
AP 8	Putih	Putih	Negatif	
AP 9	Putih	Putih	Negatif	

AP 7 = Ayam Potong 7
AP 8 = Ayam Potong 8
AP 9 = Ayam Potong 9
AP 10 = Ayam Potong 10
AP 11= Ayam Potong 11
AP 12 = Ayam Potong 12

Tabel 3. Qualitative Test Results for Formalin in Wet Noodles

Kode sampel	Warna awal	Warna akhir	Keterangan	Gambar
MB 1	Putih	Putih	Negatif	
MB 2	Putih	Putih	Negatif	

Ket: MB 1 = Mie Basah 1 MB 2 = Mie Basah 2

Tabel 4. Results from Standardizing 1N HCl Using 1N NaOH

Vol titrasi 1 (HCl)	Vol titrasi 2 (HCl)	Vol titrasi 3 (HCl)	Volume rata-rata	N HCl
25,3 ml	27,1 ml	26,5 ml	26,3 ml	1,90 N

Tabel 5. Acid-Base Titration Results

Kode sampel	Vol titrasi1 (HCl)	Vol titrasi 2 (HCl)	Vol titrasi 3 (HCl)	Volume rata-rata (HCl)	Kadar formalin (%)	Hasil titrasi
IK 3	11,3 ml	11,7 ml	10 ml	11 ml	25,43	
AP 5	14,2 ml	15 ml	13,7 ml	14,3 ml	33,06	

Ket: IK 3 = Ikan Asin 3 AP 5 = Ayam Potong 5

DISCUSSION

This study was all about finding out whether there's formalin in some common food items specifically salted fish, cut chicken, and wet noodles being sold at Pagesangan Market. We did both qualitative and quantitative lab tests on a total of 17 samples: 3 salted fish, 12 chicken samples, and 2 wet noodle samples.

For the quick check, we used a test kit that works based on colour changes. These rapid test kits are like handy screening tools—they're super simple, don't need fancy equipment or skills, and

are perfect for field testing. You just drop a bit of reagent onto the food sample, and if it changes colour (from white to purple), boom—there's formalin. If there's no color change, then it's most likely safe. These kits are actually widely sold and already used by many (Suryadi et al., 2022). So, what did we find? Out of the 3 salted fish samples, 1 tested positive. From the 12 chicken samples, 1 also tested positive. The 2 wet noodle samples were all clean, no formalin detected. The positive results were confirmed by the colour change mentioned earlier. Once we found those positive samples, we went deeper with a quantitative test basically to figure out how much formalin was actually in there. For that, we used an acid-base titration method.

The colour change during this process helps pinpoint the exact amount of formalin by reacting with the chemical indicators. Interestingly, the samples that tested positive also showed some physical signs. The formalin-positive salted fish looked unusually clean and bright, didn't smell like normal salted fish, and didn't attract flies. The chicken was pale white, didn't have that usual meaty smell, had a firmer texture, and again—no flies. This matches what Suwartiningsih & Asfawi (2020) found too. Formalin-laced fish and chicken tend to look unnaturally fresh and bug-free.

To avoid eating food with formalin, there are a few things we can do:

1. Choose fresh ingredients—fresher stuff doesn't need chemical preservatives.
2. Buy from trusted sellers who care about food safety.
3. Use natural preservatives like salt or vinegar when preparing food.
4. Raise public awareness about how dangerous formalin is in food.
5. The government also needs to step up enforcement and tighten regulations on the use of harmful chemicals in food.

By taking these steps, we can hopefully cut down the risks and keep our food safe (Suhada, 2021). In short, out of the 17 samples we tested 3 salted fish, 12 chicken, and 2 noodles came back positive: one salted fish (code: IK 3) and one chicken sample (code: AP 5), both showing a colour shift from white to purple, which signals the presence of formalin.

CONCLUSION

The qualitative analysis of formalin content in food samples (salted fish, broiler chicken, and wet noodles) obtained from Pagesangan Market identified two positive samples: salted fish sample number 3 (IK 3) and chicken sample number 5 (AP 5). The presence of formalin in these samples was further supported by organoleptic observations. The formalin-positive salted fish exhibited characteristics such as a clean and bright appearance, absence of the typical salted fish odor, and no fly activity. Similarly, the chicken sample showed a pale white colour, lacked a typical meat odor, had a firm texture, and was not infested by flies.

Quantitative analysis of the positive samples was conducted using the **acid-base titration method**, which is indicated by a colour change from white to pink. The formalin concentration was found to be **25.43%** in salted fish sample IK 3 and **33.06%** in chicken sample AP 5.

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