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Qualitative Analysis of Methanyl Yellow in Traditional Traditional Foods: A Case Study of Yellow Rice and Fresh Wet Noodles in Manado, Indonesia

Michael Vallery Loueis Tumbol[1], Allan Johannes Andaria[2], Meildy Esthevanus Pascoal[3], Mokoginta Jusran[4], Marjes Netro Tumurang[5], Imanuel Medy Pasanda[6], Lyvia Aurelia Pondaag[7], Helvrida Apnatasya Ampilan[8], Virginia Damay Kindangen[9], Ayu Sofiana Bonde[10], Shekinah Glory Tessa Tani[11]

[1,2,5,6,7,8,9,10,11]Department of Medical Laboratory Technology, Manado Health Polytechnic, Ministry of Health, North Sulawesi, Indonesia
[3]Department of Nutrition, Manado Health Polytechnic, Ministry of Health, North Sulawesi, Indonesia
[4]Department of Environmental Health, Manado Health Polytechnic, Ministry of Health, North Sulawesi, Indonesia

*** Corresponding author:**
Allan Johannes Andaria, Department of Medical Laboratory Technology, Manado Health Polytechnic, Ministry of Health, North Sulawesi, Indonesia, allan.andaria@gmail.com

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Abstract

ABSTRACT
The increasing demand for practical and visually appealing foods has contributed to the widespread use of food additives, particularly synthetic colorants. However, the illegal use of hazardous dyes such as Methanyl Yellow remains a significant food safety concern. Methanyl Yellow is an industrial azo dye prohibited for food applications because of its potential toxic and carcinogenic effects on human health. Previous studies have reported its presence in street foods and fresh wet noodles in several regions of Indonesia. Yellow rice and fresh wet noodles are widely consumed traditional foods in Manado City, highlighting the need for routine monitoring to ensure consumer safety. This descriptive laboratory-based study aimed to qualitatively detect Methanyl Yellow in these food products. A total of 150 samples, comprising 120 yellow rice and 30 fresh wet noodle samples, were collected from Wenang District, Manado City, between November 2024 and May 2025. Laboratory analysis was conducted at the Toxicology Laboratory, Department of Medical Laboratory Technology, Manado Health Polytechnic, Ministry of Health, using hydrochloric acid (HCl) reagent and the Methanyl Yellow Test Kit (LabTest). Samples were considered positive when a red to purplish-red color change occurred. All samples tested negative for Methanyl Yellow, indicating good compliance with food safety regulations among local food vendors. Nevertheless, continuous surveillance, routine food testing, and public education remain essential to maintain food safety and protect public health.

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INTRODUCTION

Along with the increasing public demand for food products that are practical, have a longer shelf life, and are visually appealing, the food industry is required to produce products that are not only palatable but also possess good physical quality and storage stability. To meet these demands, manufacturers often incorporate food additives into their products. Food colorants are one category of food additives used to enhance the visual appearance of food products, making them more attractive to consumers. (1). When used within the established safety limits, food colorants generally do not pose a health risk to consumers. However, in reality, many parties, particularly producers and sellers, still misuse these substances (2). The use of hazardous food colorants refers to the practice of adding synthetic dyes that are not intended for human consumption into food products. These dyes are usually derived from industrial chemicals, such as Methanyl Yellow, which is intended only for coloring textiles, paper, or plastics (3). Although their use has been prohibited by regulatory agencies such as the Indonesian Food and Drug Authority (BPOM), these substances are still found in various types of food products, particularly traditional snacks, street foods, and food products without official supervision (4). A study identifying Methanyl Yellow found positive results in culinary snacks in Banda Aceh City (5), In addition, research conducted in the canteen of Rappokalling Elementary School in Makassar found food samples that were positive for Methanyl Yellow contamination (6). Another study analyzing Methanyl Yellow in fresh yellow noodles circulating in Pedongkelan Market, Kelapa Gading District, North Jakarta, found six samples that tested positive for Methanyl Yellow (7). These findings indicate that monitoring remains inadequate and that food business operators still have limited awareness regarding the dangers of using hazardous synthetic dyes. Yellow rice and noodle-based culinary products in Manado are also popular and widely sold in various locations, including traditional markets and surrounding areas.

METHOD

Research Design

This study employed a descriptive research design with a laboratory testing approach to detect the presence of Methanyl Yellow using a qualitative test method with the LabTest Test Kit and HCl reagent in yellow rice and fresh wet noodle samples sold in Manado City from November 2024 to May 2025. The sampling location was in Wenang District, Manado City.

Setting and Samples

The test samples were collected from the research location, and sample examinations were conducted at the Toxicology Laboratory of the Medical Laboratory Technology Department, Manado Health Polytechnic, Ministry of Health. The samples in this study consisted of yellow rice and fresh wet noodles sold in Manado City, with a total of 120 yellow rice samples and 30 fresh wet noodle samples. Sampling was conducted using a total sampling technique.

Measurement and Data Collection

Data collection in this study used primary data obtained from laboratory examination results using a qualitative test method with the LabTest Test Kit and HCl reagent to detect the presence of Methanyl Yellow in yellow rice and fresh wet noodle samples.

The examination using the LabTest Test Kit was performed by weighing 25 grams of the test sample, homogenizing the sample, and adding distilled water until a volume of 50 mL was reached. The mixture was stirred, then 3 mL of the solution was pipetted into a test tube, followed by the addition of 3 drops of LabTest kit reagent. The resulting color change was then observed. A positive sample was indicated by the formation of a light red to dark red or reddish-purple color.

For the HCl method, 25 grams of the test sample were weighed and placed into a beaker glass, then distilled water was added. The sample was stirred using a glass stirring rod. Subsequently, 5 drops of the sample solution were placed on a spot plate, and 5 drops of concentrated HCl solution were

added. The color change was then compared with a standard reference sample. A positive result indicating the presence of synthetic Methanyl Yellow dye was shown by a color change to purplish.

Data Analysis

The data obtained from the research results were presented in tables and described descriptively.

Figure 1. Yellow Rice Sample



Figure 2. Fresh Wet Noodle Sample



RESULTS AND DISCUSSION

This study was conducted using two laboratory testing methods, namely the LabTest Test Kit method and the HCl reagent method, to detect the presence of Methanyl Yellow in 120 yellow rice samples and 30 fresh wet noodle samples sold in Wenang District, Manado City. The examination results are presented in the following table.

Table 1. Results of Methanyl Yellow Examination in Yellow Rice and Fresh Wet Noodles Using the LabTest Test Kit

Sample Type	Results of Methanyl Yellow Examination using Test Kit Labtest	
	Positif	Negatif
Yellow Rice	0 (0%)	120 (100%)
Fresh Wet Noodle	0 (0%)	30 (100%)

Table 2. Results of Methanyl Yellow Examination in Yellow Rice and Fresh Wet Noodles Using HCl Reagent

Jenis Sampel	Results of Methanyl Yellow Examination Using HCl Reagent (n,%)	
	Positive	Negative
Yellow Rice	0 (0%)	120 (100%)
Fresh Wet Noodle	0 (0%)	30 (100%)

Based on these results, the 120 yellow rice samples and 30 fresh wet noodle samples tested qualitatively showed negative results, as there was no red or purplish color change observed, as shown in Figures 3 and 4.

Figure 3. Results of Yellow Rice and Fresh Wet Noodle Examination

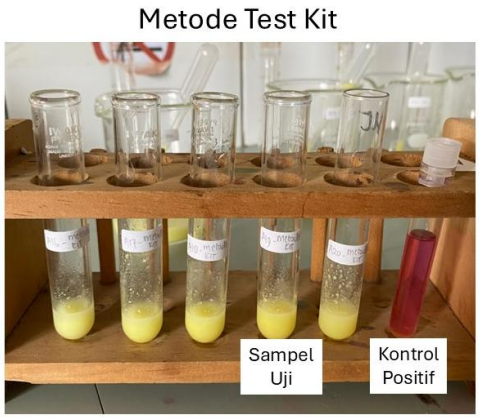
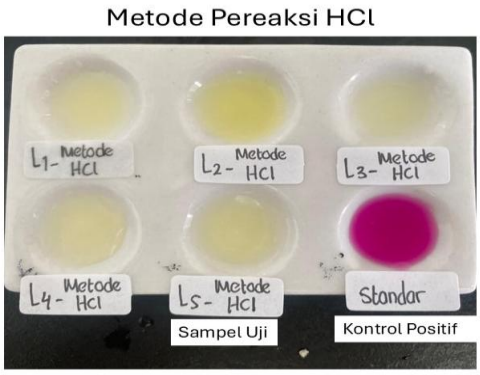


Figure 1. *Test Kit Labtest*



Figure 5. Results of Yellow Rice and Fresh Wet Noodle Examination



A total of 120 yellow rice samples and 30 fresh wet noodle samples were successfully collected (Figures 1 and 2) from the Manado City area. The samples were immediately transported to the laboratory for examination to determine the presence or absence of the illegal dye Methanyl Yellow. The laboratory examination methods used were qualitative testing using the LabTest Test Kit (Figure 4) and confirmation testing using hydrochloric acid (HCl) (Figure 5). The test results showed that the illegal dye Methanyl Yellow was not detected. The examination method provided only two result categories, namely positive or negative, present or absent, reactive or non-reactive, indicating whether or not a substance was present in the sample based on chemical reactions. Some qualitative tests do not produce numerical values because the results are only presented as positive or negative categories (9). Based on the laboratory tests presented in Tables 1 and 2, the results of Methanyl Yellow examination showed that the 120 yellow rice samples and 30 fresh wet noodle samples tested using the LabTest Test Kit did not contain Methanyl Yellow (Figure 3), as indicated by the absence of a red or purplish color change. The working principle of the Methanyl Yellow Test Kit is to react the sample with a specific reagent to detect synthetic dye compounds, which is indicated by a characteristic color change. The reaction with the reagent produces a red to purplish color due to the interaction between Methanyl Yellow and the acidic compounds in the reagent, which react with the azo group in the Methanyl Yellow structure. Tables 1 and 2 show the results of Methanyl Yellow examination in 120 yellow rice samples and 30 fresh wet noodle samples sold in Wenang District, Manado City, using HCl reagent. No Methanyl Yellow content was detected in the tested samples (Figure 5). The examination using HCl is based on a chemical reaction that causes a color change. This color change occurs due to protonation and cleavage of the azo bond in the Methanyl Yellow structure when exposed to a strong acidic environment, such as HCl. When Methanyl Yellow solution is treated with HCl, hydrogen ions from the acid react with the compound, causing the solution to change color into red or purplish (8).

These findings are consistent with several previous studies. One study that identified Methanyl Yellow content in yellow rice using a Test Kit around Krida Street and Parigi 7 Street, Manado City, examined a total of 8 yellow rice samples, and all samples showed negative results for Methanyl Yellow (10). In addition, a study analyzing Methanyl Yellow in fresh yellow noodles circulating at Pedongkelan Market, Kelapa Gading District, North Jakarta, found 6 samples that were positive for Methanyl Yellow (7). Furthermore, a study examining Methanyl Yellow content in 15 yellow rice samples from the campus area of Sam Ratulangi University, Bethesda Street, and Piere Tendean Street, Manado City, reported that all samples did not contain Methanyl Yellow (11).

Synthetic dyes are commonly used to improve the visual appeal of food products to attract consumers, as well as to stabilize color and mask color changes that occur during food processing. However, Methanyl Yellow is prohibited for use in food and beverages because it contains heavy metal residues that are highly hazardous to human health. Studies have shown that even at minimal doses and with long-term exposure, Methanyl Yellow can cause toxic effects on various organs, including degenerative changes in the gastric lining, kidneys, and liver, as well as negative impacts on reproductive organs (12). Therefore, the use of this dye should be avoided to prevent potential risks to human health.

CONCLUSION

This study showed that Methanyl Yellow was not detected in yellow rice and fresh wet noodle culinary products sold in Manado City.

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AUTHOR CONTRIBUTION STATEMENT

MVLT contributed to conceptualization, data collection, laboratory investigation, data analysis, and manuscript drafting. AJA supervised the study, contributed to study design, data interpretation, manuscript review, and served as the corresponding author. MEP and MJ participated in laboratory methodology development and validation. MNT, IMP, LAP, HAA, VDK, ASB, and SGTT contributed to sample collection, laboratory analysis, data curation, literature review, and manuscript editing. All authors reviewed, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

CONFLICTS OF INTERES

The authors declare that there are no financial, institutional, personal, or other conflicts of interest that could have influenced the design of the study, data collection, analysis, interpretation of the results, preparation of the manuscript, or the decision to publish this article.

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