



# The Correlation Between The Level of Knowledge of Traders With Rhodamine B Content in Snack Sauce Around Muhammadiyah University of Surakarta

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<p><b>Track Record Article</b></p> <p>Accepted: 27 December 2023 Revised: 4 March 2024 Published: 10 March 2024</p> <p><b>How to cite :</b> Nindyasari, J. B., &amp; Asyifiradayati, R. (2024). The Correlation Between The Level of Knowledge of Traders With Rhodamine B Content in Snack Sauce Around Muhammadiyah University of Surakarta. <i>Contagion : Scientific Periodical of Public Health and Coastal Health</i>, 6(1), 67–77.</p>	<p style="text-align: center;"><b>Abstract</b></p> <p><i>Food producers or sellers still useives such as prohibited dyes such as rhodamine B dye are still oeir products more attractive. There needs to be more traders' knowledge of the impact of using rhodamine B dye as a food additive. This research aims to determine the relationship between traders'ders' knowledge levehodamine B content in chili snacks around the Muhammadiyah University Surakarta campus. This research is quantitative research with an analytical observational research design with a cross-sectional approach. This research was conducted around the Muhammadiyah University Surakarta campus from October to November 2023. The population in this study was 40 traders. The sample in this research was 36 traders, determined using non-probability sampling techniques. A total of 36 sauce samples were tested using the Rhodamin Test Kit which was carried out at the Microbiology Laboratory of Muhammadiyah University, Surakarta. Data analysis using the Fisher Exact test processed with SPSS version 16 software. The results of identifying the rhodamine B content in 36 sample snack sauces around the Muhammadiyah University campus showed that two sauce samples were positive for containing rhodamine B, and there was no relationship between the level of knowledge and the rhodamine content B on chili snacks around the Surakata Muhammadiyah University campus (<math>p</math>-value=1.000). It is recommended to increase traders' understanding of applicable food safety regulations and standards and continue to update information regarding ingredients that can endanger consumer health.</i></p> <p><b>Keywords:</b> <i>Rhodamine B levels, Sauce, Knowledge, Traders</i></p>
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## INTRODUCTION

One of the most essential basic needs that people must meet is food. And another human right is food. According to Article 27, paragraph (2) of the 1945 Constitution, every Republic of Indonesian citizen is entitled to employment and a living wage that is suitable for people. Fulfilment of a decent livelihood for humanity can be done through food security and protection. In its context as a consumer, the public has the right to obtain protection from the circulation of unsafe food. Article 4 (a) of Law Number 8 years 1999 on Consumer Protection states that consumers have the right to comfort, security and safety in consuming goods and services (Lestari, 2020).

Food is a basic need that humans need at any time, anywhere, and anytime. Food needs to be managed correctly to provide good benefits for the body (Widyastuti et al., 2019). Food is categorized as healthy if it contains nutrients needed by the body, no toxins, and does not cause disease.

According to World Health Organization data, about 600 million people or 1 in 10 people in the world experience certain diseases caused by the consumption of unsafe food or contaminated with bacteria, viruses, parasites and hazardous chemicals and result in 420.000 people dying each year (WHO, 2022). Based on data from the Food and Drug Administration in 2022, about 234 samples (1.75%) of the samples tested indicated that the samples contained ingredients that are prohibited for use in food. Of the 234 samples, about 0.77% indicated that they contained formaldehyde, 0.59% indicated that they contained Rhodamine B, and the rest contained Borax and Metanil Yellow.

Food producers or sellers often use additives like colourants, sweeteners, preservatives, and flavourings. However, it is not uncommon for food producers or sellers to add prohibited food additives that are not in accordance with the regulations set by the government. Abuse of food additives is increasingly widespread due to public ignorance about colouring agents for food. On the other hand, prohibited food additives are easier to obtain because the price is relatively cheaper than the colouring agents allowed for food.

Based on the Decree of the Director General of Food and Drug Control Number 00386/C/SK/II/0 on certain dyes that are declared as hazardous substances in drugs, food and cosmetics, several dyes are prohibited from use because they adversely affect health and are usually used in the textile industry. The banned substances include Orange K1 (C.I. Pigment Orange 5, D&C Red No. 8), Red K.10 (Rhodamin B, C.I. Food Red 15, D&C Red No.19) and Red K11 (C.I 45170:1) (Hasanah et al., 2014).

Cilok and pentol are round snacks, made from starch with a little extra chicken or beef, and have a savoury and chewy taste. Traders around us often sell this food. Not infrequently, cilok or pentol is sold at a relatively cheap price. In serving, traders often use chilli sauce, tomato sauce or peanut sauce to add to the flavour. However, some producers still deliberately add rhodamine B as a red dye to the sauce (Fitriani Sannulia et al., 2019).

The large number of people interested in pentol and cilok meatballs has made traders start using food additives ranging from natural ingredients to chemicals. Based on observations around the Muhammadiyah University Surakarta campus, pentol or cilok meatballs are very popular with the public because they are cheap and have a distinctive taste when added to the sauce. Sauce is a flavoring that is often used as a complement to various types of food, including coloring, pentol, and meatballs. Sauce added to food will provide a taste that can increase appetite (Thalib, 2019; Sulistijowati et al., 2021).

The use of rhodamine B dye in food is inseparable from traders' knowledge of food colourings, both permitted and unpermitted dyes. The misuse of textile dyes by traders or food

producers, especially rhodamine B, is due to the relatively lower price of this dye than other food dyes. In addition, getting this dye is also very easy because it can be purchased at textile material stores. Until now, it is still often found that food traders or producers still use rhodamine B dye intentionally to obtain the desired colour so as to produce an attractive appearance.

From the results of interviews or initial reviews on snack food sellers, including cilok, pentol and meatballs, regarding banned food colouring rhodamine B, there are still many snack food sellers who do not know what is meant by rhodamine B dye and its impact on health. Based on this background, the researcher is interested in analyzing traders' knowledge level with rhodamine B content in snack sauces, especially cilok, pentol and meatballs around the campus of Universitas Muhammadiyah Surakarta.

## **METHODS**

This study used quantitative research with an analytical observational research design with a cross-sectional approach to determine the relationship between the level of knowledge of traders with Rhodamin B content in snack sauce around the campus of Universitas Muhammadiyah Surakarta. This study was conducted in October - November 2023 around the campus of Universitas Muhammadiyah Surakarta.

The population in this study were traders of pentol, cilok and meatballs located around the campus of Universitas Muhammadiyah Surakarta along Jalan Garuda Mas, Jalan Rajawali and Jalan Menco Raya, Pabelan, Kartasura District, Sukoharjo Regency which indicated the use of sauce containing additional colouring banned Rhodamin B as many as 40 traders.

The sample in this study was taken using a non-probability sampling technique. Non-probability sampling is a sampling technique that does not provide equal opportunities for each element or member of the population to be selected as a sample (Sugiyono, 2022). The saturated sampling technique is a sampling technique used by the author where all members of the population are sampled so the sample in this study totalled 40 traders. However, of these 40 traders, 4 traders were not willing to be sampled, so the final sample used in this study amounted to 36 traders.

The questionnaire in this study was used to obtain information about traders' level of knowledge about Rhodamin B banned food colouring. The results of the data test showed that the data were not normally distributed, so the Fisher exact test was conducted to determine the relationship between traders' level of knowledge and Rhodamin B content.

Furthermore, the sampling of ketchup was carried out to determine the presence or absence of Rhodamin B content in the ketchup used by traders. Samples of ketchup taken for testing were 36 samples. The samples were tested in the microbiology laboratory of Universitas Muhammadiyah Surakarta. After collecting the data, it will be processed using univariate and bivariate analysis using SPSS 16.0 software.

## RESULTS

This research was conducted around the campus of Universitas Muhammadiyah Surakarta with a total sample size of 36 and 36 sauce samples. Furthermore, based on the study results, data on the number of respondents based on the factors studied, namely the level of education, age, length of selling, knowledge, and rhodamine B content are in Table. 1 :

**Table 1. Characteristics of Respondents (n=36)**

Characteristics	Total	%
<b>Education</b>		
Not in school	1	3.0
Elementary School	1	3.0
Junior High School	9	25.0
High School	19	53.0
College	6	16.0
<b>Age</b>		
Mature (20-45 years)	30	83.0
Early Elderly (46-65 years)	5	14.0
Late Elderly (> 6 years)	1	3.0
<b>Length of Service</b>		
<1 year	12	33.0
1-5 years	14	39.0
6-10 years	4	11.0
>10 years	6	17.0

Based on the results of Table 1. shows that the respondents in this study have the highest level of education at the high school or equivalent level, namely a total of 19 people (53%), the age of respondents is dominated by adults from the age range of 20-45 years as many as 30 people (83%) and the most selling period is in the range of 1-5 years as many as 14 people (39%).

**Table 2. Distribution and frequency of knowledge level and Rhodamine B content**

Variables	Total	%
<b>Knowledge Level</b>		
Good	12	33.3
Less	24	66.7
<b>Rhodamine B Content</b>		
Positive	2	5.6
Negative	34	94.4

Based on Table 2. The research results show that, in terms of knowledge level, most respondents had good knowledge (66.7%), while in terms of Rhodamin B content test results, most respondents did not use Rhodamin B (94.4%).

Researchers identified the rhodamine B content in 36 samples of snack sauce. Based on the identification results, it is known that 2 samples of sauce are positive for rhodamine B. The results of identifying rhodamine B content in snack sauces around the campus of Universitas Muhammadiyah Surakarta are presented in Table 3.

**Table 3. Identification results of rhodamine B content in ketchup (n = 36)**

Number	Sample	Result	Description
1.	Sample 1	-	
2.	Sample 2	-	
3.	Sample 3	-	
4.	Sample 4	-	
5.	Sample 5	-	
6.	Sample 6	-	
7.	Sample 7	-	
8.	Sample 8	-	
9.	Sample 9	-	
10.	Sample 10	-	
11.	Sample 11	-	
12.	Sample 12	-	
13.	Sample 13	-	
14.	Sample 14	-	
15.	Sample 15	+	
16.	Sample 16	-	Negatif (-) :
17.	Sample 17	-	No faint purple ring on the surface of the
18.	Sample 18	-	tested sample
19.	Sample 19	-	Positif (+) :
20.	Sample 20	-	There is a faint purple ring on the surface of
21.	Sample 21	-	the tested sample
22.	Sample 22	-	
23.	Sample 23	+	
24.	Sample 24	-	
25.	Sample 25	-	
26.	Sample 26	-	
27.	Sample 27	-	
28.	Sample 28	-	
29.	Sample 29	-	
30.	Sample 30	-	
31.	Sample 31	-	
32.	Sample 32	-	
33.	Sample 33	-	
34.	Sample 34	-	
35.	Sample 35	-	
36.	Sample 36	-	

The identification of rhodamine B in the sauce was done with two repetitions. The results of the identification of rhodamine B content in snack sauce around the campus of Universitas Muhammadiyah Surakarta from 36 samples that were tested quickly using the rhodamine B test kit and it was found that two samples of sauce were positive for rhodamin B. This is not by the provisions of the Minister of Health Regulation Number 722/Minister of

Health/Per/IX/1988 on Food Additives, which states that rhodamine B is a hazardous substance and its use in food products is prohibited.

**Table 4. The relationship between the level of knowledge of traders and rhodamine B content in snack sauces around the campus of Universitas Muhammadiyah Surakarta**

Knowledge level	Rhodamine B Content				Total	P-value	
	Negative		Positive				
	n	%	n	%	n		%
Less	11	91.7	1	8.3	12	100	1.00
Good	23	95.8	1	4.2	24	100	
<b>Total</b>	34	94.4	2	5.6	36	100	

Based on Table 4, it was found that out of 36 respondents from the category of lack of knowledge and good knowledge, there was 1 respondent whose sauce sample was positive for rhodamin B. Based on the fisher test results, the p-value is 1.00 ( $p > 0.05$ ). This result shows no relationship between the seller's knowledge and rhodamine B content in snack sauce around the campus of Universitas Muhammadiyah Surakarta.

## DISCUSSION

Traders with a good level of knowledge amounted to 24 people (66.7%), while traders who were included in the knowledge level of the category less amounted to 12 people (33.3%). From the test results conducted on 36 samples of soy sauce, the results showed that there were 2 positive soy sauce containing rhodamine B which was characterized by the presence of a purple ring on the tested soy sauce samples.

In line with research conducted by Amelia et al., (2021) who analyzed the presence of rhodamine B in tomato ketchup circulating in the Palembang City market, showed that of the 18 ketchup samples tested, 12 samples changed colour from striking red to pale red, indicating that the 12 samples were positive for rhodamine B dye. Other research conducted by Dewi et al., (2021) who identified rhodamine B content in tomato sauce showed that of the 3 tomato sauces tested, there was 1 brand of sauce that was positive for rhodamine B.

These results are also in line with research conducted by Sujarwo et al., (2021), which examined the content of synthetic dyes that are not permitted in several food samples taken from around schools, exhibition venues and traditional markets and found that as many as 80% of the total food samples examined for hazardous food additives tests were mostly obtained from the school environment. The content of synthetic dyes used included Rhodamin B, Methanil Yellow, Borax and Formalin.

Other research conducted by Puspitasari et al. (2023) on the use of Rhodamin B in School Children Snacks traded around Laweyan State Elementary School showed that of the 27 samples studied, there were 4 samples of food products that were positive for Rhodamin B.

The presence of the purple ring in this test result is not very noticeable and is only faintly visible. According to the researchers' assumption, the presence of the faint ring indicates the presence of rhodamine B in small amounts. However, the use of rhodamine B itself is not recommended to be added to food, including in ketchup, because rhodamine B has a bad effect on health.

One significant amino xanthene dye that is frequently utilised in fluorescent dyes for a wide range of applications including glass, fireworks, paper, textiles, plastics, paint drawings, and coloured pesticides is called rhodamin B (RhB) (Nguyen et al., 2021; Ashfaq et al., 2023). Humans should not consume rhodamine B as it is known to irritate the skin, eyes, and respiratory system. Both people and animals can develop cancer from rhodamine B. It was categorised as a Group 3 carcinogen by the International Agency for Research on Cancer in 1978 and 1987 (Tatebe et al., 2014).

Moreover, rhodamine B is neurotoxic, genotoxic, and hazardous to animals over time. Additional test findings using animal models demonstrated that a three-month oral 1% rhodamine B diet caused significant liver enlargement and weight loss. At autopsy, the most notable abnormality found was liver enlargement. Studies on the metabolism of rhodamine B in vitro revealed that the liver deethylated it into three less harmful metabolites: Monoethyl-3,6-diaminofluoran, 3,6-diaminofluoran, and N,N'-diethyl-3,6-diaminofluoran (Cheng & Tsai, 2016).

Since rhodamine B (RhB) is a widely used organic dye in numerous chemical and biological processes, it was selected as the model dye. RhB also has a negative impact on the ecosystem, as seen by its long-term effects on aquatic life.<sup>22</sup> In many countries, it is used illegally as a food colouring even though it is known to be carcinogenic.<sup>23</sup> Before discharging wastewater containing RhB into the environment, it should be fully eliminated or broken down because RhB is stable in water across a broad pH range and is not biodegradable (Chin et al., 2018).

When food is processed using rhodamine B, it can lead to a number of health issues, including cancer, heart disease, kidney disease, liver dysfunction, hormonal imbalance, premature birth, lowered immunity, impaired nervous system development, mental health issues, learning disabilities, and cognitive abnormalities (Mohiuddin, 2019).

Rhodamine B is a dye prohibited from being used for food colouring, but many people still do not know this. Rhodamine B dye is generally widely used in the textile industry. However, it is widely used by traders because the price is relatively cheap. The colour produced by rhodamine B has brighter characteristics and is more stable in storage (Listiana, 2009).

Based on the bivariate analysis conducted on the relationship between the level of knowledge of traders with rhodamine B content in snack sauce around the campus of Universitas Muhammadiyah Surakarta, as many as 23 respondents (63.9%) who did not use rhodamine B had a level of knowledge in the good category, while as many as 1 respondent (2.8%) with a level of knowledge less known rhodamine B in the sauce used.

The results of the test of the relationship between the level of knowledge of traders with rhodamine B content in snack sauce showed that there was no relationship between the knowledge of traders with rhodamine B content in snack sauce around the campus of Universitas Muhammadiyah Surakarta as indicated by a p-value of 1.00 ( $p > 0.005$ ).

The results of this study are in line with the results of research conducted by Hidayah et al., (2017), the study analyzed the level of education and knowledge of mixed ice sellers about hazardous dyes with rhodamine B content in kolang-kaling fruit where the results of the analysis obtained no relationship between the knowledge of traders with rhodamine B content. In contrast to research conducted by Pramastuty et al., (2016) which showed a significant relationship between knowledge and the presence of banned dyes and preservatives in the hawker food studied.

According to the theory created by Bloom, known as Bloom's Taxonomy, knowledge is one of the cognitive domains in education. The level of knowledge is the lowest cognitive level or basic, where the purpose of this knowledge is generally related to a person's ability to remember things he has learned or recall (Swarjana, 2022). In the cognitive domain, knowledge involves an individual's capacity to recognize, understand, apply, analyze, reconstruct and assess certain information or concepts. Knowledge is an impression in the human mind that results from using the five senses. Knowledge is a knowledge or information about a subject that one person, or people generally, possesses using experience or study (Notoatmodjo, 2014).

Education and knowledge are intrinsically linked. In general, education is any deliberate attempt to persuade others individuals, organisations, or communities to act in a way that conforms to the expectations of those who are delivering it. Judging from the frequency distribution at the education level, respondents in this study had the highest level of education at the senior high school level, namely a total of 10 people. This shows that the respondent's level of education is quite high. Education is important in terms of shaping one's knowledge.

The higher the education, the broader the knowledge. Suhendi et al. (2009), in their research, stated that education is one of the things that can affect traders' knowledge about natural and synthetic dyes and dyes that are not permitted. Knowledge about food coloring is the trader's skill in choosing and using permitted dyes. Good knowledge about the use of



prohibited dyes is by the characteristics of education. Meanwhile, traders' lack of knowledge can be caused because they need to learn the impact or effects of using banned or non-banned dyes on health if consumed continuously, so they continue to use them for a long time.

Knowledge is a very important domain that will later shape the attitudes and behaviour of a person (Fajriansyah, 2018). Knowledge of traders regarding permitted and prohibited food additives will affect attitudes and behaviour in the use of food additives. In research conducted by (Handayani et al., 2016), the attitude of traders who disagree with using harmful synthetic dyes was followed by positive actions, namely not using harmful synthetic dyes.

Positive and negative attitudes are formed from the knowledge component. The more positive aspects of attitude are formed in relation to the use of special food synthetic dyes, the more knowledge about the use of special food synthetic dyes, it is expected that traders will have a more positive attitude towards the use of special food synthetic dyes. The intention to use special food synthetic dyes is manifested in an action or behaviour (Handayani et al., 2016).

## CONCLUSIONS

The results of the rhodamine B content test on 36 samples of soy sauce used by traders showed that 2 samples of soy sauce were positive for rhodamine B content. The results showed no relationship between the level of knowledge and rhodamine B content in soy sauce around the Universitas Muhammadiyah Surakarta campus.

The results showed Rhodamine B content in the snack sauce around the campus. Therefore, it is recommended to increase education and awareness about hazardous chemicals in food around campus. Good food policies include strict supervision of food additives, regular food supply inspection, and promoting safe and sustainable food production practices.

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