



IDENTIFICATION OF CYCLAMATE AMONG CONTEMPORARY DRINKS IN URBAN AREA OF MAMUJU REGENCY

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ABSTRACT

There are still many problems in the use of artificial sweeteners in Indonesia. Artificial sweeteners are still often used above the allowable threshold. Cyclamate is one of the sweeteners that is often used in Indonesia. Cyclamate has no caloric value and is difficult to absorb by the gastrointestinal tract. However, a number of variables hydrolyzed by bacteria in the intestinal tract can form cyclohexilamine which is a potential carcinogen. Two scientific studies linked cyclamate to the production of rat bladder cancer tumors which led to cyclamate being banned from use in many countries. This study was to identify cyclamate content among contemporary drinks in Urban Area of Mamuju Regency. This research was conducted in June – August 2022. The sample of this study is a contemporary drink circulating in the Urban Area of Mamuju Regency as many as 30 brands. The research method uses observational methods with a descriptive approach. Cyclamate content is measured using gravimetric methods. based on SNI 01-2893-1992 concerning How to Test Artificial Sweeteners. Data collection is carried out by taking samples of contemporary drinks and then checking the cyclamate content in the laboratory. The samples taken are drinks with the best-selling flavor variants in each brand. The measurement result is compared with the threshold standard. It is said to exceed the threshold if the weighing results are above 3 mg / L. This study was analyzed using descriptive analysis. All samples examined contained cyclamate with the lowest content of 1.19 gr/L and the highest at 237.9 gr/L and 24 brands of contemporary drinks containing cyclamate above 3gr/L. Conclusions: 80% of contemporary drinks circulating in Urban Area of Mamuju Regency contained cyclamate exceeding the threshold.

Keywords: artificial sweeteners; contemporary drinks; cyclamate

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INTRODUCTION

Health is something that is very valuable in one's life. Eating nutritious foods is one way to maintain a healthy body. While consuming foods that are not nutritious will have a negative effect on the body. Unsafe food poses a global health threat, endangering everyone. Every year at least 600 million people (about 1/10 of the world) who consume tainted food fall ill and 420,900 die (WHO, 2020). The use of food additives in the community is increasing in line with the development of the food processing industry in Indonesia. One type of food additive commonly used in the community is artificial sweeteners. Some artificial sweeteners have such a negative effect on health that their use is banned by the government. Food additives, including those permitted for circulation, can also be harmful to health if used in high quantities or doses (Alsuhendra & Ridawati, 2013). Cyclamate is an artificial sweetener with a high sweetness and low calories, and is a common sugar substitute for weight control

and diabetic patients. However, excessive consumption of cyclamate is associated with various health disorders, and is therefore banned as a food additive in many countries around the world (Liu et al., 2023).

Siklamat is one of the artificial sweeteners that are often used in Indonesia. Cyclamate has no caloric value and is difficult to absorb by the gastrointestinal tract. However, a number of variables hydrolyzed by bacteria in the intestinal tract can form cyclohexylamine which is a potential carcinogen. Two scientific studies prior to 1970 linked cyclamate to the production of rat bladder cancer tumors which led to cyclamate being banned in many countries (Britanica, 2021). Another study said the degree of liver damage in rats was higher following the higher the dose of artificial sweetener given (Utomo et al., 2012). There are still many problems in the use of artificial sweeteners in Indonesia. Although the maximum limit for the use of artificial sweeteners has been determined, the use of exceeding the maximum allowable limit is still often carried out by producers, food traders, and home industries that have not received guidance or counseling.

A study says, in Australia it is estimated that there are about 1004 kg of artificial sweeteners (cyclamate, aspartame, acesulfame, sucralose and saccharin) consumed every day (D. Li et al., 2020). The Padang City Food Office managed to find melons and candied kedondong fruit containing cyclamate with limits that exceeded the provisions (Republika.co.id, 2019). The West Sulawesi POM Center in 2019 found food samples containing excessive cyclamate sweetener (BPOM RI, 2019). Consumer protection through food safety is still an issue that needs attention. Many food products in circulation, including contemporary drinks, do not clearly state the content of chemicals including artificial sweeteners that pose a risk to public health.

One product that may contain artificial sweeteners is contemporary drinks. Contemporary drinks have recently been widely circulated in the city center of Mamuju Regency. This contemporary drink is available in various types of flavors and is very popular with the public. Based on the above, it is necessary to conduct research to analyze the artificial sweetener cyclamate in contemporary beverage products circulating in the community. The objective of this study is whether the cyclamate content in contemporary drinks circulating in the City Center of Mamuju Regency exceeds the threshold. This research needs to be carried out in order to prevent diseases associated with the use of food additives that are not in accordance with regulations.

METHOD

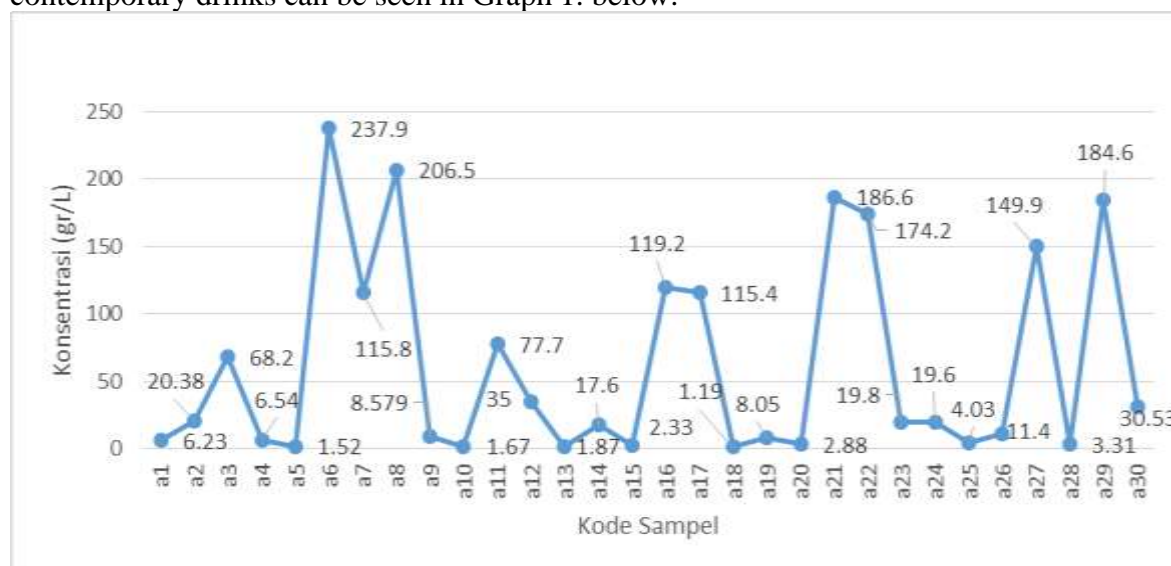
This study used observational method with a descriptive approach. This research was conducted in June – August 2022. The sample of this study is a contemporary drink circulating in the City Center of Mamuju Regency as many as 30 brands. Cyclamate content is measured using gravimetric method based on SNI 01-2893-1992 concerning How to Test Artificial Sweeteners. Data collection is carried out by taking samples of contemporary drinks and then checking the cyclamate content in the laboratory. The samples taken are drinks with the best-selling flavor variants in each brand.

Samples of contemporary drinks were taken as much as 50 ml and then added activated charcoal at the tip of a spoon then homogenized and allowed to stand for 30 minutes. Next, the sample is filtered and inserted as much as 10 ml into the test tube. Then into the test tube containing the sample added 1 ml of HCL 10% and 1 ml of BaCl₂ and allowed to stand for 30 minutes then filtered using whatman paper no.42. The filtrate attached to the whatman

paper is added 1 ml of NaNO₂ 10%. Then heated for 5 minutes using a hotplate at a temperature of 120 oC. then allowed to stand for 3 hours at room temperature. Samples containing cyclamate are characterized by the formation of a white precipitate. Filter the sediment with whatsmann paper no.42 then put the wahtsman paper containing the sediment into a cup that has been previously weighed then put it in the oven with a temperature of 1000C for 15 minutes, then put it in the desiccator for 30 minutes. Weigh whastman paper until a constant weight is obtained. Then the results are compared with the threshold standard. It is said to exceed the threshold if the weighing results are above 3 mg / L. This study was analyzed using descriptive analysis.

RESULTS

This study identified the content of cyclamate artificial sweeteners in contemporary beverages circulating in the City Center of Mamuju Regency using gravimetric methods based on SNI 01-2893-1992 concerning How to Test Artificial Sweeteners and compared with standards. The results of the analysis of the artificial sweetener content of cyclamate in contemporary drinks can be seen in Graph 1. below:



Graph 1. Concentration of Cyclamate Content in Contemporary Beverages in the City Center Mamuju Regency in 2022

Based on Graph 1. It can be seen that the lowest cyclamate level in sample a17 is 1.19 gr / L and the highest in sample a26 is 237.9 g / L. Based on the data from the results of the study, it was found that from 30 samples examined there were 24 samples exceeding the predetermined level of 3gr / L.

DISCUSSION

Health effects and food safety aspects are important issues for consumers. Some consumers are concerned about the safety of certain food additives. Sweeteners are one of the most contentious food additives. Sweeteners are considered potential high-consumption food additives due to their use in products consumed in large quantities, such as soft drinks (Mortensen, 2006). The safety of cyclamate artificial sweeteners for humans is not entirely clear, the threshold value for the presence of cyclamate in food in various countries varies. some countries such as America, India, Hong Kong and the United Kingdom have banned the use of cyclamate as a food additive (J. Li et al., 2017).

One type of soft drink that is rife in circulation in the community is contemporary drinks. Contemporary drinks have now become popular drinks throughout the world, including Indonesia. This drink is very much loved by teenagers and young adults. Contemporary drinks are part of a group of sweetened beverages that contain high levels of sugar and calories. The results of research conducted by Veornica MT and Ilmi IMB stated that 89.4% of the total 540 respondents of Depok and Jakarta students with an age range of 16-24 years liked to consume contemporary drinks (Veronica & Ilmi, 2020).

Currently the addition of chemicals to food and beverages is often done. With the development of an increasingly advanced era, it has resulted in changes in people's lifestyles to be instantaneous. This is what drives the development of the beverage industry. Based on this, eating the safety of instant food and drinks needs to be known, including the level of artificial sweeteners used. The samples in this study were 30 types of contemporary drinks with different brands sold in the City Center of Mamuju Regency.

Based on the results of a qualitative analysis on contemporary beverage samples, it is known that all positive samples contain cyclamate artificial sweeteners characterized by the presence of white deposits. This result is in line with research conducted by Mariana L and Sa'adah AR which states that all samples of 6 drinks sold on the roadside are positive for cyclamate (Marlina & Sa'adah, 2016). The results of research conducted by Setiawan, Egi Aldi et al also found that from 8 samples of school children's snack drinks, all of them contained cyclamate (Setiawan et al., 2016). The results of research by Rina et al also found that of the 10 samples of ice candle snacks examined, all of them contained cyclamate (Rina et al., 2020). Another study conducted by Luviriani E and Sari IP also found that 6 samples of unbranded milk powder on the market were positive for cyclamate (Luvriani & Sari, 2020).

Based on the results of the study, it was found that 80% of contemporary drinks circulating in the City Center of Mamuju Regency contain cyclamate above the threshold. This is in line with research conducted by Nurlailah et al who analyzed the cyclamate content in ice cream also found that 82% of samples were positive for cyclamate, the levels exceeded the threshold (Nurlailah et al., 2017). This indicates that the abuse of food additives, especially cyclamate sweeteners, still occurs around us. This research is also in line with research conducted by Handayani, T and Agustina, A which states that 5 out of 8 samples of instant powder drinks contain cyclamate that exceeds the threshold (Handayani & Agustina, 2015).

Research conducted by Maudu et al also stated that 7 out of 20 samples of school snack drinks contained cyclamate above the threshold (Maudu et al., 2019). Research conducted by Herman NO et al also found that 8 out of 10 samples of soy milk containing cyclamate all exceeded the threshold (Olivea Herman et al., 2020). Another study conducted by Luviriani E and Sari IP also found that 6 samples of unbranded milk powder on the market contained cyclamate that exceeded the threshold (Luvriani & Sari, 2020). Research conducted by Hartini and Simorangkir found that 6 out of 24 jam samples had cyclamate levels that exceeded the maximum allowable levels (H & Simorangkir, 2020).

Excessive use of sodium cyclamate can lead to health problems. Sodium cyclamate can be carcinogenic if consumed excessively and routinely for a long time (Nurlailah et al., 2017). Health problems caused by cyclamate are known as silent diseases, which are diseases whose effects will be felt for a long time (Jamil et al., 2017). Food additives or additive compounds will not be able to be processed / metabolized all by the body. Cyclamate will produce metabolism, namely cyclohexilamine compounds. This compound will remain intact until

excreted through urine. Although this cyclohexilamine compound is excreted through urine intact, but there will be something left behind and settles in the digestive system which can cause tumor growth. Many of these compounds settle in the digestive system in line with the consumption of many foods containing cyclamate (Marlina & Sa'adah, 2016).

Cyclohexilamine is toxic because it can cause cardiovascular disorders and can cause kidney damage (Huwaida, 2020). Cyclohexilamine may also cause chronic toxicity and bile cancer risk (Praja, 2015). In addition, consumption of sodium cyclamate in large doses can cause bladder cancer (Huwaida, 2020), the formation of free radicals that can create oxidative stress and can also cause an increase Leukocytes thus causing leukocytosis (Dewi & Woelansari, 2018). Research conducted on mice (*Mus musculus*) found that sodium cyclamate has an influence on the histopathology of the lungs, liver and kidneys (Habisukan, 1970). The higher the dose of artificial sweetener given to mice, the higher the degree of liver damage (Utomo et al., 2012). Mice are mammals that are most often used in a study because they are considered to represent animals from the mammal group and the completeness of organs, nutritional needs, reproductive system, respiratory, blood circulation, and excretion resembling humans (Wolfensohn & Lloyd, 2013).

Cyclamate intake that exceeds the threshold is thought to damage the liver and nervous system; especially in the elderly and children with weak metabolic detoxification abilities, as well as pregnant women (J. Li et al., 2017). In severe cases, it can even cause cancer or fetal malformations. Olenya, citing safety concerns cyclamate has been banned as a food additive in many countries around the world (Liu et al., 2023). Based on the dangers caused, the government needs to conduct strict supervision of the use of sodium cyclamate, especially in unbranded foods or beverages that are sold freely in the market in order to prevent negative impacts caused by cyclamate. In addition, it is necessary to disseminate information to contemporary beverage traders about the health hazards posed by the excessive use of Food Additives such as cyclamate (Luvriani & Sari, 2020). The rarity of regular hearings and laboratory tests on contemporary drinks circulating in the community is one of the factors that encourage deviations by producers. Therefore, people need to be more selective in choosing foods and drinks that are safe for consumption so as not to interfere with health (Handayani & Agustina, 2015).

CONCLUSION

80% of contemporary drinks circulating in the City Center of Mamuju Regency contain cyclamate exceeding the threshold

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